

The New Corporate Identity of the American University

by Sheldon Krinsky

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Universities are adaptive institutions. They resonate with and adjust to the political and economic events taking place around them. The nature and extent of the adaptations, and the degree to which they alter established academic norms and practices, is a subject of continuing interest and concern. During this century, American universities have undergone profound changes. Prominent among these are the emergence of government sponsorship of scientific research, the institutionalization of academic freedom through the creation of the tenure system for professors, the establishment of classified military research,

and the beginnings of formal university-industry ties. One can generally find a correspondence between periods of greatest change within academe and fluctuations at the national scale such as war, economic and social transformation, or scientific/technological revolution.

Over the past decade, the American research university has been undergoing a gradual but significant transformation that brings it to a new stage in its evolution. The transformation reveals itself as a closer coupling between universities and industry, in values, mission, institutional structure, and the consciousness of their workforces.

Some have argued that the changes taking place within academia do not represent a qualitative departure from past practices. Moreover, they claim the critics of university-industry ties exaggerate the negative impacts and neglect the reciprocal benefits to both institutions.

My own analysis leads me to very different conclusions. First, I consider the changes taking place within universities as they develop closer ties to the corporate sector to be of great significance. The new corporate-academic partnerships have resulted in a crisis of identity for those academic institutions that have dared to give the issue serious

reflection. Among the questions being raised are: Whose interests does the university serve? What is the purpose of research? Does corporate sponsored research distort the university's primary mission and force the abandonment of widely accepted norms?

Second, there are reasons why university-corporate relationships have intensified at this historical juncture. The changes have been fostered by government policies, the world economy and a technological revolution. In other words, the factors driving this transformation are external to and in large part beyond the control of the academic sector.

Third, I do not believe that these changes are temporary or of little consequence to the culture of university science. The new academic-corporate partnerships have created novel structures for financing research that make universities less dependent on federal grants. If these financing arrangements prove successful for a first generation of institutions, they will serve as a model for a much broader representation of the university community. The long term consequence of these financial partnerships will be a new balance between public and corporate sponsorship of academic research ultimately affecting the direction and composition of research programmes in the basic and applied sciences.

The new structural accommodations by the university that allow it to benefit from closer links to the corporate sector are beginning to affect the ethos of science. Norms of acceptable behaviour within the scientific community are being modified. What was previously a sharp demarcation between academic and industrial science has become blurred.

Faced with a more complex environment than existed in the first half of the century, the modern university has evolved into an institution of multiple personalities. Each of its several personalities is useful to the fulfillment of certain ends. Each embodies a vision about the authentic role of the university in American society. Conditions external to the institution may throw off the balance between the different interests. Typically, there is internal debate and a new equilibrium is established. In the course of the struggle, certain traditional values may be lost. But the loss is generally rationalized as a requirement for survival or as a compromise that serves the national interest.

I shall start by exploiting the metaphor of multiple personalities within a single organism. Applied to the modern research university, the metaphoric

personalities are used to signify principles of institutional identity. The principles describe an institutional mission and provide a clarification of social and professional responsibility. Conflicts that arise over university-industry connections often reflect different values between one or more of the four models of institutional identity. The anthropomorphic metaphor of multiple institutional personalities allows us to understand the emergence of periods where latent contradictions are revealed as explicit antagonisms involving academic goals and practices.

Four personalities of the modern university

Classical form: knowledge is virtue

According to its classical identity, the university as ivory temple gives primary emphasis to teaching, basic research, and the critical examination of cultural traditions of civilization. It is a place where knowledge is respected and pursued for its intrinsic value. Science is nourished by free and open exchanges of information. Individuals are free to choose research problems. There is no place for proprietary knowledge. The classical university is not designed to serve any social or political purpose. Knowledge is viewed as ideologically neutral. Science serves no master and is

bound by the norms of universal co-operation.

Foundation of industrial society: knowledge is productivity

The primary function of the university is to provide the personnel and intellectual resources for industrial development. To ensure that a nation maintains its competitive edge over other economies, universities must provide a steady stream of new scientific and technological knowledge. Free and open exchanges in science that threaten industrial leadership are justifiably controlled. Universities exist mainly to help industry turn knowledge into technology, technology into productivity, and productivity into profits.

The guiding principle of the industrial-academic mind is technology transfer. Knowledge has not fulfilled its function unless it can contribute to the productive capacity of the industrial economy. Some U.S. universities, notably Rensselaer Polytechnic Institute, Georgia Institute of Technology, Carnegie Mellon University and the Massachusetts Institute of Technology, have developed the industrial side to their identity by forging exceptionally close relationships with the private sector, providing excellent opportunities for faculty to patent discoveries, and, in the process, adopting some of the norms of corporate institutions.

Résumé

Quatre traits de personnalité du système universitaire américain sont examinés à l'aide de métaphores données à l'identité institutionnelle. Les multiples facettes de la personnalité de l'Université incluent: sa forme classique, selon laquelle "le savoir est vertu"; son rôle de pierre angulaire de la société industrielle selon laquelle "le savoir est productivité"; sa contribution à la défense nationale grâce à laquelle "le savoir est sécurité"; et sa fonction d'investissement social où "le savoir est justifié par l'intérêt public". L'article examine les changements qui sont apparus au sein de la recherche universitaire contemporaine au fur et à mesure qu'elle a développé des liens de plus en plus étroits avec le secteur profit et redéfini son identité institutionnelle. Les manifestations de cette transformation sont illustrées par les liens académiques —corporatifs en biotechnologie. La commercialisation de l'Université est causée par des facteurs macro-économiques qui résultent en de nouvelles politiques et de nouvelles formules de financement de la recherche. Empressée, entre autres, par la position faiblissante des Etats-Unis par rapport à d'autres pays, l'administration Reagan a stimulé l'investissement du secteur privé dans la recherche académique. Les résultats de ces politiques sur l'université sont, entre autres, la commercialisation de la biologie et des changements dans la structure normative de la science. Un principe de confidentialité limitée remplace la circulation libre de l'information; on a mis l'accent sur le support de l'entrepreneurship des facultés; et les universités se sont accommodées de nouveaux conflits d'intérêts. L'influence corporative est aussi en train de remplacer l'injection de fonds publics dans de larges secteurs de la recherche académique. L'attention des hommes de science et des administrateurs universitaires s'est tournée vers les bénéfices économiques de la recherche.

Academe and national defence: knowledge is security

Since World War II universities have been aiding the country's national defence effort. Some view university research laboratories and the scientists who manage them as a national defence resource, not simply during periods of national emergency, but under normal circumstances. To cultivate this resource, Congress created DARPA (Defense Advanced Research Projects Agency) as one of the main tributaries of Department of Defense support for basic research. The willingness of universities to allocate their intellectual resources for the development of weapons varies greatly, particularly between those that are willing to perform classified research and those who forbid it.

Faced with extensive research opportunities through the newly proposed Strategic Defense Initiative (SDI) or "Star Wars" programme with estimates of multi-billion dollar Department of Defense research budgets, universities will be under enormous pressure to

renegotiate their classification restrictions. University policies against classified research represent an important barrier blocking fulfillment of the national defence model of academic institutions. SDI officials remain confident, however, that scientific expertise is available to the highest bidder and under conditions specified by the benefactor. For example, when asked how his agency decided what basic research gets funded, James A. Jonson, head of SDI's basic science programme, referred to the "Golden Rule": "Ye with the gold, rule." In other words, the military views the intellectual capital within the university strictly from a market perspective.

Universities as social investments: public interest science

Universities have an essential and direct public interest function. Social resources are invested for social benefits. Science and technology must be steered by institutions accountable to the people in the interest of major sectors of the society. Targeted programmes like the

"war against cancer" were based upon the premise that the federal government could achieve a distinct public purpose, namely, the elimination of a dread disease.

There is another side to the public interest function. University scholars are a public resource. They are called upon to assess complex social, economic and technological problems. All agencies of government depend upon an independent academic sector to render honest and competent analyses of problems.

The four images of institutional identity exist as part of the modern research university. Some universities express one of their multiple institutional personalities more aggressively than others. Universities willing to permit classified Department of Defense research do so at the expense of their classical identity by compromising traditional scientific norms. At times two or more personalities provide mutual support. Weapons research may be

Canada's Universities: Under Fire and For Hire?

In the accompanying article, and in an equally insightful companion piece published in 1985,¹ Sheldon Krinsky shows that corporate priorities are shaping fundamental changes in the nature of university-based scientific research in the United States, and in academics' perception of their relationships with clients outside the university. An article published last year in *Canadian Dimension*² pointed to the development of a similar trend in Canada, citing as an example the 1983 establishment of a group called the Corporate-Higher Education Forum (CHEF), composed of "university presidents and senior executives of major Canadian corporations" including Northern Telecom, Xerox Canada, Shell Canada and the Royal Bank. A recent article in the *Globe and Mail* quoted the current chairman of CHEF (also the chairman of Mutual Life Assurance Co. of Canada and chancellor of Hamilton, Ontario's McMaster University) as saying that: "Previously, universities had virtually complete autonomy over their own agenda. . . . Now they have to negotiate program planning with corporate donors. There's an enormous sense of apprehension about how that's going to change universities."³

CHEF is far from alone in seeking to introduce corporate priorities into university decision making. The Science Council of Canada was once the generator of thought-provoking studies like *Canada as a Conserver Society*. Now an unabashed advocate for industrial growth at any cost, the Council has conceded in its plan for a study on "Canadian Universities and Economic Renewal" that: "Teaching and basic research are major roles of the university, and must remain so. but as knowledge replaces raw

materials as the primer of the world economy," according to the brochure explaining the study, "the university's role in creating wealth — too often under-rated — becomes crucially important. . . . Canada's future prosperity increasingly depends on designing effective ways to integrate the university and the marketplace."⁴

At least one corporate official has made a more explicit pitch for "integrating the university and the marketplace." William Cochrane, Guaranty Trust's senior vice-president of corporate services, recently argued that "all professors should be obliged to develop revenue-generating projects as part of their responsibilities . . . a professor's ability to generate funds should be one of the conditions of tenure." While admitting that this might be far easier for faculty in some disciplines than for those in others, he claimed that accepting tenure "without accepting personal responsibility for the university's financial viability is irresponsible . . . Each university faculty should be able to catalogue the expertise of its members and then market those talents for fees or grants to corporations or other clientele."⁵ The University of Toronto, Canada's academic legend in its own mind, last year appointed Imperial's vice-president for corporate business development and technology, as a special advisor to its president. According to *University Affairs*, the new appointee (whose "salary will be paid by Imperial Oil" but who "will work out of an office on the U of T campus") will advise the president "on a broad range of issues such as planning and budgeting, corporate fundraising, corporate relations, and the university's involvement in the federal government's new matching grants scheme for research."⁶

rationalized as a public interest role of academic institutions while extravagant financial incentives represent the essential motivation. The concept of multiple institutional personalities helps to draw attention to the adaptive function of universities and the internal struggles that take place over institutional roles. In the next phase of the analysis I shall discuss the emergence of a new corporate identity in America's research institutions.

Manifestations of the new corporate identity

Less than a decade ago, the start of a new corporate influence on academic institutions could be observed. The changes taking place are a significant departure from previous periods when corporate-academic relationships developed. The current wave of corporate-university affinities is revealing itself in three modes. First, universities are entering long term agreements with major corporations that define a research programme, provide funding for

basic/applied science, and offer a corporate sponsor exclusive rights to market discoveries. Second, universities are developing their own corporate-like structures to profit from campus discoveries. Third, an atmosphere has developed that encourages faculty to play the roles of academic scientist and entrepreneur concurrently. Here are some of the indicators of the transformation that is underway:

- In 1978 industry funding of university research constituted less than 3 percent of the total university budget. In 1982, industry contributions rose to between 6-7 percent of university research and development.²
- The academic fields of biochemistry, genetics and molecular biology have been intensely commercialized. There has been a dramatic shift in the attitudes of biologists toward commercialization of knowledge.
- A sizable number of multi-million dollar grants have been negotiated between universities and corporations.

The intense competition between major corporations staking a claim to U.S. science is a new phenomenon.

- Many universities have established new and aggressive policies for monitoring and patenting faculty discoveries.
- Universities have invested in companies started by one of their current faculty who also holds a managerial position in the firm.
- A relatively new kind of arrangement in university-industry relationships which has emerged is the establishment of a non-profit buffer to funnel contract research money and royalty payments between the university and the company.³
- Foreign corporations have begun to negotiate sizable research contracts with American universities.
- Some universities have started for-profit firms to licence and market technologies.

Any one of these developments standing in isolation might not warrant the

Clearly, only large and wealthy firms like Imperial (Canada's largest oil company and the Canadian subsidiary of Exxon, the world's largest oil company) can afford to buy access to the priority-setting processes which go on within universities. Unions cannot afford to do so; neither can the single mothers half of whom live below Canada's poverty line, the homeless, or any number of other constituencies both organized (like environmentalists) and unorganized whose priorities ought arguably to be given at least as much attention in decisions about what universities do and how they do it. But how serious, in practice, is the corporate threat to Canadian universities' independence? The March, 1987 *Globe and Mail* article cites some examples which may be of particular concern to environmentalists, like the University of Guelph's attempt to set up a gravel pit on farmland it owns, and the fact that its "long-standing financial and research relationship with the agricultural chemical industry has spawned a 16-hectare 'technobusiness park' in which private sector and government tenants will lease university land on which to build laboratories and other agribusiness facilities."⁴

Overt or institutionalized censorship of faculty activities is likely to remain infrequent. The real assault will be far subtler, and far more effective. For instance, decisions about faculty appointments, promotion and tenure may give growing weight to the probable attractiveness of the candidate's research to corporate sponsors. And on many campuses, senior administrators are already chosen not just for their ability to provide much-needed academic leadership, but also for their ability to act as fund-raisers. Yet university faculties must themselves accept much of the blame for the current situation. Consistent underfunding of universities by the federal and provincial governments which, in Canada, provide the lion's share of university budgets has created the financing crisis which has led to aggressive pursuit of corporate grants and contracts. In a magnificently scathing article which is probably the best single piece written about the plight of

Canada's universities, a member of the *Toronto Star's* editorial board has noted that despite the financial crunch, Canada's universities have been remarkably reluctant to become the "high-profile problem-solvers"⁵ for all elements of society which would lend credibility to the claim that their familiar functions of teaching and scholarship deserve expanded support without associated obligations to any particular economic interest. Understandably, therefore, financial support for universities tends to rate relatively far down most governments' lists of political priorities. Universities are seen as "just another vested interest competing for scarce resources,"⁶ and one without a strong constituency or a convincing case.

Alternatives welcomes the comments of readers about the changing mandate and priorities of Canadian universities, an about how these changes will affect the future of environmental concerns in Canada.

— Ted Schrecker

Notes

¹ S. Krinsky, "The Corporate Capture of Academic Science and its Social Costs," *Genetics and the Law III*, ed. A. Milunsky and G. Annas (New York: Plenum Press, 1985). See also M. Kenney, *Biotechnology: The University-Industrial Complex* (New Haven: Yale University Press, 1986).

² H. Buchbinder and J. Nelson, "Universities 'For Sale': the need for an alternative vision," *Canadian Dimension* 20(1), March 1986: 21-24.

³ J. Harris, "Cash-starved universities nervously wooing business," *The Globe and Mail*, March 30, 1987: B1, B10.

⁴ "Winning in a World Economy" [brochure] (Ottawa: Science Council of Canada, 1987).

⁵ "Make professors pay their way," *The Globe and Mail*, November 3, 1986:A7.

⁶ "Corporate executive joins U of T as special adviser," *University Affairs*, October 1986: 7.

⁷ Harris, *op.cit.*, p. B10.

⁸ K. Warden, "Universities must make their own case for public and government support", *CAUT Bulletin*, April 1986: 8.

⁹ *Ibid.*

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interpretation that the modern research university is undergoing a transformation. However, the combination of these indicators makes a strong case that a new corporate-academic identity is gaining hegemony and widespread social acceptance over the classical identity. Concurrently, universities are also building stronger bonds with the Department of Defense. While this is equally an important trend that threatens to eliminate certain classical academic traditions, it will not be the subject of this paper.

What are some of the effects of the new corporate personality? The direct outcomes are additional sources of income for universities and their research faculty, more direct control of academic research by corporations, new restraints on the flow of scientific information, and special forms of entrepreneurship for academic scientists. More subtle changes can be found in the consciousness of scientists. A new attitude about the proper role of the academic scientist is emerging. Entrepreneurship is not simply tolerated or seen as a denigration of one's purer pursuits, it is now viewed as another milestone in one's professional career.

For the corporate model of academia, scientific discovery takes on a dual significance consisting of truth and economic value. There will always be many things to discover in nature. Science,

after all, is an endless frontier. Why not pursue truth that bears economic value? Will the intellectual pleasures be any less? Slowly, the reward structure changes. Scientists who can generate patentable discoveries are afforded a new status within their institutions — producers of marketable knowledge.

Milestones in the corporate transformation of academia

The following are a few examples of the trend toward a new identity. The illustrations cite shifts from classical values and indicate the seeds of a modified normative structure of scientific research.

Washington University and Monsanto entered into an agreement in 1982 whereby the company has agreed to provide the university with \$23.5 million for research over a five year period. Under the contract, scientists at Washington University must present manuscripts to Monsanto so that the company can review the results for patentable materials prior to publication.⁴ In addition, faculty members have to sign confidentiality statements in which they agree not to disclose proprietary information. All funding must be approved by an internal peer review system consisting of four Monsanto employees and four Washington University School of Medicine Faculty. The programme director must be approved by Monsanto. Thirty percent of the funds are allocated to basic research; 70 percent are directed at applied research.^{5,6}

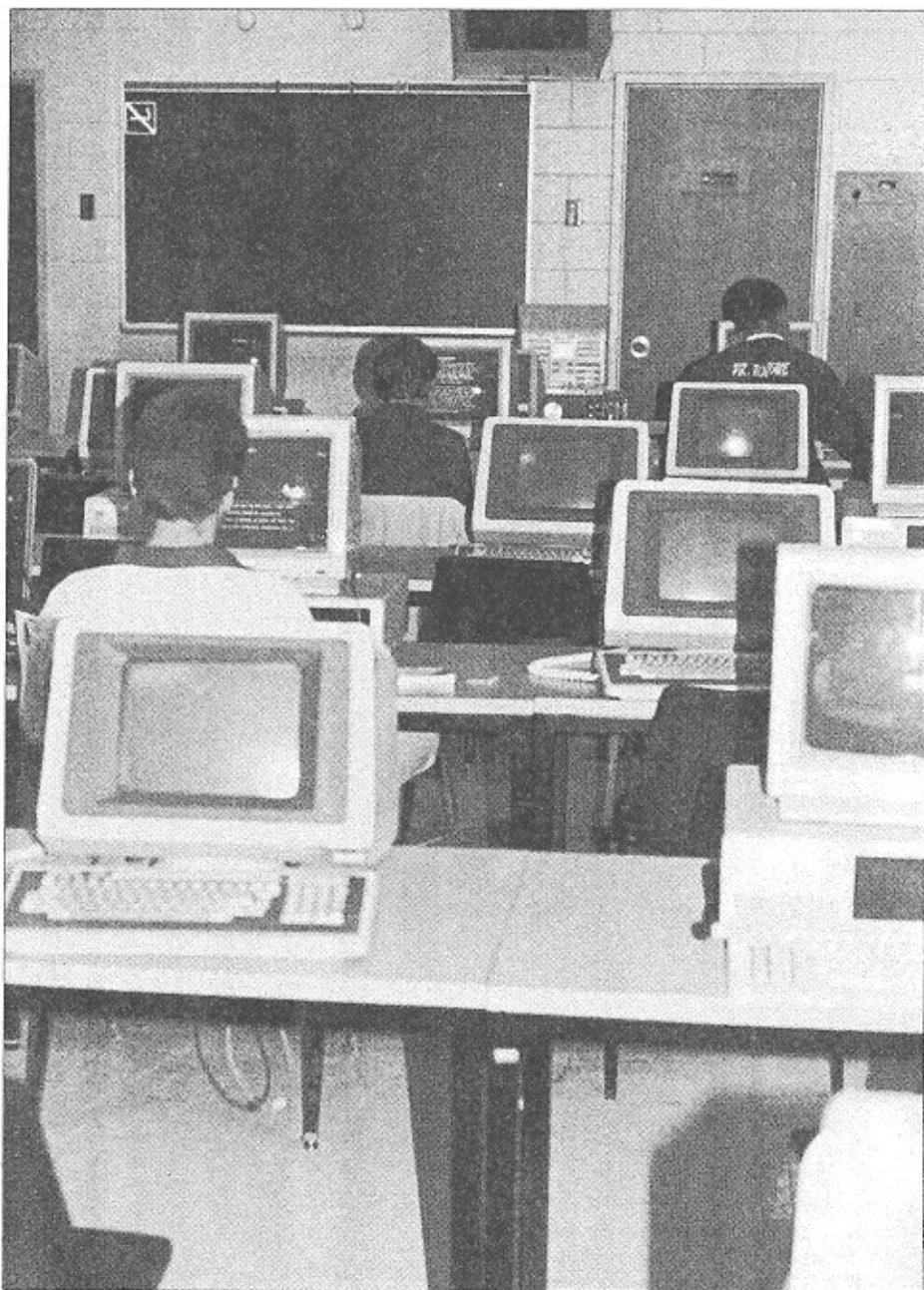
Hoechst, a German pharmaceutical corporation, established a new department of molecular biology at Massachusetts General Hospital — an institution with close ties to the Harvard Medical School. The Hoechst-MGH agreement sets a number of restrictions on scientists working in the department. Specifically, all manuscripts must be submitted to Hoechst 30 days prior to submission to a journal; any consulting with other companies must be cleared by Hoechst. Consulting for non-profit organizations is permitted only under conditions that it not interfere with the company's research programme.

This phenomenon is not limited to the United States. At Montreal's McGill

University, a private laboratory was operating within the microbiology department with approval of the administration. Students and staff protested that the funds allocated for academic research were used for the company lab (a practice called the commingling of funds). The company was formed in 1982 by two of McGill's professors who discovered a mechanism which had the potential for cleaning up industrial wastes and nuclear contamination by removing toxic metals out of solution. The university not only gave its approval for the location of the laboratory but purchased shares in the company. A McGill newspaper reported the range of allegations: "Locks were changed and the private laboratory was placed off limits to anybody but the lab's seven researchers who were not allowed to discuss their work with scientists in their department."⁷

Whether research funds originated in government or in the private sector, scientists were always accountable. These new agreements point to a change in the structure of accountability. Most government grant programmes utilize peer review in assessing research projects. Corporate-funded science emphasizes other norms of accountability. Peer review is no longer pre-eminent. Proprietary information shares the stage as a value of equal import. Corporate-sponsored research reinforces a culture of confidentiality that extends well beyond pre-publication review of research.

A relatively new domain of corporate-academic linkage is the field of public policy. For obvious reasons this is a sensitive area of co-operation. Regulations cost industry money. Consequently, to have influence over regulatory policy that restricts market activities is equivalent to profits. It is no longer viewed as a conflict of interest for a company to support policy research at universities in areas directly affecting the activities of the corporation. One vehicle for exercising such influence is the Corporate Liaison or Corporate Affiliates Programme. Traditionally, corporations paid handsome fees to universities in exchange for access to breaking research and the science/engineering faculty. The current climate favouring



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university-corporate partnerships has nurtured bolder agreements involving policy research.

At my own university, Tufts, the newly formed Center for Environmental Management initially developed a blueprint for a Corporate Affiliates Programme that offered sponsors an unusually strong influence on policy research. Currently, the Center is chiefly funded by federal dollars, over \$3 million from the Environmental Protection Agency. Its research agenda is directed at hazardous substances, including health effects, engineering problems and public policy. A second draft of the Affiliates Programme was very explicit in inviting member corporations to shape the Center's agenda. Under the plan, industry affiliates were permitted

to review all Center proposals and to have a "more direct bearing on the decision-making process that affects the bottom line." The proposed programme also emphasized the influence corporate members can have on students and academic curricula. As a result of internal criticism from members of the Tufts faculty the conditions of corporate membership were recast. The agenda-setting role of industry affiliates was removed from the programme.

Should Tuft's Center for environmental management develop into a national centre of engineering and policy studies on hazardous waste. Under the earlier plan, industrial affiliates would have had an excellent vantage point from which to influence the outcome of federal policies that relate directly to their

firms' activities. Under such circumstances, the division of responsibilities among the industrial, policy and regulatory sectors would be precipitously eroded.

External factors of influence

The international economy has been a silent but significant factor behind federal policies promoting university-industry partnerships. Several rising industrial nations, notably Japan, have made substantial entries into U.S. markets, particularly automobiles and electronics. The enormous success of Japanese industry has been attributed, in great part, to its efficiency in exploiting new technology for industrial process and product design. Pointing to the United States' failing competitive position, Congressional attention has

Corporate sponsored research reinforces a culture of confidentiality.

turned to investment incentives in science and technology, the irrelevance of academic research to industrial needs, and improvements in technology transfer. Falling in step with Reagan administration proposals, Congress has enacted legislation and supported programmes designed to stimulate innovation in American industry through a close coupling of academic science/technology and corporate research.

The Reagan administration has advanced policies to stimulate private sector investment in academic research, while federal dollars available to universities have been severely cut. These policies would be futile unless the universities were receptive to greater corporate/academic linkage. New federal patent legislation has made it more attractive for universities to exploit faculty discoveries, and attractive tax shelters and investment opportunities have been created in the form of limited partnerships for research and development.

Most university research is still supported by the government. Even for those institutions that have large grants from industry, the amount of industry funding generally does not exceed 20 percent of the total research and development budget. For many years universities were enchanted with the possibility of striking gold by patenting a discovery arising out of a federal grant. However, prior to 1980 the U.S. government lacked a clear and uniform policy on the patent rights to discoveries. Patents were not an important part of university fundraising strategies. Very few university patents generated incomes over \$100,000.⁸

A new law that took effect in 1980 gave universities greater opportunity to benefit from faculty discoveries supported by federal grants. The Patent and Trademark Law Amendments Act of 1980 (P.L. 96-517) enables universities and small businesses to make patent applications and enter into licensing agreements without obtaining government permission on a case by case basis. This law sends a clear signal to centres of academic research that discoveries are potential sources of income for the institution whether they were supported by private or public funds. The potential financial benefits to all but a

few select institutions may not be great. But the new policy contributes to the rising entrepreneurial climate on the campuses. It made some universities aware of a world of patent attorneys and venture capitalists. Others were thinking of more far-reaching ideas such as setting up for-profit companies to develop and market discoveries.

Another side to the academic-corporate equation is the attraction of private capital to universities. Industry's orientation is toward short term profits and product development. Other incentives are needed to draw investments in basic research. A creation of the revised tax laws, the Research and Development Limited Partnership (RDLP) began to gain recognition in the early 1980s as an instrument for attracting R&D capital to the campuses. The RDLP structure provides special tax shelters and high investment income. Investors can secure the following benefits from setting up a university-RDLP:⁹

- they can deduct R&D expenditures in the year they are made;
- the deductions from R&D investments may be used to offset (shelter) other income; and
- income from RDLP investments is taxed at capital gains rates.

The Office of Productivity, Technology and Innovation (OPTI) was created in the Department of Commerce in 1981 by the Reagan administration. OPTI advocated the use of RDLPs at universities as a means of generating alternative sources of research capital and accelerating the transfer of federally developed and funded technology. The limitations of the RDLPs as long term sources of income are cited by financial analysts. According to one observer, investments in university RDLPs should not be considered unless the research will lead to the development of a marketable commercial product in approximately three years.¹⁰ Thus, once a university establishes an RDLP, its research will be guided toward product development.

The company identifies precursor technology in place at public research institutions that fit areas the company has identified as market needs. The company then enters into appropriate agreements with the principal investigators and the university or research institution to carry on research under contract at that institution.¹¹

Despite the current administration's enthusiasm for them, university RDLPs have not been widely used. But the few that have been formed are cited as models. A university serving as a limited partner in an RDLP is a selling point for investors. The university offers its reputation; its name may also be used to help in the marketing of a product. Here's how one analyst sums up the role of RDLPs for universities:

The RDLP offers the university a new and better approach to determine the commercial potential of its technology, fund the development of that technology, and bring it to the market. The RDLP, due to tax laws, is an attractive vehicle for investors. It offers them the ability to deduct a large part of their investment, and to have future income taxed at capital gains rates. Finally, the RDLP offers the university the opportunity to minimize its entanglement with a commercial venture, yet at the same time, increase its chances of economic rewards.¹²

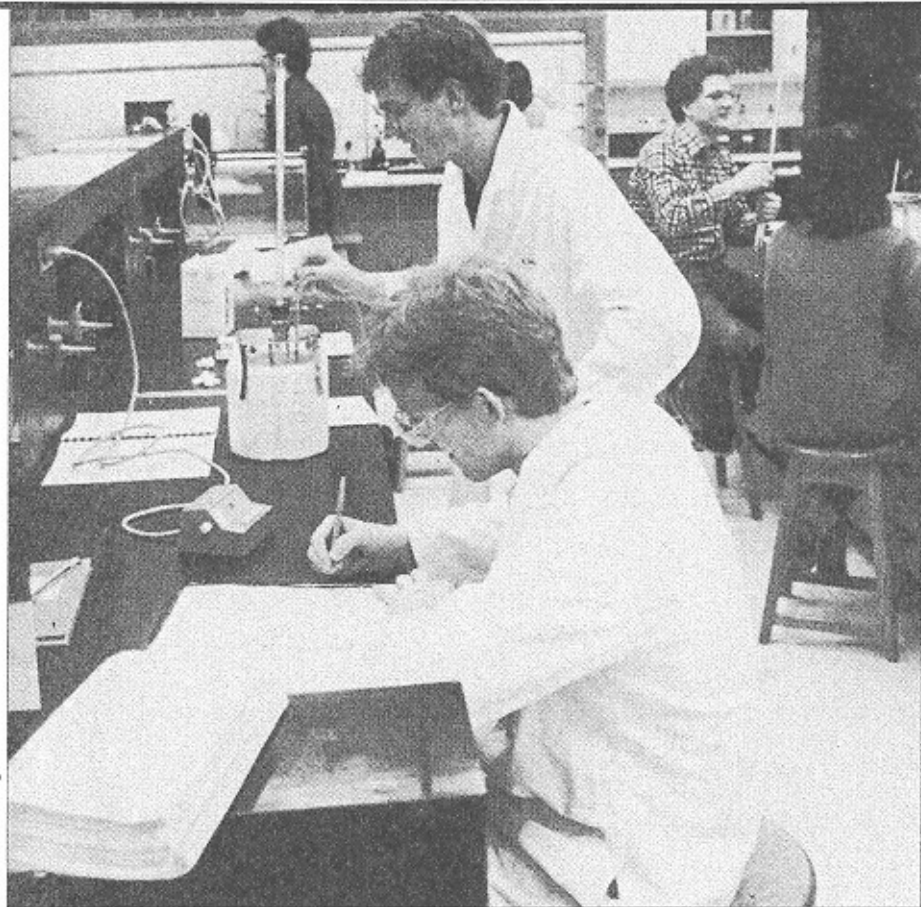
The RDLP, along with licensing agreements, long term industry contracts, and more liberal patenting provisions, has contributed to a change in the way that universities think about academic research.

The genetics revolution in the 1970's was the ideal catalyst for developing new corporate-academic linkages and reshaping a field of science toward an entrepreneurial focus, for several reasons. First, the gap between discovery and application in molecular genetics is narrow. The solutions to certain fundamental problems in gene expression have immediate commercial value.

[I]n genetic engineering there seems to be no phase of applied research; the discovery of basic scientists may go directly and swiftly from the laboratory bench in the university to a profit making venture.¹³

Second, in contrast to fields like nuclear physics, biological research does not require large teams in multi-million dollar facilities. The intellectual resources for the new biotechnology industry exist in small laboratories throughout the country. For the hundreds of start-up firms seeking a niche in the research and development market, the decentralized character of the science means that no one firm can gain a monopoly over the expertise.

Third, the excess of demand over supply for trained molecular biologists resulted in a great rush by firms to stake



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a claim on academic scientists, most of whom would not leave their university positions, through lucrative consultative relationships. Some scientists, inclined toward entrepreneurship and mesmerized by the expected financial rewards, started their own firms while holding on to their academic appointments.

In the 1960's, the microelectronics field also witnessed strong linkages between academic scientists and industry. However, a principal difference between microelectronics and biotechnology is that in the former case new firms evolved directly out of academia.¹⁴ The current generation of biomedical scientists establishing their own firms are more experimental and aggressive than their predecessors in forging close relationships with industry. Also, the fact that most of the top ranking molecular biologists are actively involved in new firms gives a new respectability to academic corporate linkages.

Stanford University's President Donald Kennedy noted, in Congressional testimony, that unlike microelectronics, the biotechnology industry has shown more intense corporate interest in the basic research process. Moreover, scientific affiliation has departed from the fee for service in favour of payments in equity.¹⁵

The new structural forms for stimulating industry investment in university research are part of the Reagan administration's master plan to transform the U.S. economy. The strategy of "privatization" — put simply, less government and more private enterprise — has been applied to every phase of American life from social programmes to the government's own printing office.¹⁶ To achieve its goal, the administration sought lower taxes, drew national attention to the rising budget deficit (exacerbated by tax reduction), and presented Congress with an austerity budget in most major categories except defence, including many areas of scientific research.

This left the universities with a choice: either cut back on research programmes or enter into agreements with the private sector. Universities began to accept the change in research priorities, responding to critics by claiming that they must accommodate to the new funding sources or be left behind. These agreements will eventually shift the focus of research toward the agenda of the investor.

The stronger linkage between universities and corporations is part of the Reagan administration's narrowly conceived industrial policy. Former presidential science adviser George

Keyworth argued that "most academic and federal scientists still operate in virtual isolation from the expertise of industry and from the experience and guidance of the marketplace".¹⁷ Keyworth attributed the separation of academia from industry as a "root cause of the sluggishness of the economy". Historian of technology David Noble observes: "Industrialized nations, especially the United States, see [scientific knowledge] as the key to reversing their weakened competitive positions in manufacturing and their balance of trade deficits".¹⁸ The remedy is to develop a new set of incentives for creating closer bonds between corporations and universities. These relationships are nourished by reductions in federal support for basic science.¹⁹

Changes in the normative structure of science

It remains for us to understand how the new corporate identity of the universities is changing the normative structure of science. Molecular biology provides a useful case study for this analysis. Not only has it been studied extensively, but the rapid commercialization of biology resulting from the discovery of gene splicing sharply illuminates changes in the normative behavior of the discipline.

... universities
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apple.

One view, widely supported by biomedical scientists, holds that biologists have started doing what physicists and chemists have been doing for years. They argue that the media's emphasis on biology's advances toward commercialization is a result of the public controversy over genetic engineering. Biology is falsely accused of being a pacesetter in corporate-academic partnerships and a progenitor of new conflicts of interest. This view is generally supported by a recent study of the Congressional Office of Technology Assessment:

U.S. university/industry relationships in biotechnology will most likely follow the same pattern that they have in other high technology areas. First, scientific breakthroughs generate a period of hyperactivity in university/industry relationships. This hyperactivity phase is characterized by the promise of "big bucks", which leads to a short-term faculty and post-graduate drain. After the industry goes through its initial phases, an equilibrium state is reached and a fairly healthy symbiotic relationship emerges.²⁰

There is no question that biology has been transformed. Bacterial strains are not as freely exchanged as they used to be. Some universities have found it necessary to monitor the external activities of faculty. Most of the leading molecular biologists in the U.S. have a dual affiliation with universities and industry.²¹ A *New York Times* report estimated that at Harvard alone more than 50 scientists had become affiliated with commercial gene splicing estab-

lishments between 1980 and 1982.²² Patenting and trade secrets have become prolific in a field where they were once rarely considered. One study published in *Science* estimated that 41 percent of biotechnology firms with university relationships derived at least one trade secret from their university supported research.²³

If through these changes in biology the boundaries of acceptable behaviour within the culture of science have been shifted, biology is not necessarily the cause of the shift. Its commercialization just came at the right time and in the right form. David Dickson concludes "Close links between universities and industry are merely the reflection within the research community of a broader strategy adopted by U.S. capital, namely its effort to tighten control over access to the results of scientific research".²⁴

Although the evidence is still mounting, there are clear indications of a trend among research-oriented institutions toward greater accommodation to the industrial mission at the expense of traditional norms of scientific behaviour. The trend has spread to smaller institutions that tend to be less vigilant with respect to potential conflicts of interest.

Limited secrecy

"Limited secrecy" is replacing the unrestricted flow of information as an approved norm of scientific behaviour. Most universities involved in corporate research agreements accept as a given some delay in the publication of manuscripts and the removal of information in published studies that is deemed proprietary by the firm. The tone of the literature on this issue is toward practical compromise and away from science as an ideal of social collaboration. Varrin and Kukich²⁵, writing in *Science*, propose a set of guidelines for successful university-industry ties. The paper builds on the assumption that "many of society's needs could be met most effectively if universities and industries joined their broad range of capabilities and facilities". The authors conclude that universities will not be able to be what they used to be if they wish to take a bite of the corporate apple. Among the norms suggested are

- graduate theses that disclose patentable material may be sequestered for a year; and
- investigators may sign confidentiality agreements prohibiting them from divulging certain information for up to five years.

That these discussions are taking place in the open literature is a sign of the increased tolerance for "limited secrecy" as an emergent norm in academic science. This is confirmed by Etzko-

witz²⁶, who conducted in depth interviews with scientists in two institutions. One respondent capsulized the new ethic when he remarked that "informing researchers without limit is a nineteenth century idea".

Faculty entrepreneurship

Universities have shown a willingness to support faculty entrepreneurship even invested in faculty businesses and rented space for commercial projects. According to Etzkowitz: "Some university administrations such as those at Wayne State University, Rensselaer Polytechnic Institute and Brown University, are explicitly encouraging their academic staff to participate in industrial enterprises, viewing it as a contribution to regional economic development and as a means of gaining financial support for the university".²⁷

In the past, faculty-owned firms have been handled discreetly. Most universities have no restrictions against full-time faculty holding managerial positions in firms. The current debate has shifted from whether faculty entrepreneurship is appropriate to whether universities should be able to invest in faculty-managed firms and whether such firms should be permitted to sponsor research on the campus. Varrin and Kukich frame the boundaries of the new debate by offering the compromise position: a faculty entrepreneur's company should not be permitted to sponsor his or her own research on campus, but a company should be permitted to sponsor other research on campus, even within the same department. Under this norm, a senior faculty member with managerial responsibilities in a firm might serve in two roles with respect to a junior scientist, namely, colleague and client.²⁸ These mixed relationships invite conflicts of interest that cannot be avoided by vigilance or good faith.

Corporate grants

The introduction of multi-million dollar corporate grants to universities that extend over many years is becoming a common practice. Over the past several years a new phenomenon has appeared on the academic landscape: foreign corporations have begun to invest heavily in university research.²⁹ These grants often involve elaborate confidential contracts whose size and duration provide an unusually powerful influence on the research and the composition of the faculty. According to some informed observers, smaller universities excited by the opportunities of research capital are "giving away everything".³⁰

Beyond the problems of restricting information flow, corporate financing influences the faculty recruitment process. Sometimes the company reserves the right to review appoint-

ments. In other cases, joint faculty-industry appointments are made. The Whitehead Institute-MIT agreement was a highly publicized case in which an institution external to MIT agreed to offer full-time researchers at Whitehead tenure in the biology department. In exchange, MIT received \$7.5 million.

Martin Kenney notes that universities are prepared to modify their conflict of interest rules to accommodate entrepreneurial ventures. Michigan State University founded Neogen in 1981 — a private for-profit company — and changed its conflict of interest rules to allow professors to acquire equity in the company while also serving as its consultants.³²

Conclusion

The classical image of the university as a sanctuary for the production of knowledge, set apart from the forces of the marketplace and the power brokers of political culture, is a fading memory of a past era. Likewise, the independence of scientists to work on self-generated problems deemed worthy in and of themselves is a vanishing expectation.

Does it make any difference if the private sector replaces or complements government as the patron of science? To the scientist, it may not matter so long as the professional reward system is preserved. Privately financed research may even involve less administrative time than federal grants. To the university administrator, corporate-financed research produces overhead, provides greater opportunities to young faculty, and opens up new sources of income through licensing agreements.

Where, then, are the liabilities? The change from publicly to privately financed research has profound implications for the production and utilization of knowledge. Government-supported science is publicly accountable whereas corporate sponsorship is accountable only to private investors. Public debate over issues of preventative versus curative research frequently accompanies reauthorization of appropriations for the National Cancer Institute. There is no opportunity for public debate when research is privately financed.

Corporate-funded academic research usually places constraints on the flow of scientific information. Similar constraints may be found in government-funded classified research, but not in most sectors of federal sponsorship. Ironically, some universities that refuse to accept support for classified research will accept provisions of "limited secrecy" in industrial contracts.

Even if the percentage of private sector support of academic science remains small in comparison to federal dollars, a few heavily endowed industrial pro-

jects can distort the values and mission of the university. Industrial projects bring with them a new kind of scientific culture that rewards marketable research and protects proprietary information. One biologist at Columbia University observes that "information and research material of the kind hitherto freely circulated among scientists will be sequestered entirely or enter public circulation at a much slower pace."³³ The peer review system gives way to corporate review of proposals.

Finally, one of the least visible effects of the new corporate identity of the university may also be among the most profound. Scientists who shift their attention to the economic benefits of research or who hold equity in firms that market scientific discoveries cannot, at the same time, serve society as disinterested experts on the impacts of the new scientific technologies. One of the vital roles of universities — to provide independent expertise to government uncontaminated by the motive of financial association — is thwarted when industry and academia become indistinguishable. The public interest would no more be served if every heart surgeon had stock in firms producing artificial hearts than it will be if every molecular geneticist has equity in a biotechnology firm. If the linkage between university and industry continues, and the entrepreneurial activity of faculty intensifies, then academe will lose its special status as an independent sector. The boundaries between academe and industry, like those between the branches of government, must be securely established. Otherwise, the loss to society will be immeasurable.

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Notes

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¹² Bartlett and Siena, *op. cit.*

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