Universities, governments and industry: Can the essential nature of universities survive the drive to commercialize?

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Having spent 40 years in universities, I have had sufficient time to consider some of the idiosyncrasies, foibles and problems of these academic institutions. The purpose of this editorial is to discuss the current state of university research and explain why I find some aspects of the current situation disturbing. Changes that started during the second half of the 20th century and that have continued into the 21st threaten to bring about fundamental changes in the nature of universities. Some of the changes are commendable, for example, the large expansion in the proportion of the population attending universities, at least in the richer nations. Other trends are disturbing, especially the increasing tendency of governments and industry to view universities as engines for short-term economic gain. While universities certainly cannot ignore the context in which they function and the needs of society, responding purely to short-term economic considerations threatens to subvert the very nature of universities and some of the benefits they provide to society.

So what exactly is a university and what is its purpose? I much prefer the Oxford English Dictionary definition of the word "university" to some of the more utilitarian definitions in other dictionaries. The Oxford definition reads, in part, "whole body of teachers and scholars engaged in the higher branches of learning." Thus, it is the community of faculty and students that is the essence of a university. The higher branches of learning in which teachers and scholars engage have 2 important products: the educated minds that are essential for the well-being of society, and new knowledge and ideas. Some of that new knowledge will enrich society by producing economic growth, directly or indirectly, but the benefits of new knowledge go far beyond economic gain.

Universities have always been subjected to outside influences. The oldest European university, the University of Bologna, has existed at least since the 1080s. Some time before 1222, about 1000 students left Bologna and founded a new university in Padua because of "the grievous offence that was brought to bear on their academic liberties and the failure to acknowledge the privileges solemnly granted to teachers and students."[1] The outside interference came from the Roman Catholic Church, and, for several centuries, Padua was home to the only university in Europe where non-Catholics could get a university education. Both Bologna and Padua were student-controlled universities with students electing the professors and fixing their salaries. However, in spite of marked differences, there are similarities between what happened then and what is happening today, with important outside influences — then the dogma of religion, now the dogma of business — threatening to change the activities of the community of teachers and scholars.

The seeds of what is happening now were sown in the years following World War II. Before the war the most important influence on a faculty member was probably the departmental chair, who in those days had power to influence in an important way what went on in the department. Nonetheless, a faculty member would have had access to departmental resources and would not necessarily have required outside research funding (although such funding was sometimes available from private foundations). The mechanism of funding research, and the amount of money available for research, changed greatly in the postwar years. In 1945, Vannevar Bush's landmark report to President Harry Truman, *Science the Endless Frontier*,[2] had an important influence on university research. In this report, Bush stated, "The publicly and privately supported colleges, universities, and research institutes are the centers of basic research. They are the wellsprings of knowledge and understanding. As long as they are vigorous and healthy and their scientists are free to pursue the truth wherever it may lead, there will be a flow of new scientific knowledge to those who can apply it to practical problems in Government, in industry, or elsewhere." Bush supported the idea that the US government should provide strong financial support for university research, but also

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supported the idea that the individual investigator should be the main determinant of the topics for investigation, with statements such as "Scientific progress on a broad front results from the free play of free intellects, working on subjects of their own choice, in the manner dictated by their curiosity for exploration of the unknown."[2]

In the latter half of the last century, many countries adopted the model of granting councils, which used a system based on peer review to distribute money for investigator-initiated research. This model has been a great success, but it has also contributed to important changes in universities. Much more money has been available to support medical research, basic science research and engineering research than has been available for the social sciences or arts. Thus, decisions about support for different disciplines devolved from the universities to governments, who decided on the budgets of their various grant-giving bodies. Also, individual researchers who were successful in obtaining grants no longer depended as much on departmental facilities. In my opinion, this not only weakened the power of departmental chairs but also decreased collegiality within departments.

With increased enrolments, as a university education became accessible to a greater proportion of the population, and an increased need for infrastructure for the larger student population and for complex research equipment, administrators became more concerned about sources of funding and consequently more detached from the faculty. There is always a tendency for senior academic administrators to speak and behave as though they *were* the university (when of course they are there to serve the community of teachers and scholars). This is of course a normal human trait, no different from the tendency of politicians to forget that they are elected to *serve* the people. However, this increasing detachment of senior university administrators from the faculty has facilitated the erosion of collegiality within departments and universities. The individual personalities of university faculty probably also facilitated this change. I learned recently, when looking at the literature on personality, that an inverse correlation between intelligence and conscientiousness has been demonstrated in a number of studies (see, for example, Moutafi et al[3]). Thus, it might be more than just my paranoia leading me to believe that the small proportion of university faculty who lack conscientiousness and collegiality is larger than in some other walks of life. The erosion of collegiality is not a matter of great significance, except that it probably played a role in making researchers more open to the efforts of governments to transform them into entrepreneurs.

The most recent and possibly the most important change in university research resulted from the push by governments to commercialize the results of such research. In the United States, the Bayh-Dole Act of 1980 encouraged universities to license to private industry discoveries made with federal funds.[4] The push by governments for commercialization of new knowledge grew during the 1980s and 1990s and continues to have an important influence on universities. Recently, Lord Sainsbury, the science and innovation minister in the United Kingdom, boasted that there had been a cultural change in universities there, which has resulted in a substantial increase in university spin-offs.[5] In 2002 the Association of Universities and Colleges of Canada entered an agreement with the government to double the amount of research performed by these institutions and to triple their commercialization performance by 2010.[6] Although this agreement was reached in the absence of any broad consultation with the faculty who are supposed to commercialize their work, the universities seem to be well on track to achieve this objective, with a 126% increase in revenues from licence royalties between 1999 and 2001.[7] Most major universities now have a technology transfer office, and at many universities success in commercialization is taken into account when faculty are considered for tenure. Will there come a time when success in commercialization carries the same weight as (or more weight than) teaching and research in the awarding of tenure?

The end result of all the changes discussed above is that individual faculty members have become much more like entrepreneurs whose main allegiance is to the maintenance or growth of their own research programs and not infrequently to the commercialization of their research. The researcher exploring Vannevar Bush's "endless frontier" could be considered the modern equivalent of the homesteader taming the seemingly endless frontier of the 19th century American West.[8] This is not necessarily detrimental if a new generation of university research entrepreneurs provides the new knowledge that will benefit patients and society. However, the change in culture that made university faculty more like entrepreneurs also made them more open to the desire of governments to make them entrepreneurs in the economic sense. Although the nature of universities has been changing, there was no threat to the fundamental nature of universities until the drive for commercialization began.

A recent report of the Canadian Association of University Teachers[9] states that university administrators have been "building increasingly hierarchical management structures" that "place the future of academic medicine in danger." The report's main concern is that "incentives to create commercializable products push economic concerns, rather than scientific and ethical considerations, to the forefront."[9] In the fields of biologic psychiatry and behavioural neuroscience the emphasis on commercial applications has already, to some extent, moved research priorities away from an emphasis on mental well-being to an emphasis on commercial products. There are many examples of this shift. For example, more research is being carried out on antidepressant drugs than on psychotherapy, even though in mild to moderate depression (the majority of cases) drugs and psychotherapy are approximately equal in efficacy. There is increasing evidence for the efficacy of exercise[10,11] and fish oils[12,13] in the treatment and prevention of depression. However, these strategies receive much less attention than antidepressant drugs. Even an established antidepressant treatment such as *S*-adenosylmethionine (SAMe)[14] receives little attention. Searching the abstracts of the 2004 meeting of the Society for Neuroscience, I found 179 with the key word "antidepressant" and only 4 with the key word "*S*-adenosylmethionine," and none of those 4 was concerned with the antidepressant action of

SAMe. SAMe is a major methyl donor and seems to work in a fundamentally different way from any product being investigated by drug companies. Surely we could expect that an antidepressant acting through a different mechanism would be a popular topic of investigation. However, SAMe is a natural product and not of commercial interest. Similarly, insights into what exercise or fish oils do to the brain may provide important insights into the pathophysiology of depression and its treatment, but these subjects receive little attention.

Many basic science researchers investigating the mechanisms of antidepressants produced by drug companies do not receive funding from those companies. However, enough are lured by drug company research funds into working on topics of interest to the companies to significantly influence what are fashionable topics of research. Laboratories with funding from industry can often afford more trainees, who may then adopt a more industry-centred approach in their own research. While the availability of funds from industry has certainly influenced research, the pressure on university faculty to commercialize the results of their research will undoubtedly cause even greater distortion in the areas of research that are most popular.

Granting agencies have increasingly tried to foster research in neglected areas by allocating funds to specific areas of research and requesting applications in those areas. Although this approach is certainly necessary, it has not done much to alter the effects of drug company money on research output. Also, in some ways it moves research even further away from the ideal in Vannevar Bush's report that "Scientific progress on a broad front results from the free play of free intellects, working on subjects of their own choice, in the manner dictated by their curiosity for exploration of the unknown."[2] This model was notably successful in the last half of the 20th century, but it may not survive the pressure to commercialize. While there is still much scope for curiosity-driven research, the curiosity of researchers is likely to be aligned increasingly with the interests of drug companies. As mentioned above, a cultural change has accompanied the increasing commercialization of university research. The pressure to commercialize has been critiqued in some quarters, but many university faculty have nonetheless embraced commercialization, or at least remained unconcerned about it. Are we far from a time when a researcher without a patent that is being commercialized will be regarded in the same way as those who do not publish regularly in the top journals? And how long will it be before governments make commercialization a mandate of granting councils and a requirement for the majority of grants?

A fascination with the workings of the brain and how it can malfunction in mental illness is the usual motivator for researchers in neuroscience and psychiatry research. As a result, curiosity-driven research will always tend to serve the best interests of patients. Although research driven by commercial interests will certainly benefit psychiatric patients in some ways, it cannot serve their overall needs, as it is much too narrowly focused. The designation of funds by granting agencies for specific neglected topics will help but is unlikely to produce any large changes in the direction of research. Thus, the biggest losers from the pressure to commercialize will be psychiatric patients. In addition I am concerned whether students who are trained to focus on the short-term commercial implications of their research will be able to maintain the breadth of vision that is a characteristic of the majority of creative researchers.

Changes due to pressure from governments to commercialize are not limited to researchers. The increased emphasis on commercialization in universities has in some ways distorted the perceptions of senior university administrators about the purpose of the institutions. For example, there seems to be a lack of concern about some of the sources of funds that universities receive. Universities now hold patents on many life-saving drugs. These patents sometimes limit access to the drugs, particularly in low-income countries.[15] In Canada, one-quarter of the faculties of medicine receive funding from the tobacco industry.[16] Perhaps a suitable future definition of a university will be a "whole body of teachers and scholars engaged in turning ideas into profit."

In 13th century Italy the response to interference by the Roman Catholic Church in the work of scholars was a move to another location to escape the interference. In the 21st century that option is not available even to the minority who are concerned about the drive to commercialize. However, the picture is not entirely bleak. Charitable foundations will remain immune to commercial interests. In addition, even though charitable foundations will probably remain relatively small players in the funding of research, there are promising signs. For example, the Bill and Melinda Gates Foundation, created in 2000, has an endowment of about US$27 billion and is striving to use its money for the benefit of humankind in areas neglected by governments. This foundation is not involved in psychiatric research, but its focus on preventive approaches may help to direct interest to that important area. Research on prevention in psychiatry is still in its infancy and will certainly remain that way if short-term commercial considerations stay paramount. However, charitable foundations cannot be expected to have any large effect on the change in university culture brought about by the drive to commercialize. Although I would like to be able to end this editorial on a more hopeful note, I am concerned about these cultural changes, and I do not see any solution. Still, one lesson from history is that the communities of teachers and scholars making up universities have adapted to many changes over the centuries without changing the fundamental nature of universities, and they will surely continue to do so. I am just not sure how.

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