

## Creative Models for University Technology Transfer

### Addressing Location Based Obstacles through Resource Consolidation and Third Party Engagement

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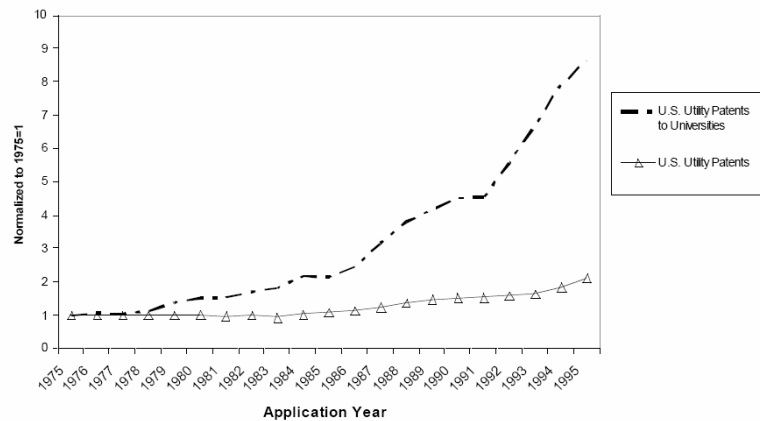
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## The Increase in University Patents has Outpaced Growth in Patenting

University  
 Tech  
 Transfer  
 Trends



**Source:** *The use of University Research in Firm Innovation: Kira R Fabrizio, Emory University: to appear in Open Innovation: Researching a new Paradigm: Oxford University Press (2006)*

## Dramatic increase in Patent Activity: Mixed Results on Commercialization

- The number of U.S. academic patents quadrupled from approximately 800 in 1988 to more than 3,200 in 2003.

*Source: National Science Board: Science and Engineering Indicators 2006*

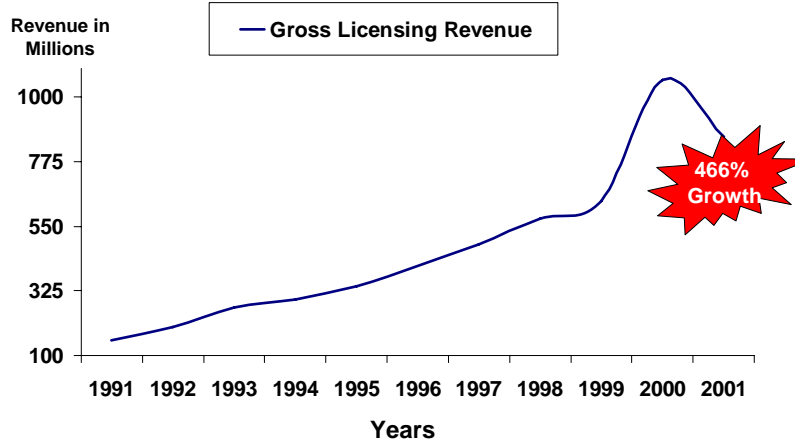
- University patents are associated with slightly fewer total ventures than are the other patents.  
*(Henderson, Jaffe, & Trajtenberg 1998)*

- “Results suggest that university patenting is slowing the exploitation of existing knowledge by industrial researchers”

*Source: UNIVERSITY PATENTING AND THE RATE OF KNOWLEDGE EXPLOITATION; KIRA R. MARKIEWICZ, Walter A. Haas School of Business, UC Berkeley*

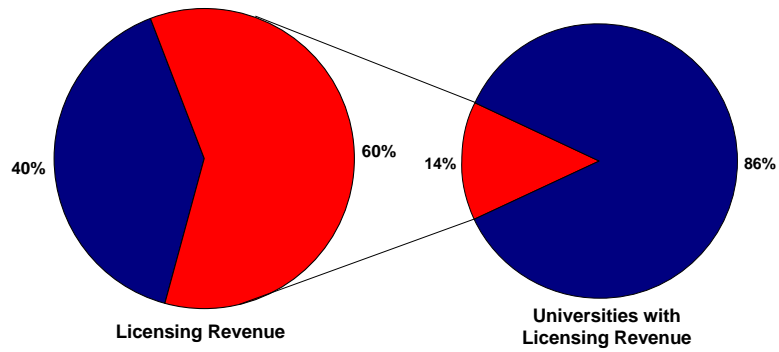
## Gross University Licensing Revenue

(Data for all Recurrent Survey Respondents 1991 – 2001)



Source: AUTM Licensing Survey 1991-2001

## % of Total Licensing Revenue to Universities with Licensing Revenue (2001)

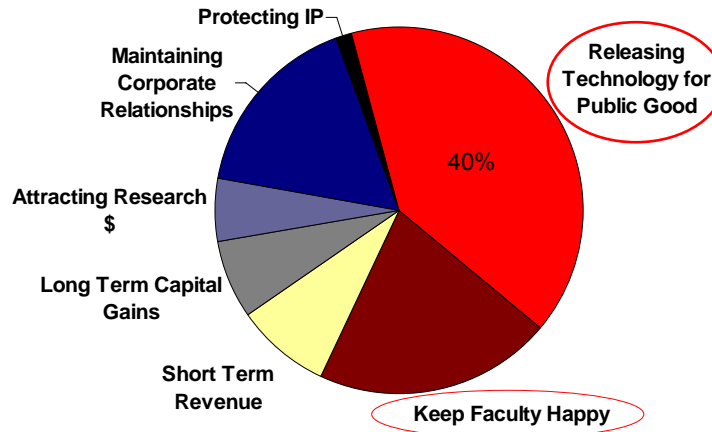


Source: Accelerating Tech-Transfer & Commercialization in the Life & Health Science, August 2003

## Technology Transfer Office Priorities and Mission

- Data Collection
  - Contacted all TTOs in US
  - 75 TTOs responded
  - Telephone interviews
  - Standardized interview protocol
  - Talked to directors of TTO

## Top Priorities for University Tech Transfer Offices



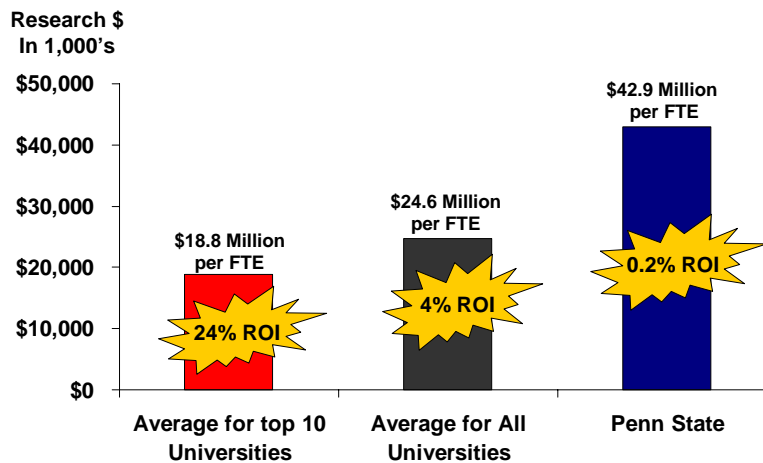
Source: PSU Tech Transfer Survey, 2003

## Aligning Technology Transfer Office with Local Support Systems

- **Vibrant entrepreneurial infrastructure:**
  - The missions of releasing technology for the public good and promoting regional economic growth are well aligned.
- **Geographically isolated from these support networks**
  - The accomplishment of the mission to release technology for the public good is actually hindered by efforts to simultaneously promote regional economic growth.

## Research Expenditures per Tech Transfer Full Time Staff Equivalent (2001)

University Tech Transfer Trends – Efficiency Disparity



Source: AUTM Licensing Survey 2001

## Why the Disparity?

University Tech Transfer Trends

- **Technology transfer and commercialization outside University mission**  
*(Owen-Smith, Riccaboni, Pammolli, & Powell, 2002)*
- **Most technological development occurs within high tech regions**  
*(Kenney, 2000; Lee, Miller, Hancock, & Rowen, 2000; Saxenian, 1994)*
- **Local lack of a culture of entrepreneurship.**  
*(Degroof & Roberts, 2004)*
- **New firms rely on the University for the resources to get off the ground**  
*(Degroof & Roberts, 2004)*

## Support Structures for Innovation

### Integrative systems comprised of:

- Universities;
- Technology-oriented enterprise;
- Highly skilled labor;
- Considerable public/private R&D expenditures;
- Extensive networks of suppliers, manufacturers and vendors;
- Support firms such as law offices and consultants specializing in high technology;
- Strong entrepreneurial networks; and
- Informal mechanisms for information exchange and technology transfer

*(Source: Florida & Kenney, 1988)*

## Issues

- **Vastly different support environments in which university Technology Transfer Offices (TTOs) operate may influence their ability to achieve stated goals and objectives.**
- **Political exigencies often demand that Universities must claim to play a role in local economic development, a task that may not be the most effective use of tech transfer resources and intellectual property.**

## Hypothesis

- Universities that exist outside support structures of innovation are at a disadvantage and are less likely to succeed at commercializing innovations and patents regardless of the efforts put forth by technology transfer offices.

## Research Method

- Historic AUTM data
- A range of performance metrics averaged over a 7 year time frame from 1996 – 2002
- Compared those metrics to the magnitude of VC activity that occurred within a 50 and 100 mile radius of each university - using VC activity for proxy of strength of infrastructure
- Focused on Licensing Model
- Spin-outs under investigation

## Metrics

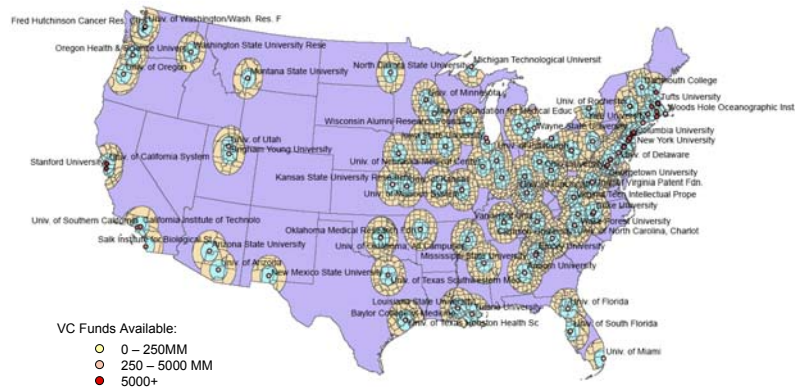
Quantitative Research

- Licenses executed per research dollar spent
- Licensing income per research dollar spent
- Non-equity licensing income per research dollar spent
- License income per legal fees spent
- Cost to non-equity income ratio
- **Cost to total income ratio**  
 (Level of effort/resources required to generate commercialization revenue)

## VC Activity (deals done) within 50/100 Mile Radius of Universities

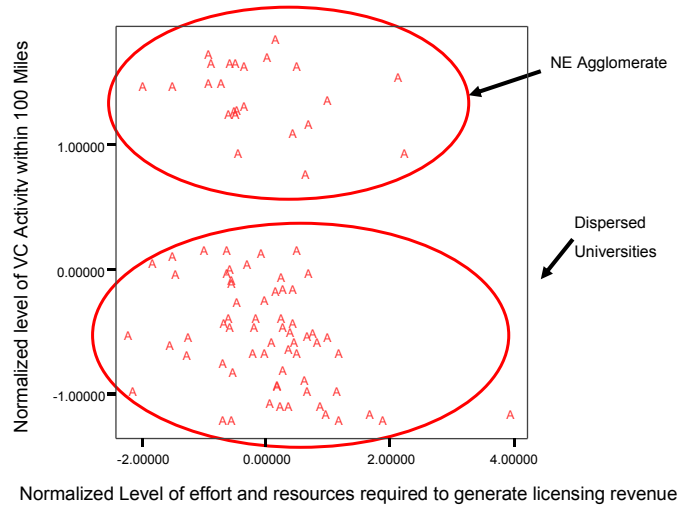
Quantitative Research

VC Activity is used as a proxy for Innovation Support Structure

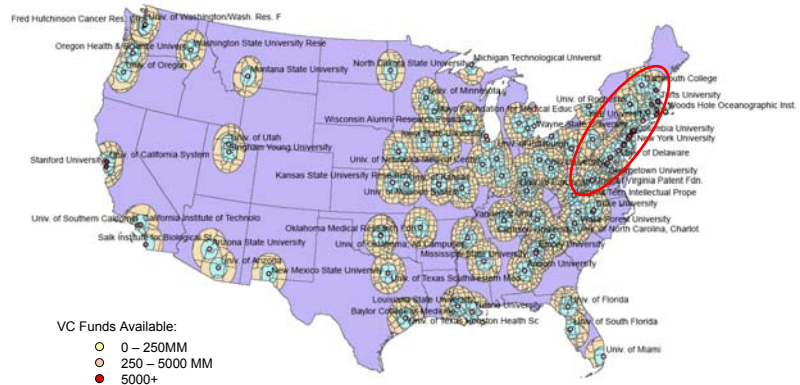


Source: Thomson Venture Economics Database

## Two Distinct Clusters of VC Activity Levels within 100 Mile Radius of Universities



## The NE Cluster



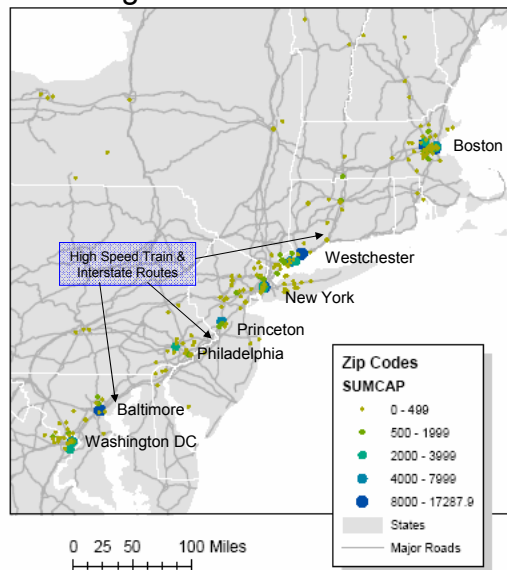
## VC Activity and Cost/Total Income Ratio For Universities

	Dispersed Universities*	NE Agglomerate**
$\beta$ Coefficient	-.169	.054
F	12.024	1.46
p	.001	.685
R	.406	
adj R <sup>2</sup>	.165	

\*The higher the level of VC activity, the lower the level of effort and resources required to generate commercialization revenue.

\*\*No discernible relationship between VC activity and the resources required to generate commercialization revenue.

## Venture Capital Activity along the East Coast Corridor



SUMCAP = total available VC capital \$MM by zip code, 2005, source, Thomson VentureEconomics

## Model 1: Resource Consolidation

- Establish partnerships with other universities to jointly operate TTO's in key areas of social structures of innovation (*i.e. Silicon Valley, Route 128 near Boston, and Austin, Texas*)
  - Potential licensors know where to find technology
  - Aid in “value bundling” of inventions
  - Identify patents more likely to enter commerce
    - reduce the costs of patenting orphan inventions
  - Technologies best commercialized in start-ups likely to find fertile ground for entrepreneurs and funding sources

## Model 2: Local Seed Scattering-Barriers

- Faculty member must immediately reimburse the University for all patent costs to date, and continue to pay patent costs going forward.
- The faculty member must produce a complete business plan to be reviewed by the TTO.
- The new company must raise a defined amount of equity capital in a short time.
- The University must receive both an equity stake in the new company AND uncapped royalties on future sales.

## Model 2: Local Seed Scattering-Solution

- Faculty should be encouraged to form new companies based on University technology.
- The process should be as easy as possible.
- The faculty member must form a legal entity, into which the technology is licensed.
- The entity takes on, as unsecured debt, the existing and future patent costs that are paid down as a percentage of any revenue the company receives in the future.
- The University receives warrants to purchase an equity stake in the company based on certain future events.
- The new company must employ one full-time person NOT on the payroll of the source University
- If the company chooses to move to a more supportive region University may exercise its warrants and/or call on any unpaid debt for patent expenses

## Model 3: 3rd Party Agency Support

**Premise:** Universities are not inherently designed to commercialize technology; they are designed to develop technology.

- Technology transfer staff focuses exclusively on the inward facing activities of faculty relationship management and invention screening
- Hire a third party agency, located in a more fertile deal making environment, is hired to focus on the outward facing activities of licensing and contract management.

## Conclusions

- The use of a “Gold Standard” or “Best Practices” to define how universities should approach the technology transfer process does not accommodate for the complex matrix of influencing factors including geographic location, university culture, UTTO missions and priorities, economic development roles, etc.
- Our results support the contention that one size DOES NOT fit all. Instead, we suggest that universities need to assess their own particular strengths, weaknesses and goals and use strategic management frameworks to develop policies and mechanisms that best suit their particular situation.

## Questions/Discussion

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