

SIMON FRASER UNIVERSITY
School of Engineering Science

To: **Members of Senate**

From: **John Jones, Senator**

Subject: **Commercialization of University Research**

Date: **23 November, 1999**

Motion:

"Senate deplores the recommendation, expressed in the report "Public Investments in University Research: Reaping the Benefits", that the commercialization of the results of research be made a part of the university's mission. Senate urges the government to reconsider and reject this report."

Rationale:

The federal government is currently contemplating a report "Public Investments in University Research: Reaping the Benefits" prepared by an Expert Panel on the Commercialization of University Research.

This report makes a number of recommendations concerning the funding of research and the ownership of the resulting intellectual property. The report is available at http://acst-ccst.gc.ca/acst/comm/home_e.html [Executive Summary attached.]

I believe that the report is deeply flawed, and that its implementation would do serious damage to Canadian universities and Canadian society. I urge you to read the report and, if you share my misgivings, to write to Tim Nau, Director, Communications, NSERC, tim_nau@nserc.ca.

The report recommends that 'innovation' be made a fourth mission of Canadian universities, on a level with teaching, research and community service; and that universities be required to give equal weight to innovation in tenure and promotion considerations. From reading the report, it is clear that 'innovation' is interpreted to mean 'commercialization'.

The chief problem with this recommendation is the obvious conflict between our traditional mission of creating and transmitting knowledge, and the proposed new goal of pursuing commercial profit. A researcher who publishes results in professional journals is pursuing the first goal; under the new policy, the researcher might chose to keep the results secret to maintain a competitive advantage, and still expect to be rewarded by tenure and promotion.

If the university is charged with pursuing commercialization, it is in an immediate conflict of interest: how to deal with research results that, although valid, would hurt

future sales? This is not a far-fetched scenario; the recent case of Nancy Olivieri, and the similar case of Betty Dong at UCSF, shows that it's all too probable.

Putting commercializability on a par with research merit in tenure considerations will skew our values: the development of a new video game now scores higher than the discovery of a new galaxy or a new species.

The report justifies this change in the mission of the university by noting that Canadian companies have a poor track record in commercializing university research. The change would thus enlist publically funded universities to increase the profitability of privately-owned companies. Throughout the report, there is an uncritical equating of 'maximizing social returns to Canada' with maximizing the profitability of Canadian companies. Although the report pays lip service to improving social conditions and the natural environment, there is no link between these goals and the policies proposed.

As John Ralston Saul and other commentators have noted, the prevalent ideology of the nineties is one of 'corporatism', that is, the unquestioned assumption that the public good is identical with corporate profitability. Historically, a major role of the universities has been to develop and articulate alternatives to the dominant ideology. The underlying thrust of this report is to bring the universities to heel as servants of corporatism.


John Jones
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Advisory Council
on Science and
Technology

Conseil consultatif
des sciences et de
la technologie

Public Investments in University Research: Reaping the Benefits

Report of the Expert Panel
on the Commercialization
of University Research

Canada

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Executive Summary

Canada's standard of living has been slipping relative to the standard of living in the United States and other countries over the last two decades. There are many reasons for this, and many different measures will have to be taken to reverse this trend.

This report is about one such measure. It proposes actions that will greatly increase Canada's ability to deploy the intellectual property created in university research to contribute to wealth creation in the Canadian economy. The proposed actions necessarily focus on university research supported with federal funds, but it is our hope that research supported with public funds from all other sources will be accorded the same treatment.

Universities are a very important element of Canada's innovation system. Their most visible contribution is in the education of people who acquire the knowledge and skills that enable them to contribute to their society in a great many ways. However, their contribution as centres of research is very important as well. The recommendations in this report are intended to strengthen the role of university research in Canada's innovation system.

The Focus and the Terminology

This report is focussed on just one element of the contribution of universities to Canada's innovation system, but one that we consider very important. It deals with the process for developing new goods and services for the market from those inventions and discoveries made by university researchers that are judged to have the potential for commercialization. We call this research-based innovation originating in the universities.

When we use the term "innovation" in this report we mean the following:

innovation: the process of bringing new goods and services to market, or the result of that process.

We will also refer to intellectual property resulting from federally funded research. We will explicitly exclude intellectual property created without federal funding, which should be left to the universities and the private sector to negotiate on a case-by-case basis. We will also explicitly not include in that term either journal articles or scholarly books written by university authors. There are established traditions and practices for dealing with scholarly publications, and it is not our intention to recommend that they be changed in any way.

In this report the term intellectual property will mean the following:

intellectual property (IP): an invention, discovery or new idea that the legal entity responsible for commercialization has decided to protect for possible commercial gain, based on the disclosure of the creator. This definition is intended to exclude journal articles and scholarly books, and IP created without federal funding.

This definition makes it very clear that we are interested only in those forms of intellectual property that can be protected for possible commercialization. It also underlines the fact that it is up to the creator to decide whether an invention, discovery or new idea is to be treated as IP. For example, a researcher who immediately publishes a discovery has made the decision that it is not to be treated as IP. Our recommendations do not infringe on researchers' rights to publish.

The Main Directions

Everything that follows begins with the people who create inventions, discoveries or new ideas in the course of their research at Canadian universities. We are acutely aware that their time is a scarce and precious resource.

The overriding objective of our recommendations is to increase the return to Canada on the investment in university research made by Canadian taxpayers. That goal is not in dispute. We believe that research-based innovation originating in universities has the potential to contribute much more than it does now in a form that is very important to all Canadians, namely well-paying new jobs.

We understand that most university researchers are not entrepreneurs, and that they do not want to learn how to become entrepreneurs in order to take a promising invention or discovery to market. They are skilled at research, and they believe that their time is used better in doing more research than in learning how to start a business. But we also understand that there may be some researchers who have the aptitude and taste for entrepreneurship, and who might be the best people to commercialize their own inventions. Our recommendations address the needs of both groups.

At issue is the commercialization of discoveries and inventions that are the result of research in Canada's universities. It is understood that a great deal of university research is basic research whose goals have nothing to do with the development of marketable products. Provided that basic research meets high standards of excellence, it is valuable in many ways. In the present context, it builds the foundation for important future innovations whose shape cannot even be foreseen today. And on the flip side of that same coin, it may show that certain lines

of industrial research and development (R&D) would be dead ends, thereby saving industry a great deal of time and money. However, publicly funded university research also produces discoveries and inventions that immediately show the potential to be developed into new goods and services for the market. Enhancing Canada's ability to obtain economic benefit from such results is the objective of the actions recommended in this report.

Canadian universities also engage in a great deal of project research in partnership with industry. The economic benefit from that research is more easily obtained, since the industrial partners share in the funding of the work in the clear expectation of a significant economic return. Innovation resulting from project research takes place through established channels, and is assisted by the eventual employment of research students who were engaged in the projects. This process is working so well across the country and in all sectors of the economy that it should be considered a national success. For this reason, we are not preoccupied with project research in this report, although some of our recommendations will have an impact in this area.

Let us now be very clear in stating the main goal of the proposed actions. It is to increase wealth creation in Canada; it is not primarily to produce new revenue streams for universities. The experience in the United States, which we use as a benchmark in this report, is that in the vast majority of research universities the revenues from commercializing research constitute a small addition to university budgets, generally well below 1 percent. It would not be realistic to expect much more in Canada. That amount of incremental income might be sufficient to provide useful incentives to the researchers involved, and to pay some of the cost of managing IP, but it could not be counted on to relieve the financial pressures that Canadian universities face today. Discoveries that produce financial bonanzas are so rare that policies designed to pursue them would almost always lead to failure.

However, if policies are designed to make university research the source of new value-added activities in the Canadian economy, we believe that the potential benefit is much greater. Canadian universities are a very important element of our national capacity for innovation. They perform 21 percent¹ of all Canadian R&D, account for 31 percent² of Canada's R&D personnel, generate 65 percent³ of Canadian scientific publications, conduct research of world-class quality, and train many highly skilled people

who can function at the leading edge of important technologies. That all adds up to a great potential to play a crucial role in the transformation of Canada's economy into one that thrives on innovation and value-added activities in all sectors. In return, greater prosperity in the nation, achieved with a visible contribution by universities, could be expected to produce increased public support for these institutions.

Recommendations

Our first recommendation makes explicit the expectation that if any commercial activity is created from the results of research supported by the Canadian public, that commercial activity must bring a benefit to Canada. Presently, university researchers are under no obligation to act in the national interest if they decide to commercialize IP created with federal funding.

It would be best if Canadian companies had the capacity to receive and make good use of all research-based innovations that come out of the universities. The benefit to Canada would come in obvious ways from the success of these companies. The Canadian receptor capacity is substantial, but not as extensive as it needs to be.

One way of increasing that capacity is to create spin-off companies to exploit university discoveries. That is being done with remarkable success in many cases, but more needs to be done.

However, in some markets it may not be practical to create Canadian spin-offs. Some technologies might best be brought to market through multinational enterprises that have Canadian operations. In such cases, negotiations to use IP to create a world product mandate for the Canadian operation would be a good outcome for Canada. At the very least, a significant number of value-added jobs based on the innovation should be created in Canada.

Benefit to Canada can also result if the IP attracts new foreign direct investment (FDI) to Canada. Federal and provincial governments have programs in place to attract FDI, and they should be called on for assistance.

One of the least desirable options is to license IP to a foreign company, with all the jobs and profits realized outside Canada, and to receive only a flow of licence revenue in return – if the licensee, in fact, decides to market the technology.

1. Statistics Canada, Estimates of Canadian Research and Development Expenditures (GERD) Canada, 1987-1998 and by Province 1987-1996. (Service Bulletin. Cat. No. 88-001-XIB, Vol. 22, No. 5. Ottawa, Canada, 1998).
2. Statistics Canada, Estimates of Research and Development Personnel in Canada, 1979-1995. (Science and Technology Working Paper No. ST-97-14, Ottawa, Canada, 1998).
3. Benoit Godin, Yves Gingras and Louis Davignon, Knowledge Flows in Canada as Measured by Bibliometrics (Working Paper prepared for Statistics Canada, Cat. No. 88F0006XPB No. 10, 1998).

The worst option, of course, is to do nothing and lose the potential benefit to Canada entirely.

Recommendation #1:

The federal government should require an explicit commitment from all recipients of federal research funding that they will obtain the greatest possible benefit to Canada, whenever the results of their federally funded research are used for commercial gain.

Our second recommendation urges the federal government to develop a coherent IP policy framework. The proposed policy should apply to all university researchers that receive federal research funding, regardless of their position or affiliation. That is to say, the policy should apply to faculty and students alike, including researchers working for universities and their affiliated hospitals, research institutes and Networks of Centres of Excellence (NCEs).

The ownership of IP is an important and controversial issue. Presently there are a number of approaches to determining IP ownership:

- a. in many universities the creator(s) own IP from federally funded research and can commercialize it how they wish, be they faculty, graduate student or post doctoral fellow;
- b. in other cases the creator(s) own the IP but are required to assign it to the university to manage the commercialization process; and
- c. in yet other cases, universities own IP and manage the commercialization process.

Advocates of each approach can point to successes. However, some of the people who have the most experience commercializing the results of research have pointed out lost opportunities and other problems that are caused when creators commercialize research results.

The Panel strongly believes that university ownership of IP (either in the first instance or through assignment) would greatly increase the number of commercialization opportunities emanating from university-based research. The Panel also believes that the benefits arising from these commercialization opportunities must be shared with the creator(s) of the IP. University researchers do not need to own IP in order to benefit from successful commercialization undertakings.

Canadian universities are no strangers to innovation based on research results. Many good practices have been developed and many successes have been achieved. What has been achieved in research-based innovation in Canada, has been done in an environment of laissez-faire by the federal funding agencies, under varied and inconsistent university policies and practices, and under many different organizational arrangements. Rarely has innovation been treated as a mainstream university function, and the importance attached to it varies greatly among the universities. Moreover, university researchers cannot generally be certain that their efforts in innovation will be supported or recognized by the university in the same way as traditional academic work. Our recommendation addresses these problems.

Recommendation #2:

In order for researchers to qualify for federal research funding and universities to qualify for commercialization support, universities (and their affiliated research hospitals and research centres) should be required to adopt policies consistent with the principles set out below:

- 1. Universities (and their affiliated organizations) must recognize the importance of research-based innovation as a mainstream activity by identifying "innovation" as their fourth mission, in addition to teaching, research and community service; alternatively, they might explicitly identify innovation as an element of the three missions, as appropriate.*
- 2. All IP with commercial potential (excluding books and journal articles) that was supported in whole or in part with federal funding, must be promptly disclosed by the researcher to the university. Researchers who do not comply will be denied access to future federal research funding.*
- 3. All IP with commercial potential (excluding books and journal articles) that was supported in whole or in part with federal funding, must be disclosed annually by the university to the federal government, provided that such information is not subject to the Access to Information Act.*
- 4. All IP created from research that was supported in any part by federal funding is owned either by the university or by the researcher(s) who created it. In those universities where the ownership of such IP resides with the researcher(s), the IP must be assigned to the university for possible commercialization (subject to appropriate sharing of benefits – see item 9).*
- 5. Universities (and their affiliated organizations) must make reasonable efforts to commercialize IP that they have found to have innovative potential. They must make reasonable efforts to maximize the benefits to Canada by deploying IP in the interest of generating increased wealth for Canada.*
- 6. Universities can assign IP back to the creator under the following conditions: when the university has decided not to pursue commercialization; when the university has been unsuccessful in commercializing the discovery within a reasonable time frame; or when the university and the IP creator both agree that the creator can maximize benefits to Canada without undue conflict of interest.*
- 7. Universities can assign IP to firms when this is considered necessary to ensure the success of the innovation.*
- 8. Universities can assign IP to NCEs, affiliated research hospitals and affiliated research institutes when the university and the assignee both agree that the assignee can maximize benefits to Canada without undue conflict of interest.*
- 9. Universities (and their affiliated organizations) must provide incentives to encourage their faculty, staff and students engaged in research to create IP. These incentives must include appropriate sharing of net benefits from successful commercial undertakings whether in the form of equity or licensing income. These incentives must also include appropriate recognition of innovative researchers in tenure and promotion policies.*
- 10. Universities (and their affiliated organizations) will encourage the participation of small and medium-sized enterprises and, where appropriate, support the creation of spin-off companies in commercializing publicly funded research. Small businesses, including local spin-off companies, will be given priority to license innovations, dependent on finding appropriate businesses and equitable terms.*
- 11. Universities (and their affiliated organizations) must make reasonable efforts to license or assign innovations locally or nationally. Whenever possible, licensing should be to a Canadian company or a Canadian subsidiary of a foreign company. Commitments to Canadian value-added must be obtained when foreign licensing is the only feasible route.*
- 12. The university must designate a senior officer responsible for innovation arising from its research, and establish an organizational capacity to carry out its innovation function.*

Universities will likely require two years to modify their existing policies, or create appropriate policies in cases where none exist.

The proposed policy framework for managing federally funded IP is a necessary, but not sufficient, condition for success. Additional funding is also required to help universities strengthen their capacity to take advantage of an improved IP management regime.

We recognize that many university researchers are frustrated with the level of support presently available to them by university commercialization offices. If they are expected to assign IP to universities, it is critical that these offices be properly resourced, and staffed with people who are able to manage the innovation process efficiently and effectively. We need to develop world-class commercialization offices that generate high returns to Canada, and in the process generate higher returns to university researchers than they could achieve on their own. The Panel is convinced that once these offices create wealth among researchers, the culture within Canadian universities will change quickly and innovation will become a real priority.

Recommendation #3:

The federal government should invest new and additional resources to strengthen the commercialization capacity of universities in an amount equal to 5 percent of its investment in university research. This new funding is to be invested in the commercialization function and must be additional to the university's current spending. To be eligible for commercialization grants, universities should be required to adopt policies consistent with federal policy requirements (Recommendation #2), submit annual reports of their innovation performance and submit annually updated innovation strategies to the federal Granting Councils. These reports should reflect the shared priorities and performance of the university and its affiliated research organizations.

Money alone, however, will not enable university commercialization offices to achieve their full potential. Canada has a skills challenge that must also be addressed. We do not have an adequate pool of people with the skills required to commercialize research. The report offers specific proposals to develop the talent that university commercialization offices require. Part of the solution is to provide opportunities for existing staff to network and share best practices. A national networking forum might also enable universities to more readily identify opportunities for bundling IP.

Recommendation #4:

With the new funding proposed in Recommendation #3, universities should make the commitment to use their educational resources to develop the people with the necessary entrepreneurial, business and technical skills required to increase the number of successful innovations created from the results of university research. The federal Granting Councils should add to this effort by helping to create national and regional networks to share knowledge, expertise and best practices in this area.

Successful innovations based on university discoveries or inventions may often require the formation of spin-off companies. This is much more likely when the innovation arises from basic research than when the innovation arises from project research conducted in partnership with an existing company. A spin-off requires new investments at a level far greater than the original public investment in the research. A spin-off also requires the commitment of very skilled people aside from the researchers, most notably entrepreneurs and managers who are experienced in building research-based companies.

It is also important that business conditions support the growth of established companies that form strategic alliances with universities since most technology transfers involve existing companies.

Without supportive business conditions, Canada is very unlikely to reap the benefits of discoveries and inventions arising from university research funded by the public. If any innovations are produced from them, they will probably be produced somewhere else.

Recommendation #5:

The federal Department of Finance is encouraged to undertake a wholesale review of Canadian tax policy to ensure that it does not impede and, where possible, supports research-based innovation. (Specific proposals are contained in the report.)

To increase the potential of Canadian universities to contribute to our economy through research-based innovation, the federal and provincial governments should work together to increase the time that university faculty have for research, and to improve the tools with which they work. This involves building further on the measures taken by the Government of Canada in the last three federal budgets to increase research funding. It also requires

a concerted collaboration of the federal and provincial governments to deal with the indirect costs of research and with the basic funding of the universities that is the biggest factor in determining the workload pressures on faculty and staff.

Recommendation #6:

Governments should increase their investment in university research. They should also resolve, on an urgent basis, situations where universities have difficulties conducting research when federal funding is provided, but when limited provincial support is available for the associated indirect costs.

None of our proposals, on their own, will position Canada to maximize returns on its investment in research. Taken together, however, we believe that the recommendations contained herein would have a dramatic effect in fuelling the Canadian economy and generating social and economic benefits for years to come.