

Chapter 8

Technology Transfer: Are Faculty Entrepreneurs Still Swimming Upstream?

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ABSTRACT

Universities and their faculties have long been exalted for the benefits of their innovations on the United States economy, defense, and security. In fact, one of the American public's sustaining beliefs is that the tens of billions of their tax dollars that are provided for university-based research support is important for our country to remain competitive, safe, more energy sufficient, and healthy. However, despite all of the fine examples of regional, state, and individual university responses to supporting innovations, there are still ample examples of faculty who are confused about their roles and responsibilities in the area of technology transfer, entrepreneurship, conflict of interest, and entry into commercial ventures. This chapter will cover technology transfer from a university and faculty perspective and describe key issues that evolve once faculty decide to course through the technology transfer pipeline, which begins with innovations and ends with commercialization.

Universities and their unique resources (high-speed internet, technical workforce, tech-transfer offices, centers of excellence) have proven to be central assets in large regional economic growth spurts. Whether one considers the "Silicon Valley" in the Santa Clara Valley south of San Francisco, "Route 128" outside of Boston, or North Carolina's "Research Triangle Park," these areas have all benefited from the tightly knitted association of university researchers with industry/government scientists in technologies ready to commercially explode. The down side of this association is that universities suffer the criticisms that research programs are being bought out and that commercialization is turning scientists and

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their universities into servants of the industry (Sanger, 1981; Bok, 2003; Press and Washburn, 2000; Greenburg 2007). Although we are almost three decades past the Bayh-Dole Act (1980) in a period where university and industry links have proliferated, there are still many critics among both academia and the public opining that academics should stick to their classrooms and basic science labs and not venture into the technology transfer pipeline.

In the past three decades, economic competitiveness has morphed from an international concern (e.g. outcompete Japan) to a regional concern (e.g. knowledge clusters) to one where individual universities are in an “arms race” with each other for private and public funding (including licensing royalties, retaining star faculty, pursuing academic earmarking, developing technology parks and incubators, etc.). The greatest benefit that Bayh-Dole afforded universities, namely, to promote the utilization of their research for the public good, sometimes seems distant to the perceived objectives whereby universities attempt to maximize their own resources, including commercialization profits from faculty innovations that are ultimately transferred to the economy.

THE SCALE OF U.S. UNIVERSITY R&D

The 2008 R&D expenditures for universities from all sources are just over \$50 billion with over two thirds of that amount funded by the government. Altogether, in 2008, industry is responsible for performing over 72%, of the nation's total R&D with academic institutions performing 13% percent, and federal laboratories, nonprofit institutions performing the remainder (NSF, 2009). Although federal agency support seems modest compared to the industry support for R&D investment, this investment supports over 60% of the nation's basic research with over 60% of that basic R&D conducted by universities (AAAS, 2008).

The most telling statistics regarding shifting R&D investment is that the 100 Award-winning US innovations in the 1970s came from corporations acting on their own, whereas the top 100 R&D innovations in the last decade come from collaborative ventures with business, government, and universities (Block and Keller, 2008). This shift is due to many influences, such as, shrinking product life cycles or technological expertise out running the research budgets of industry. With

proportionally less research investments made by industry, it is no wonder that they are seeking key relationships with universities who are carrying on the bulk of basic and exploratory research. It is the essence of those university/industry relationships and the faculty tensions of entrepreneurship versus commercialization versus scholarship versus teaching that causes some faculty to feel as if they are swimming upstream against a constantly shifting current of recognition and rewards --and possibly sanctions.

FIRST THINGS FIRST

From a purely academic perspective, there are several key motivators that control faculty recognition and rewards. The first is that that universities have been important sources of knowledge and purveyors of truth as they go about their scholarly activities in teaching, research, and public service. It is through this unfettered compact with the university where faculty and their students have *de facto* become the intellectual center of the entire U.S. research enterprise and where most of the basic intellectual energy is spent. However, this

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