

Academic Capitalism at Work

Successful commercialization of university-developed technology will benefit all, including public

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Technology transfer from university campuses and research laboratories to the commercial sector has become the center of much attention. So, this article will discuss:

1. Why the subject is now in the forefront.
2. The complexities of making this interface work successfully.
3. Some experiences of our seed capital investment firm University Technology Transfer, Inc. in attempting to commercialize projects that present interesting opportunities.

Why this interest in cooperative efforts between higher education and the private business sector? Many diverse forces have converged.

First, there is a perception that we are falling behind other developed nations, primarily West Germany and Japan in the technological revolution. (Perhaps this gap is more than a perception when one reflects on the fact that 42% of the U.S. patents granted in 1984 went to foreign residents, with Japan in the lead (11,648 U.S. patents compared to 9,212 in 1983).

Aware of the erosion of America's competitive pre-eminence in global economics, President Reagan in 1983 appointed a Commission on Industrial Competitiveness to identify the problems and opportunities for the private sector to transform new knowledge and innovations into commercial products, services and manufacturing processes.

With 70% of research dollars going to universities and to government laboratories run by universities, one can easily see why government economic planners are turning to academic institutions as critical resources in strategies to reinvigorate mature industries and stimulate new "sunrise" industries.

Simultaneously, local governments are seeking to enhance and better their competitive position nationwide. Economic development programs in over 22 states have been designed to create jobs through innovation. Substantial increases in appropriations for higher education "to spur research" are proposed for several states, seeking to advance basic research, development of skilled, technical manpower, and utilization of innovative

ideas around which new companies can be created.

There are important examples to be emulated:

- Boston's Route 128.
- California's Silicon Valley.
- North Carolina's Research Triangle Park.

The self-interest of higher education has also brought pressure to bear. Declining Federal financial support; e.g. the recent cutback in National Health Foundation grants, has spotlighted research work as a critical inventory of potential value. Also, the lure of higher paying jobs in the private sector tempts many top scientists away from the academic search for new knowledge. Tangible and intangible rewards for ideas, products and/or processes that can be successfully marketed can retard this brain-drain.

Complex Forces

Thus, we can see that in a period of rapid, almost dizzying, rise in the level of public consciousness of high technology, a number of complex forces are joining together to answer mounting, mutually-shared concerns. Higher education and the private sector business community are being called upon to form a partnership in both their own and in the public interest.

How to make this industry/academic interface work? Essential to success is an understanding of their cultural differences. Technology transfer, I prefer to call it technology utilization, will not work without this understanding. One similarity at the outset: The educational institution and the capitalist both seek to maximize a return. But there the similarity ends. The capitalist represents money in pursuit of a profit. Higher institutions of learning are nonproprietary and nonprofit. They do not belong to people, i.e. owners or shareholders, as private property. They do not have a monetary "bottom line."

Business enterprises seek to maximize return on assets or equity by satisfying consumers of their products. Our leading research universities strive to maximize academic quality measured by assembling fine scholars and producing scholarly, trained graduates.

Faculty have a dual role, that of teaching and researching. Faculty members are compelled to maintain a high level of research activity. In their world a premium is placed on the quality of one's knowledge over an academic lifetime.

Much of university research is so-called "basic research" with no immediate commercial value. From this basic research might eventually flow applied research and specific knowledge that has commercial value. But the researcher cannot sell "basic" research in the marketplace. One might say faculty are free to speculate *intellectually* in a nonprofit, highly secure environment (in which, incidentally, the venture capitalist most usually will not

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or cannot speculate *financially*).

The private sector reward is clear: Profit or R.O.I. The faculty reward is just as clear but also just as opposite: The esteem of their peers and reward from their university. In most instances faculty is content to seek these nonpecuniary rewards.

Beyond these differences in incentives or sought returns, the fundamental basic policies of the university must be respected, not just to "get along" but for the social good. Freedom of intellectual inquiry; free exchange of new knowledge and the critical evaluation of research findings; publication of new knowledge; faculty excellence in teaching and research—these must drive the university as an institution of learning. Were industry to drive university research toward short-term profit goals, education and ultimately the nation would suffer.

While I have touched on only some of the issues involved in commercial utilization of university-developed technology, you can see how complex a subject it is. But given the pressures to make it successful and the promise of large benefits to all—the university, the researcher, the consumer, and industry—areas of mutual concern must supercede differences.

Corporate Goal

At UTTI, our corporate goals are not those of the large corporation. Such corporations may devote a small portion of funds to basic research. We cannot. University/industry liaison provide access to faculty; and, no less important, to the recruitment of new graduates. Collaborative research between a faculty investigator and a corporate research staff can occur on sabbaticals or during summer periods. New regulations permit the engagement of university labs for pay. And we are seeking joint ventures; collective industrial parks; innovation centers, incubators, and the like. Academic/industrial cooperation for economic growth is underway.

In contrast to these efforts, we at UTTI are seeking those ideas, innovations, products and processes around which a new company can be formed. Our resources are twofold: Financial and managerial. The financial concept involves a dedicated source of "seed capital" plus a partner with first-stage financing capability when the technical and marketing evaluations are completed, management is in place, and a competent business plan is prepared.

Our managerial component is internal management with business as well as investment experience, possessing recruitment skills and the talent to engage professional consultants as needed in the early stages of a new enterprise.

We assume the professor/investigator will remain as a faculty member, serving as a consultant, and earning a royalty or possessing an equity interest as university policy dictates. In fact, his or her continued involvement during early development is deemed essential.

The question asked of us most frequently is: What areas of technology are you interested in? The answer is: Those technologies that are found on the campuses most progressive as to technology transfer. Even if campus "A" has the best school of aquaculture, it doesn't pay us to interface with its campus if the faculty and administration don't believe in the process. Consequently, we have identified those campuses with well-defined policies stimu-

lated by administrators who want things to happen. The Silicon Valley would not be if Stanford had resisted faculty entrepreneurship.

Faculty members inquire: How do I participate? First, whether the faculty member and the university get a royalty or an equity interest is immaterial to us. The size of the interest is negotiated at arms length. If the faculty member is not represented by the University or by an attorney, we lean toward terms that cannot be criticized for overreaching.

Another frequent question is: At what stage will we invest funds—basic research, applied research or prototype. Are we interested in ideas or proven product? In 14 months we have reviewed 68 opportunities, most university related. Of these, we've taken indepth looks at eleven and invested time and money in seven with seed capital investments in four and subsequent financing by our partner in one. All I can say is, for us, there has been no singular model. Our soundest investment had a product ready for beta testing. Our riskiest is an investment in pure basic research by a truly outstanding scientist which, if successful, could win a Nobel prize.

Some 65% of the proposals we have reviewed were in the biomedical field. The majority of the balance are either computer related or apply computer techniques to advance prior art. Some specifics: We made an early equity investment in a company started by a strong technical team from the University of California. The products are designed to provide improved clinical images for diagnostic analysis. Sales have commenced and our limited partners have made a subsequent equity investment, bringing our combined position to 25% equity represented by a Series A Preferred stock.

Three other seed capital investments, varying from \$45,000 to \$150,000 are represented by Sponsored Research Agreements. They cover a cryogenic probe to address cancer in specified organs; a unique and novel process for growing gallium arsenide crystals; and a new, improved process for pre-plating computer discs. In the first two cases we have obtained a 50% equity in the project, the balance shared by the university and the principal investigator. In the latter, we have an exclusive license carrying a royalty at 8% of gross sales, payable in equal shares to the professor and his university. In all cases we are responsible for expenses of research, administrative, marketing evaluations, and legal costs.

The one certain fact we have learned: Seed capital itself now represents big dollars. We started out expecting to invest between \$50,000 and \$100,000 as seed capital before first-round financing. That figure now more accurately ranges from \$150,000 on the low side to \$500,000 on the high.

Are we successful at UTTI? Quite candidly we cannot tell yet. It'll take some time for results to come in. In all honesty, we cannot yet confirm that university campuses are promising reservoirs of technology that can be "mined" by venture capitalists. Perhaps the industrial liaison effort is the easiest answer to the complex interchange of academic capitalism.

But, it is early in the game. Based on our experience we remain extremely positive. We're spurred on by knowing our success will not only reap a reward for us—a profitable return commensurate with risk—but will also benefit the university, the researcher, and assist in achieving the economic goal of the state and nation.