Association of Universities and Colleges of Canada | Association des universités et collèges du Canada

AUCC submission to House of Commons Standing Committee on Industry, Science and Technology

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Established in 1911, the Association of Universities and Colleges of Canada represents 92 Canadian public and private not-for-profit universities and university-degree level colleges. Our mandate is to foster and promote the interest of higher education, both within Canada and abroad.

Introduction

Canadians' standard of living depends increasingly on our competitiveness in the global knowledge economy. To maintain and enhance the standard of living Canadians currently enjoy, we must secure our position among the world leaders in research. Universities educate the highly qualified researchers who are increasingly in demand across the economy; and the university sector is the only sector that performs research for all other sectors. Universities account for more than one-third of the national research effort in Canada – a higher proportion than in all other G-7 countries. University research is more geographically dispersed than private sector and government research in Canada, and consequently plays a critical role in the economic and social development of all regions of the country.

University research is a Canadian success story, but this was not always the case. Investments over the past decade by successive federal and provincial governments of all stripes and by universities themselves have turned Canada from a country at risk of experiencing a major "brain drain" to one that is benefiting from a "brain gain".

These have included investments in each of the four foundational elements of university research: the production of new ideas; the development, attraction and retention of highly qualified research talent; the acquisition and operation of cutting edge research infrastructure; and the provision of essential institutional support for the research effort. While significant, Canada's gains in university research over the past ten years remain fragile. Our competitors in the G-7 and newly emerging competitors like Russia, China and India are investing heavily in research – including university research – to increase their competitiveness in the global race to attract high-paying jobs, research talent and investment.

In February 2007, AUCC submitted a series of proposals to the government related to the development of a science and technology strategy for Canada. AUCC called for the development of a strategy that would ensure the conditions for excellence in university research, develop new research talent and promote enhanced collaboration and linkages among universities, government and the private sector. AUCC welcomed the release in May 2007 of the federal Science and Technology Strategy, with its call for more partnerships and its commitment to maintaining Canada's G-7 leadership in public research and development performance.

The federal S & T Strategy outlines three Canadian advantages that it intends to foster: a People Advantage, a Knowledge Advantage, and an Entrepreneurial Advantage. To maximize these advantages, Canada will need to overcome several major challenges. This country's universities are key partners in addressing these challenges and are prepared to work with other sectors to develop the talent, basic research, applied research and commercialization Canada requires to compete in the global knowledge economy.

The S & T Strategy reinforces the importance of all four foundational elements of university research. Balanced investments in all four elements are essential to maintain and increase our competitiveness in university research. As well, the S & T Strategy places considerable emphasis on developing private sector research and commercialization capacity while maintaining Canada's leadership in public R & D performance, and on identifying research areas where Canada can be a world leader, while also acknowledging the need for broad strength in basic research.

This brief to the House of Commons Standing Committee on Industry, Science and Technology puts forward AUCC's ideas for the ongoing implementation of the S & T Strategy and discusses AUCC's perspective on the four principles outlined in the S & T Strategy.

Implementing the S & T Strategy

Ultimately, the success of the S & T Strategy will depend most fundamentally on people – on the development, attraction and retention of talented individuals with research skills. Universities are committed to helping Canada build the best-educated, most-skilled and most flexible workforce in the world, as called for in the S & T Strategy.

Talent

Over the next decade, we expect the knowledge economy to create significantly more jobs for advanced degree holders. Furthermore, retirements of advanced degree holders currently in the labour market will generate large scale replacement demand. A number of analysts and industry and government leaders have identified the relative under-production of graduate degrees in Canada as a barrier to increasing our international competitiveness and productivity. Canada's key international competitors are awarding proportionally more graduate degrees. For example, in 2005, American universities awarded twice as many master's degrees per capita (in the 25 to 35 year-old cohort) as Canadian universities and 30 percent more doctoral degrees per capita than their Canadian counterparts. The OECD reports that Canada trails far behind the leading nations in terms of doctoral graduates.

Over the past two decades, the Canadian economy generated a significant number of jobs for people with post-graduate degrees – primarily master's and PhD graduates – an increase of more than 90 percent. During this period, Canada did not produce nearly enough advanced degree holders to meet this job growth and relied increasingly on immigrants who had completed advanced degrees elsewhere to fill the gap.

In future, the knowledge economy is expected to create even more jobs for graduates with advanced degrees. As well, retirements will create additional demand for advanced degree-holders. By 2016, AUCC estimates that the combination of job growth and replacement demand will generate employment opportunities for more than 500,000 graduates with advanced degrees. Even if Canada is able to maintain currently high levels of immigration of advanced degree-holders, their net contribution to employment levels will only be about 150,000 over the decade (assuming current labour force participation and emigration levels for these immigrants). To make up the difference, domestic production of advanced degree holders will have to increase by more than 35 percent over the next decade. After stagnating in the mid-1990s, full-time master's and PhD enrolment has risen rapidly from 65,000 students in 1996 to 102,000 students in 2006. This is a 57 percent increase over the decade, with most of that growth having taken place since the fall of 2000.

As an immediate priority, Canada must recruit more domestic students into graduate programs and attract more top international graduate students to fuel Canada's pipeline of highly qualified personnel. In this regard, AUCC was pleased to see the creation of the new Georges Philias Vanier Graduate Scholarships for top Canadian and international doctoral students announced in the 2008 federal budget.

Direct Costs of Research

The government's economic plan*, Advantage Canada* recognized the important role that university-educated researchers play in knowledge transfer in the Canadian economy:

"The research undertaken at Canadian universities creates new ideas and technologies that enrich our economy and society. Internationally renowned Canadian research in fields such as health,

information and communications technologies, energy and environmental technologies helps to solve social and environmental problems. As recent graduates enter the labour market, they transfer this new knowledge from universities to businesses. World-class Canadian research also creates exactly the kinds of jobs we need to be a leader in key economic sectors."

Investment in the direct costs of research, through the three federal research granting agencies, is crucial and Canada will need to increase these investments significantly to maintain our G-7 leadership in public research investment over time – a key facet of the S & T Strategy's knowledge advantage. Further, these investments help develop the people advantage as approximately 30 percent of faculty research grant support flows to graduate students and, in some cases, undergraduate students who benefit from participation in the research projects.

Institutional Costs of Supporting Research Excellence

The least visible and least understood of the four foundational elements of university research is support for the institutional or "indirect" costs of research. It must be remembered that there are real costs that universities must meet to create the conditions for research excellence. These include the costs of operating and maintaining research facilities; managing the research process, from preparation of proposals to accountability and reporting; complying with regulatory and safety requirements; and managing intellectual property and promoting knowledge transfer.

The federal government currently pays a portion of these institutional support costs through the Indirect Costs Program. It is important that these costs be fully covered at internationally competitive levels for all Canadian universities in order to derive the full value of other federal investments in university research. Under the current program, the overall rate of reimbursement is in the range of 25 percent of direct costs – approximately half of the average rate negotiated in the U.S. AUCC welcomed the recent funding increase of $15 million to the Indirect Costs Program in the 2008 federal budget. However, the overall rate of reimbursement has remained nearly constant at 25 percent. This is far short of the minimum rate of 40 percent required if Canada's universities are to provide internationally competitive conditions to support research excellence.

Research Infrastructure

Continued federal funding for cutting-edge research infrastructure is a crucial element in creating and maintaining the knowledge advantage. Infrastructure is critically important to the productivity of researchers and the success of many of the projects for which they are receiving support. World-class research infrastructure is essential for educating students, attracting and retaining researchers, and building "critical mass" in the context of research and innovation clusters. It can also serve wider communities through networking – for example, high performance computing and broadband networking are key to enhancing productivity and expanding the range of research that can be done and the problems that can be solved in many fields.

The Canada Foundation for Innovation is the primary vehicle through which federal support for research infrastructure is delivered. It normally funds 40 percent of a project's costs with provincial governments, research institutions and private sector partners funding the remaining costs. CFI employs a rigorous competitive process that draws on top experts from across Canada and from abroad to assess project applications.

As a result, CFI has funded a wide range of excellent and highly innovative research infrastructure projects and enjoyed broad based support across Canada. CFI's contributions to

Canada's university research effort have attracted attention from around the world. AUCC is pleased the 2007 federal budget renewed funding for another round of competitions through CFI.

Further, infrastructure can be fully and efficiently utilized only when the operating and maintenance costs are adequately covered. This has been a problem in Canada, particularly in relation to a number of the very large-scale research infrastructure projects that have been undertaken in recent years. Examples include the Canadian Light Source project in Saskatoon, the Research Icebreaker the Amundsen, the Sudbury Neutrino Observatory and the NEPTUNE project in Victoria. CFI's Infrastructure Operating fund has been a partial source of such funding, but in general, the handling of operation and maintenance of these projects has been far too *ad hoc* with project managers sometimes forced to cobble together operating funding from a variety of sources on a short-term basis. AUCC is supportive of a long-term solution to the funding issues related to the ongoing operating costs of big science projects.

Responding to the S & T Strategy's four principles

Promoting World-Class Excellence

AUCC agrees with the federal government's contention that, "In today's fiercely competitive global economy, merely being good is not good enough." The marketplace for graduate students and professors is both highly competitive and global in nature. Universities across the country know that they must constantly compete and improve if they are to succeed. The peer-reviewed and competitive nature of the federal research granting councils and CFI encourages researchers to achieve excellence across a broad range of disciplines. In its recent report entitled *The State of Science & Technology in Canad*a, the Council of Canadian Academies points to Canada's research strength across a broad array of disciplines, particularly as measured in terms of published research. AUCC believes the training of the next generation of researchers and providing for the emergence of new areas of excellence will require continued nurturing of this solid base of research strength that Canada enjoys in a wide range of areas and ensuring that all regions have research capacity. Excellence and rigorous peer review must remain central to federal investments in research but, at the same time, research excellence is not associated only with some specific areas of research or geographical locations.

Focusing on Priorities

AUCC supports the government's plan to continue to play an important role in supporting basic research across a broad range of disciplines while at the same time enhancing success by targeting more basic and applied research in areas of strength and opportunity. A "bottom-up" approach to priority-setting is already well-underway in this country. The Canadian system allows for substantial autonomy and flexibility, in which universities and researchers can be and arguably, are – encouraged to be entrepreneurial and innovative in finding, creating, and pursuing opportunities.

In part, as a result of the requirements of both the CFI and the Canada Research Chairs program that universities develop research plans, the institutions have been encouraged to identify developing areas of strength – including areas that are relevant to the circumstances and economies of the regions and provinces, as well as national priorities. In preparing our brief to the federal government in anticipation of the S&T Strategy, AUCC reviewed 69 of these institutional research plans. While the institutions identify a wide range of research strengths and priorities, consistent with the Council of Canadian Academies' finding that Canada enjoys research strength across a broad range of disciplines, it is also interesting to note that there was a strong correlation between areas of particular concentration across the institutional research plans and the four

macro areas of Canadian research strength identified in the CCA report – i.e., natural resources, information and communications technologies, health and related life sciences, and environmental S & T. All four of these areas were identified as priorities in the S & T Strategy.

Encouraging Partnerships

Canada has made significant strides in recent years in developing research linkages between universities and the private sector. Canada is first in the G-7 for the share of private sector research investments going to universities and second in the G-7 for the share of university research funded by the private sector. Over the period 1996 to 2006, investments by the private sector in university research grew by 168 percent. Since 2001, the private sector has increased its investments in university research at a rate four times faster than investments in its own research.

Despite these improvements, more can be done to enhance university-private sector linkages (as well as those with the public and not-for-profit sectors), particularly in relation to knowledge transfer. In knowledge transfer and in applying the results of research, clusters are increasingly important, both in Canada and around the world. While much of the focus has been on clusters that have been built up within larger communities and regions, it has still been possible for many smaller communities in Canada to create more focused clusters in specific areas and for linkages to be made across Canada on specific areas of excellence.

Universities play a key role in clusters, both through their regular programs and their research in general, and also through centres, institutes, and research and innovation parks that bring university researchers together with researchers and applications-focused personnel from other sectors. Investments in research infrastructure have, in many cases, been useful as "magnets" in helping to build up key research capabilities in areas important to the clusters.

Since the inception of the Networks of Centres of Excellence (NCE) program in 1988, networking has become a key element of Canada's research and innovation policy. Over the years, close to thirty NCEs have emerged as convincing examples of how to mobilize scientific excellence between academia, federal and provincial departments and agencies, and the private sector through commercial objectives and public-private collaborations. AUCC welcomed the government's decision to build upon the NCEs to strengthen links between postsecondary institutions and the private sector and to create the new Centres of Excellence for Commercialization and Research.

Enhancing Accountability

Canadians expect and deserve to see the benefits of public investments in university research. AUCC is committed to improving the visibility, accountability and transparency of federal investments in university research. In 2005, AUCC released *Momentum,* our first periodic public report on the impacts of university research in Canada. We will be releasing a new edition of *Momentum* in October of this year. This latest edition will focus on partnerships, in particular what Canadian universities are doing, both nationally and internationally, with governments, innovative businesses, the not-for-profit sector and the international community. *Momentum is* one of our many ongoing efforts to communicate to decision makers and Canadians the importance of university research and its contribution to Canada's economic and social well-being.