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# Accelerating Economic Development Through University Technology Transfer

## EXECUTIVE SUMMARY

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# **Accelerating Economic Development Through University Technology Transfer**

Based on:  
**Report to the Connecticut Technology Transfer  
and Commercialization Advisory Board  
of the Governor's Competitiveness Council**

## **Executive Summary**

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## EXECUTIVE SUMMARY

“Silicon Valley”, “Rt. 128” and “Research Triangle” have become familiar terms throughout the country and the world. For as long as these terms have been recognized, states and communities have been trying to replicate them. Universities have been at the center of these models and have provided a pipeline for science and technology innovation, generating thousands of technology licenses and spinning off new technology enterprises.

There is no doubt that university technology transfer and commercialization activities are impacting local, state, and national economies. In FY 2003, Stanford alone filed more than 300 patents and some familiar companies such as Google, Sun Microsystems, Silicon Graphics, Netscape, Cisco Systems, and Yahoo have spun off from the University. Approximately 150 new MIT-related companies are founded each year, with at least 10 percent of those directly resulting from university technology transfer activities. Other universities such as Washington University in St. Louis, Georgia Institute of Technology in Atlanta, University of Wisconsin in Madison, and Carnegie Mellon University in Pittsburgh also are making impressive strides and contributing to the diversification and growth of their regional economies.

University technology transfer and commercialization are complex processes. They involve licensing inventions or starting up enterprises based on the universities’ research. Research and development (R&D) resources, infrastructure, seed capital, entrepreneurial incentives and culture, university-industry enablers, intermediary facilitators, and leadership – political, academic and corporate – are just some of the inputs involved in shaping effective processes. Moreover, a successful practice in one environment may not be a successful practice in another since resources, cultures, environments and priorities vary from university to university, community to community, and state to state.

In 2004, the Connecticut Technology Transfer and Commercialization Advisory Board of the Governor’s Competitiveness Council contracted Innovation Associates Inc. (IA) to examine exemplary technology transfer practices and to provide recommendations for enhancing state initiatives that leverage its university R&D resources. IA examined practices at 10 universities: Carnegie Mellon University (CMU), Georgia Institute of Technology (Georgia Tech), Massachusetts Institute of Technology (MIT), Purdue University (Purdue), Stanford University (Stanford), University of California, San Diego (UCSD), University of Pennsylvania (Penn), University of Wisconsin-Madison (UWM), Washington University (WU), and Cambridge University, United Kingdom (Cambridge). In addition to examining university technology transfer and commercialization activities, IA also examined related university and/or community entrepreneurship programs, incubators, research parks, seed capital programs, and cluster-driven innovation centers. The highlights and lessons that follow are based on these successful university and related practices.

## HIGHLIGHTS AND LESSONS FROM EXEMPLARY UNIVERSITIES

The exemplary universities and the environments in which they operate provide some consistent and strong lessons to guide public and private decision makers:

- **A Strong and Focused University Research Base Feeds the Pipeline for Commercialization** – Excellent university technology transfer is built on excellent research. This research provides the pipeline for commercialization of research results. Moreover, just as important as the absolute magnitude of a university’s research portfolio is its strategic focus. In order for some model universities to build strong and focused research bases, they assessed core competencies and developed strategic plans around those core competencies. These efforts provided direction for: (a) hiring “stars” in targeted fields, (b) targeting federal R&D funds, (c) increasing corporate sponsored research, and (d) promoting state initiatives that leverage federal and corporate funds.
- **Federal R&D Funding Provides a Critical Base for Technology Transfer and Commercialization Efforts** – In most universities successful in technology transfer, there is substantial research funding from the federal government. Federal funding, particularly from the U.S. Department of Defense and the National Institutes of Health, normally accounts for the majority of the universities’ research expenditures. The National Science Foundation also plays a significant role through its programs.
- **Champions Catalyze Most Successful Technology-Based Economic Development** – In virtually every region in which a major research university has played a strong role in fostering regional economic development, one can point to a champion, often a strong university president or chancellor. These university heads, such as UCSD’s former Chancellor Atkinson and Washington University’s former Chancellor Danforth, have the experience, vision, and will to move their institutions into new roles as well as the leadership to rally the community’s corporate leaders and public decision makers.
- **Private Corporations and Foundations Can Play a Major Role** – In many communities and states, private corporations and foundations have played a major role in stimulating science and technology research and promoting regional economic outcomes. Corporations play a role not only by endowing university chairs and sponsoring collaborative R&D, but also by participating in entrepreneurial activities and funding technology-based initiatives in the community. In St. Louis, for example, the Danforth Foundation, Monsanto, and the McDonnell Family have funded substantial initiatives and, in Pittsburgh, the Heinz Endowments and other corporate contributors have provided the majority of funding for the Pittsburgh Life Sciences Greenhouse.

- **Early-Stage Capital is a Critical Ingredient in Launching University Start-Ups** – Entrepreneurs from universities successful in generating start-ups have access to seed capital. In addition, universities and intermediary organizations assist entrepreneurs with business plan development and offer entrepreneurs opportunities to showcase and network with potential investors. Where early-stage capital does not exist, universities, public and private sectors step in to create it, often seeding private funds that leverage additional monies. Angel networks also play an increasingly important role in spawning early-stage firms.
- **Innovation Centers Can Provide a Focal Point for Technology-Based Activities** – In some communities and states, innovation centers serve as focal points for technology-based activities. Innovation centers often are directly or indirectly linked to universities, involve corporate participation and provide a variety of services and linkages including pre-seed/seed capital, Executive-in-Residence programs, and mentoring for technology start-ups.
- **The Entrepreneurial Culture of a University is Key to its Technology Transfer Success** – The entrepreneurial culture of a university is perhaps the strongest and most pervasive influence on its technology transfer and commercialization performance. Creating an entrepreneurial culture is both “bottom up” and “top down”, requiring a combination of leadership from the top and entrepreneurial drive from the bottom. Universities successful in transferring technologies often provide implicit or explicit rewards and incentives for faculty who participate in technology transfer and commercialization activities, and have hiring practices that favor industry and entrepreneurial experience.
- **Networking is Key** – Part of the entrepreneurial culture inside and outside the university is networking. A critical ingredient well known to students and faculty at MIT, Stanford, and Cambridge are opportunities for entrepreneurs to network with potential investors, corporate clients, partners, service providers, and other entrepreneurs. Often the university technology transfer and licensing offices also encourage and facilitate interaction with venture capitalists, law firms, and corporations, early in the technology transfer process.
- **Entrepreneurship Programs Can Add Value to Technology Transfer Efforts** – Often model universities have strong entrepreneurship programs that offer entrepreneurial courses and activities for engineering and science students as well as business students. These activities include business plan competitions, practicum with start-ups, and mentoring by successful entrepreneurs.

- **Incubators and Research Parks Provide a Visible Technology Presence** – Many exemplary universities have incubators and research parks. This is particularly important for universities that have had to build an entrepreneurial presence such as UWM and Purdue. Their research parks are now quite successful, each employing several thousand high-tech workers and adding a technology presence where there once was none.
- **No Quick Fixes** – Most technology transfer and commercialization efforts at successful universities, and the resulting entrepreneurial and economic development phenomena that have grown around those universities have taken decades to accomplish. Moreover, the technology transfer field is still relatively new and evolving. Often results, particularly short-term results, are difficult to demonstrate and to quantify. Academic, public and private decision makers should be cognizant of these facts and accordingly build into programs the flexibility to experiment and the time to mature and evolve.

These lessons, and others found throughout this report, represent the experiences of some of the nation's most successful university technology transfer and commercialization programs. These models had academic, corporate, and political leaders willing to champion R&D and technology-based economic development over the long haul. They recognized that by leveraging R&D and entrepreneurial resources in one's university, community and state, it created new opportunities for both academic excellence and economic growth. Universities benefit from technology transfer and commercialization activities by attracting and retaining top entrepreneurial-minded academicians as well as gaining from license income. Communities and states that provide the entrepreneurial infrastructure in which university technology transfer and commercialization can flourish, benefit from the technology start-ups and business expansions that result. Not every community has a Stanford and can create a Silicon Valley, but public and private leaders can work together to identify, strengthen and leverage their own resources to enhance innovation-based economic opportunities.