MODELS FOR UNIVERSITY TECHNOLOGY TRANSFER: RESOLVING CONFLICTS BETWEEN MISSION AND METHODS AND THE DEPENDENCY ON GEOGRAPHIC LOCATION

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ABSTRACT

The conversion of University research into economic growth is vital for the future of many nations. In order to improve the efficiency of this transfer we have looked at the effectiveness of tech transfer activity in the US. Our research indicates that Universities that are not located in a region supportive of entrepreneurs should modify their mission and methods for technology transfer. Using both quantitative and qualitative methods, the authors develop an overview of the problem and recommend three new strategies for effective technology transfer including the application of regional dynamic knowledge networks.

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EXECUTIVE SUMMARY

More and more, research universities are seen as sources of commercial technology vital to the future of regional economic development as opposed to institutions for only pure scientific discovery. Attempts to replicate the successes of Silicon Valley or the Route 128 corridor around Boston have often influenced policy makers when allocating regional funding and resources for technology transfer. This paper challenges these efforts by exploring key management issues for University Technology Transfer Offices (TTOs) and the impact of location on the selection of appropriate commercialization models. We map the relative success of technology licensing to the proximity of the source of Intellectual Property (IP) and "entrepreneurial infrastructures" within the US, using the availability of local venture capital as a proxy for these infrastructures. Analyses of historic AUTM data shows how vastly different environments in which university TTOs operate greatly influence their ability to achieve stated goals and objectives. In addition, a survey of 75 TTOs reveals conflicts between stated missions and methods used. 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 resources and intellectual property. For many Universities that are geographically isolated from supportive infrastructures we find a significant reduction in their efficiency in transferring technology.

This paper explores the cultural, environmental, and strategic influences on university technology transfer. We propose a number of analytical frameworks and models for universities to asses their particular situations and develop policies and practices that are best suited to their needs, and that will result in the conversion of research dollars into economic and social value. We recommend that they reject the "one size fits all" approach to technology commercialization

and propose three innovative models for them to explore: Resource Consolidation, Local Seed Scattering, and Dynamic Knowledge Networks.

INTRODUCTION

Increasingly, regional economic development initiatives are based around the existence of major research universities (Drucker & Goldstein, 2007; Goldstein & Drucker, 2006; Lambooy, 2004). Pointing at the successes of such regions as silicon valley, home to Stanford and Berkeley, the route#128 corridor around Boston, with MIT at its core, and, to a lesser extent the Research Triangle Park in North Carolina with three major universities as well as Cambridge in the UK, policy makers seek to somehow translate the historical developments in these regions to other locales. However, despite many such efforts (Drucker & Goldstein, 2007; Lambooy, 2004), there has been relatively little success to show.

It is becoming more evident that policies for regional development need to be tailored much more specifically not only to the available intellectual and physical resources, but take into account the local cultural background, social structures and history, and *weltanshauung* (Drucker & Goldstein, 2007; Goldstein & Drucker, 2006; Lambooy, 2004).

The research reported in this paper examines in detail just one aspect of regional development, namely how the results of university research can be effectively deployed as economic drivers into the private sector. Although the research domain is restricted, we suggest our findings contribute to a broader discourse, namely that purely resource-based policies for economic development are limited and potentially wasteful.

Over the course of the past ten years, a significant amount of effort has been expended in analyzing trends in the commercialization of technologies developed within universities and developing “best practices” that are intended to increase the rate of innovation derived from university technology transfer offices. The National Innovation Initiative (NII) defines innovation as, “The intersection of invention and insight, leading to the creation of social and economic value” (Council on Competitiveness, 2004). More specifically, successful innovation is defined as, “the use of new technological knowledge, and/or new market knowledge, employed within a business model that can deliver a new product or service to customers who will purchase at a price that will provide profits” (Warren & Susman, 2004).

In both cases, the key factor is the definition of innovation as the creation of value through invention as opposed to invention in-and-of itself. It is in this context that we analyze the university technology transfer process and the administrative or management policies that serve as catalysts and/or obstacles to improving the rate of innovation derived from university inventions. This paper therefore explores the cultural, environmental, and strategic influences on university technology transfer and proposes a number of analytical frameworks and models for universities to asses their particular situations and develops policies and practices that are best suited to their needs, and that will result in the conversion of research dollars into economic and social value.

THEORETICAL BACKGROUND

In 1965, 96 US patents were granted to 28 Universities while in 1992 the government granted almost 1500 patents to over 150 universities. In the same interval total US patents increased by 50% and patents to US inventors remained roughly constant. Yet, university patents are associated with slightly fewer total ventures than are the other patents (Henderson, Jaffe, & Trajtenberg, 1998). Why is this the case?

There appear to be four reasons why tech transfer is not a booming business for universities. First, universities have, until recently, considered technology transfer and commercialization outside their mission (Owen-Smith, Riccaboni, Pammolli, & Powell, 2002). Second, most technological development occurs within high tech regions such as Silicon Valley and the Greater Boston area (Kenney, 2000; Lee, Miller, Hancock, & Rowen, 2000; Saxenian, 1994) and such environments are difficult to recreate. Third, there is a local lack of a culture of entrepreneurship. Many areas simply are not equipped for the development of growth-oriented ventures. Further, entrepreneurs in such areas lack a growth orientation. It is often the case that academic institutions simply do not have faculty who think in terms of entrepreneurial development (Degroof & Roberts, 2004). Finally, in areas where there is a weak entrepreneurship community, new forms rely on the university for the resources to get off the ground. Thus, it falls to universities to provide early stage financing, facilities, legitimacy, and connections with intermediation with outside parties (Degroof & Roberts, 2004) and it is open to question whether they are very good at it.

Florida and Kenney (1988a) identify Social Structures of Innovation (SSI) as key facilitators for the development of entrepreneurial forms and ideas. SSIs are "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" (: 130). Although Venture Capital (VC) financed enterprises do exist and grow in remote areas, it is also very clear that a disproportionate number of innovative companies funded by Venture Capitalists (VC's) are located in areas with strong social structures of innovation. There are three major centers with such structures: California (Silicon valley), New York, and New England

(Massachusetts-Connecticut) and three minor centers: Illinois (Chicago), Texas, and Minnesota (Florida & Kenney, 1988b).

Further, in industries where new economic knowledge plays an important role, innovation tends to cluster geographically. Therefore innovative activity is more likely to occur within close geographic proximity to the source of that knowledge i.e., university research laboratories, the research and development department of a corporation or exposure to the knowledge embodied in a skilled worker (Audretsch & Feldman, 1996). In the biotechnology field, for example, growth and diffusion of intellectual human capital was the main determinant of where and when the American biotechnology industry developed. Intellectual human capital tended to flourish around great universities, but the existence of outstanding scientists measured in terms of research productivity played a key role over, above, and separate from the presence of those universities and government research funding to them (Zucker, Darby, & Brewer, 1998). Great Universities are those with scholarly quality reputation ratings of 4.0 or higher in the 1982 National Research Council survey (Jones et al., 1982). There are 20 such universities; however, the vast majority of them are located within close proximity to the entrepreneurial regions identified above.

In addition, VC's form networks of information flows as well as capital flows. Interestingly capital is a far more transportable commodity than information: "Rapid and continual circulation of information through personalized networks is necessary to locate potential investments, assist in business formation, and mobilize resources over the various stages of business development (Florida & Kenney, 1988a: 43)." Information linkages, personal contacts, specialized labor supplies, material linkages, and transportation costs also influence the development of technology-based agglomerations (Scott & Storper, 1987). Regionalization is also the result of transportation costs and opportunity cost associated with travel to portfolio companies. To the extent that a VC can move more readily within the social structures of innovation identified above, they are more likely to be able to integrate the information and resources required to foster growth companies.

VCs have a propulsive effect on the development of business because they sit at the center of extended networks of services required by such businesses. Moreover, providing public VC funds is unlikely to compensate for the absence of a well-developed technology infrastructure. In particular, consider that the most successful example of public equity provision is the Massachusetts Technology Development Corporation that finances companies in an area that has a disproportionate amount of VC to begin with. Because the VC money is so successful in these established areas, they are most likely to continue to grow new ventures and capitalize on new inventions. Geographically speaking, at least, the rich will inevitably grow richer (Florida & Kenney, 1988a).

Therefore, we conclude that universities existing outside social structures of innovation are less likely to succeed at commercializing innovations and patents regardless of the efforts put forth by technology transfer offices.

METHODS AND RESULTS

I: Technology Transfer Office Priorities and Mission

We conducted an on-line survey consisting of 26 ranking questions covering the following major factors: mission and priorities, performance metrics employed, faculty involvement and compensation, management of IP, challenges, obstacles and limitations. Using the AUTM membership contact database of technology transfer offices, we mailed a letter to 200 technology transfer officers inviting them to participate in an online survey. Participants were incented to participate by offering a copy of the survey results and the final paper. We then sent an email to the each one of the directors of those TTOs. Within the email we provided a direct link to the on-line survey and requested the recipient take a few minutes of their time to complete the survey. In addition to the rankings, respondents were also encouraged to add individual comments concerning the priorities and efficacy of their TTO. 75 different technology transfer offices responded fully to the survey, a response rate of 37.5%.

Table #1 shows the top seven priorities as provided by the directors:

Center Priority	% of Centers
Releasing Technology for the Public Good	40%
Keeping Faculty Happy	24%
Maintaining Corporate Relationships	17%
Generation of Short-term Revenue	6%
Generation of Long-term Capital Gains	5%
Attracting Research Funding	4%
Protecting Intellectual Property	2%

Table #1

An important finding is the diversity of priorities from office to office. This finding indicates that uniform “best practices” may not be appropriate for all universities given that their TTOs are charged with different missions and/or they operate in different environments. For example, in the case of universities that exist within a vibrant entrepreneurial infrastructure, the missions of releasing technology for the public good and promoting regional economic growth are well aligned. However, for a university that is 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. This is because the creation of new ventures that provide jobs from university owned IP is the mechanism commonly promoted to spur regional economic growth and these ventures often require more sophisticated SSIs (Florida & Kenney, 1988a) than are available at the regional level.

The prevalence of tech transfer missions reflecting the charge to release technology for the public good was particularly interesting given that it was not one of the pre-selected options and was written in as a first priority for 33% of survey participants. Also of interest was the distinction between survey respondents that specifically noted that their purpose was to promote economic growth for a specific geographic region. The focus on local economic development has important implications to the tech transfer process when one considers the impact of “clusters” or entrepreneurial support infrastructure. Universities focusing exclusively on creating new ventures within a specific geographic region may be at a disadvantage if that region does not have the required support network in terms of industry contacts, venture capital funding, legal expertise, entrepreneurial leadership talent etc. In that sense, the mission of releasing technology for the public good may in certain situations actually conflict with the mission of promoting local economic development.

Based on these observations we argue that mission and environment are two key drivers of effective strategies for the commercialization of technology from universities. The clear establishment of, and broad commitment to, a defined mission statement is critical to the alignment of each component of a university tech transfer strategy. The mission of a TTO should also be defined or at least supported at the top levels of the institution’s administration. The alignment of TTOs activities with the broader goals of the institution works to justify the investment of resources required to achieve the expected returns. Defining the appropriate measure of returns is an important factor in developing an aligned strategy. Returns can be defined in many different ways including financial returns to the institution, as economic returns to the US economy, or even more broadly as quality of life/added value to the broader society as a whole.

Secondly, the environment in which the university is located must be taken into consideration to establish mechanisms that are best suited to leverage an institution's specific competencies and readily available resources. For example, if a TTOs mission is to promote regional economic growth but is not located in a supportive entrepreneurial infrastructure, then the best model to achieve their mission may be to promote and train faculty and entrepreneurs in bootstrap financing and remove the financial and ownership barriers to licensing university IP. Specific business models that address various environmental factors and defined missions are included in a later section of this paper.

II. Analysis from the Association of University Technology Managers (AUTM) and the Venture Capital Sector:

Our hypothesis for this analysis was:

> 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.

In order to test this hypothesis we used historic AUTM data to analyze a range of performance metrics averaged over a 7 year time frame from 1996 – 2002. The first observation was that there is a very large disparity of licensing revenues between institutions that have an established TTO; 60% of the licensing revenue goes to just 14% of Universities. To explore this apparent disparity, we selected as our independent variable, the availability of venture capital investments within a 100 miles of each research university. These data were obtained from the Venture

Economics Database compiled by Thomson Economics. This database is considered by the venture capital sector to be a highly reliable source for VC firm information including the capital raised and the portfolio of investments. We suggest that these data form a suitable proxy for the intensity of the local support structure for innovation and the commercialization of technology because VC investment tends to be made in areas of strong SSIs (Florida & Kenney, 1988a). Venture capital firms are usually headquartered close to where they expect to find valuable investment opportunities and where the other support functions for successful commercialization outcomes such as patent attorneys, mentors, and risk tolerant skilled workers co-locate. Venture partners like to be close to their portfolio firms and usually use distance as one of the decision criteria when making an investment.

We used the AUTM data to create the cost to total income ratio measure. We believe this ratio represents a solid proxy for the effort and resources required to generate licensing revenue because the cost measures the overall money spent per project to bring the idea to market. When we compared this measure to the total VC activity within 100 miles of the university, we found, there was a clear clustering of schools into two groups on these two variables. One group represented schools, primarily in the northeast, whose 100-mile VC activity radii overlapped with multiple other schools' 100-mile VC activity radii. We refer to this group as "the NE agglomerate". Detailed maps showing the two different groups are shown in Figures 1 and 2.

We performed linear regressions between the two variables for both clusters and found that for the schools that were not located in close proximity to multiple other schools (the "dispersed universities), there was a statistically significant negative relationship between the magnitude of VC activity and the efficiency ratio and that 16.5% of the variance in the relationship was explained. On the other hand, no significant relationship existed between the two variables for the schools in the NE agglomerate. Table #2 reports the results of these two analyses.

	Dispersed Universities	NE Agglomerate
β Coefficient	-.169	.054
F	12.024	1.46
p-value	.001	.685
R	.406	.02
adj R^2	.165	.004

Table #2

We postulate that the lack of a statistically significant correlation between the level of VC activity and the cost to total income ratio for schools that are closely clustered together in the northeast, can be attributable to the fact that the scale of geographic proximity is far smaller in the NE corridor than the rest of the country. In this area of the country, most universities exist within 50 miles of highly active entrepreneurial infrastructures; however, many are still far enough removed from the center of that activity so that they do not benefit from the entrepreneurial support network. For example, the Universities of Delaware and Connecticut are located within 100 miles from the active entrepreneurial areas of Philadelphia and Boston respectively. However, they are not closely enough tied into those environments to realize the full benefits of the support infrastructures. Distance therefore is not the only factor at play; sufficient scale of activity has not been developed in these less productive areas, and larger VC funds have not seen fit therefore to establish a base there.

THE IMPLICATIONS

This paper looked at the effects of geography on the technology transfer process. We found that technology transfer is currently an ineffective process for geographically remote schools. Remoteness of course, is just one factor, but an important one as it is indicative of a lack of the required support infrastructures, both tangible and intangible, that are necessary for a region to get to a self-generating scale for continued technology driven economic growth. Further, remoteness must be defined within the overall social context. For example, even along the highly developed NE corridor of the US, there are pockets of low commercialization activity, even while the investment community views the Virginia – New Hampshire corridor as their region of operation. In the UK, regional differences are stronger, and remote may denote shorter distances and time than in the US. Our contribution to the field for practitioners and policy makers is to provide evidence for the limits currently influencing technology transfer offices and the broader questions concerning the funding of local technology driven economic programs. In addition, we provide a clear set of recommendations below that provide a roadmap for TTOs as they work to increase the effectiveness of the technology transfer process.

DISCUSSION

An analysis of the efficiency of TTOs in licensing the IP developed from the research activities of a university depends strongly on whether the institution is located within an entrepreneurial eco-system as determined by the availability of VC funds. We used this marker on the basis that VC investors will move to where they have a higher chance to gain high financial returns at lower risks, locations where a full range of support infrastructure is in place to nurture new companies. A priori, we might expect that licensing efficiency would not depend on local support infrastructure in the same way, as the licensors may reside in any location. We interpret our results as showing that the resources that a “remote” university can attract and retain are inherently less efficient in that they do not themselves reside in an “entrepreneurial transaction environment” in which there is significant networking and uncovering of opportunities which is much more likely in Silicon Valley or around Boston. In addition, remote universities are less likely to be on the “travel agendas” of corporate licensing officers. The exception to this is the biotechnology and medical fields, where corporate licensing officers follow the research work actively and will search out the best researchers for themselves without even contacting the TTOs. In industry sectors where this is not common practice, licenses must be “driven” by the licensor. Not surprisingly then, our research shows that the number of transactions that can be executed by remote universities are similar to that from institutes in high entrepreneurial eco-systems, but the efforts to achieve equivalent results are significantly higher.

NEW MODELS FOR UNIVERSITY TECHNOLOGY TRANSFER.

As we have shown, “one size fits all” is not appropriate when building an effective TTO and we recommend that each situation is structured after taking into account the local resources, infrastructure, social limitations etc. In order to help this function, we provide three new models for discussion and stimulation of this planning process.

Model 1: Resource Consolidation. We propose that several universities should combine resources for licensing both to existing large companies and VC funded start-ups. We have shown that the efficiency of technology transfer from remote schools is significantly below that from other schools placed in supportive eco-systems. As many of the remote schools are concerned about the cost of operating their technology transfer offices, we propose that groupings of such schools in the US for example, combine their licensing activities into three focused offices: Silicon Valley, Route 128 near Boston and in Austin, Texas. These three highly supportive eco-systems would make it more likely that technologies from remote schools that are channeled through these offices would more efficiently enter commerce through either licensing or start-ups. The "input" functions of uncovering, filtering, and describing the new technologies would still be undertaken at the source schools. However, the "output" transactions would be undertaken at the three offices.

In addition to increase in licensing efficiency, there are other advantages to this model:

- Potential licensors would have fewer places to visit and establish relationships. Thus, the non-medical technologies would become more like the medical cases where potential licensees know where to go to find technology, thereby further enhancing the efficiencies.
- Often a combination of technologies is more valuable to a licensor than a single patented invention. Combining licensing resources will aid this "value bundling" of inventions.
- The offices, being in greater contact with the receiving marketplace, will be in a better position to advise their member schools on which patents are more likely to enter commerce and thereby reduce the costs of patenting orphan inventions.
- Technologies that are best commercialized in start-ups will be more likely to find fertile ground for entrepreneurs and funding sources.

We do not recommend that the three proposed offices serve all remote schools to avoid too much bureaucracy in the system. We recommend therefore that groupings such as the "Big 10" or MAC conference schools where close relationships already exist explore this model. These schools all have major research programs and are in "remote" locations with regard to entrepreneur support.

Model 2: Local Seed Scattering. Model 1 challenges the inevitable political imperatives that are imposed on TTOs and reflected in our research, which indicates that a key mission is to support the local economy. Politicians and policy makers are heavily focused on job creation in their local area; jobs, after all, provide additional income and votes. This pressure, particularly for non-private schools implies that TTOs must also have local job creation as part of their performance metric. This may be much more difficult for remote schools. Therefore, we propose a second model that can be implemented in parallel to Model 1 for such schools.

We suggest that the TTOs remove all barriers to faculty starting companies around University research centers. Too often, TTOs require unreasonable and multiple conditions for technology to be licensed into local start-ups. In discussions with faculty and TTOs during our research, we encountered many such barriers such as:

- The faculty member must immediately re-imburse the University for all patent costs to date, and continue to pay patent costs going forward as demanded by the University.
- 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.

These barriers are far too arduous and unreasonable in most cases and specifically for the more remote schools outside a vibrant support system. They seriously hinder the formation of new companies rather than promote them. Often the TTO, feeling undue pressure from the University to protect its assets, behaves like a library that wishes to keep its books pristine and therefore decides not to lend out any books. In remote schools, it is unlikely that any of such pre-conditions can be met. To use an agricultural analogy, we suggest that when the soil is infertile for growing companies, the policy should be to scatter more seeds rather than fewer.

To avoid this impasse, we propose the following TTO guidelines:

- Faculty should be encouraged to form new companies based on University developed technology and the process should be as easy as possible.
- The faculty member must form a legal entity, into which the technology is licensed. This entity must be situated within an agreed distance from the University, thereby satisfying the mission to support the local economy and satisfy local political agendas.
- 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. In addition, the University receives warrants to purchase an equity stake in the company based on certain future events. Currently the TTOs are patenting inventions with little knowledge of the potential value and most of the patents sit on the shelf as wasting assets in any case. So why not let an interested party try to make something of them?
- The new company must employ one full-time person NOT on the payroll of the source University. This covenant puts some burden on the faculty member, which will lessen "hobby" licenses and align objectives.
- In the event the company grows such that it chooses to move to an entrepreneurial eco-system region, then the University may choose to exercise its warrants for a minority equity stake.
- If the company chooses to remain locally, it is most likely that it will have to grow using "bootstrapping" techniques, which are not normally known or understood by faculty members. Therefore, the University should offer training programs for faculty on how to bootstrap growth without equity funding for all faculty wishing to form a new company.

Model 3: Use of a Dynamic Knowledge Internet Portal[2]

Regions that do not have a strong entrepreneurial infrastructure need to examine methods that maximize the value of the resources that exist. Regional development initiatives are often established through local outreach functions which may or may not be under the auspices of a university[3]. These functions constitute network nodes, often with different funding, skills and reporting structures. Such diverse and largely uncoordinated resources are not uncommon. The challenge is to apply the knowledge that resides in each of these resources in the most effective way in the promotion of regional economic development; we are confronted with a complex knowledge management environment.

Recently, there have been attempts to bring such disparate knowledge resources under a central coordinating function[4] using an internet portal to create connections. While an improvement on purely random connection establishment they suffer from significant shortcomings. Connections, once made, between those seeking expertise and those providing support become locked in place. Indeed, at the initial stages of business start-ups, an entrepreneur or university researcher may not even know the most appropriate resources for help. Usually, the range of help functions do not actively participate together in the provision of the most appropriate combination of resources; nor do they contribute in an active way in the *creation* of the economic opportunity. Often they view each other as competitors rather than collaborators.

Establishing static, one-on-one advisor relationships do not tap into other ways that valuable opportunities may be created and enhanced through applying diverse knowledge. By engaging

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[2] The authors would like to thank Jason R Dytche, a graduate student at Penn State, for this contribution to this section.

[3] For example, the region around Penn State University's main campus in central Pennsylvania has 16 largely independent offices involved in economic development. Two are funded by the federal government, five by the state government, three by the private sector, and six housed within the University.

[4] See for example, www.kcsourcelink.com , housed in the University of Missouri, which lists over 100 resources for entrepreneurs in the Kansas City region.

more than one party in any creative endeavor, participants may trigger ideas and concepts from each other which, individually may not have arisen (Dougherty and Takacs, 2004). Additionally, participants, through "heedful interactions" may contribute not only to the solution to a problem but may be active in defining the problem in a way that can more readily elicit a more complete and creative solution, (Weick and Roberts, 1993). Participants also have their own "transactive memory" gained through past experience and their own extended networks which they can tap when challenged with structuring a new opportunity, (Kotlarsky and Oshri, 2005, and Wegner, 1986).

Tapping resident knowledge using static knowledge management systems, despite much research and investment, has not reached its promise due to a number of factors, (Hinds and Pfeffer, 2001). These authors discuss cognitive factors including the difficulty of codifying tacit knowledge (Nonaka and Takeuchi, 1994) and the inability of the knowledge possessor to place themselves in the role of the knowledge recipient using common constructs and language. In addition, they explore motivational factors encompassing "knowledge is power" behavior, and viewing knowledge sharing as a zero-sum game. To overcome the limitations of one-on-one interactions in a static knowledge management system including proximity, experiments in using "dynamic knowledge management systems" have been performed using an internet portal to host the interaction, (Pluskowski, 2002).

In these systems knowledge is not preemptively codified, but is only requested when there is a need. Solution seekers, in this case, those wishing to establish a new enterprise, create a web-request which is then responded to, based on the knowledge and experience of the network. Experts do not work in isolation responding to a specific need; they offer tacit information as well as tapping into their own extended expert networks and transactive memories. The challenge therefore comes alive as each contributor builds on the knowledge of the others. The environment is collaborative, active, dynamic and innovative.

In order to create a more efficient use of local expertise for economic development centered on a university, we propose a web meeting place for the sharing of ideas regarding how to help new ventures succeed. Creating an effective virtual platform for entrepreneurial support optimizes the process of new business development for local businesses, aspiring entrepreneurs, and the university. It can also stimulate a much needed transformation in the business environment for economic developers. By facilitating collaboration, both productivity and program effectiveness are enhanced thereby creating value and new jobs through local technology commercialization and the development of university spin-offs.

These three models together solve many of the shortcomings we have elicited in the technology transfer processes at remote schools: improving licensing efficiency; supporting the local economy; and improving the success rate for start-ups through collaboration and focused application of limited resources.

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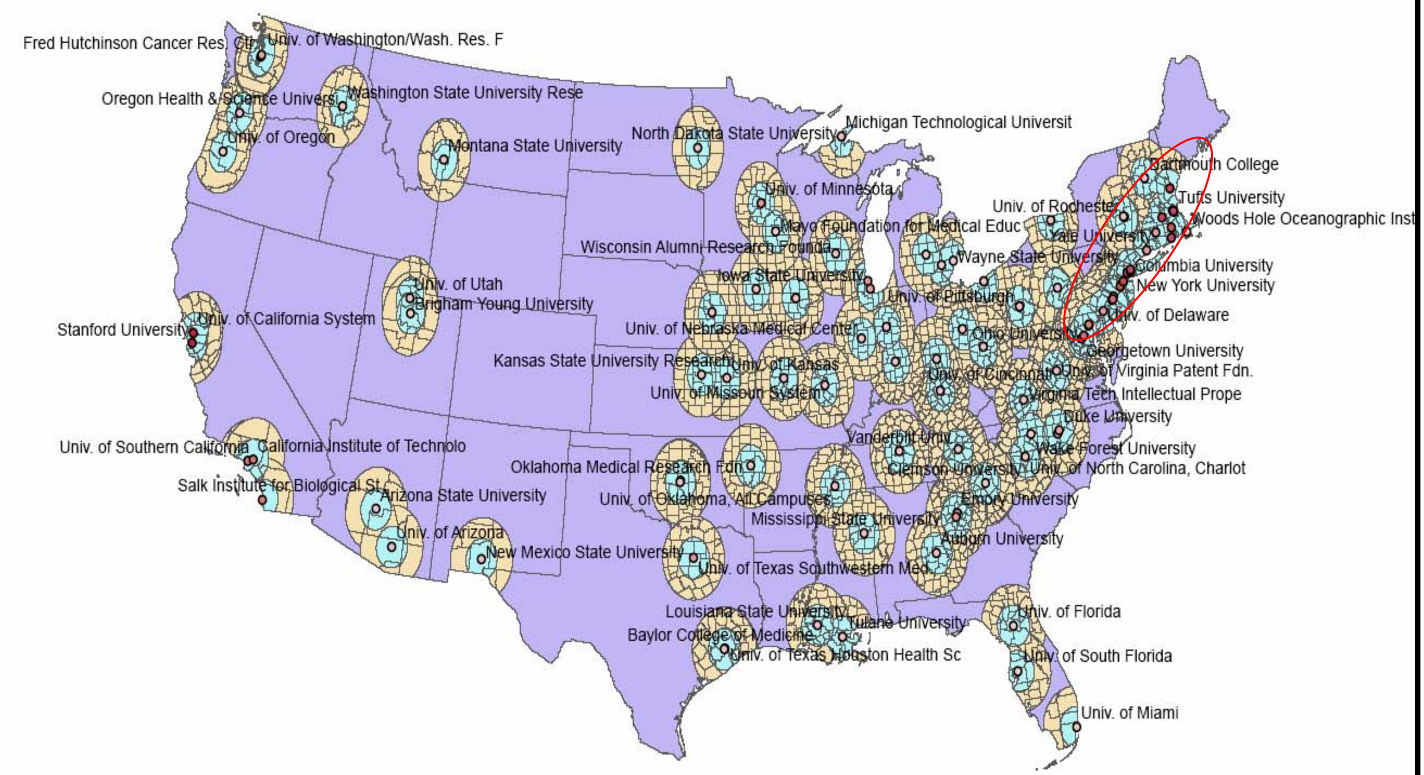
Fig. 1: The availability of Venture Capital within 100 miles of leading research Universities in the US, showing the location of the NE cluster.



$> 250MM

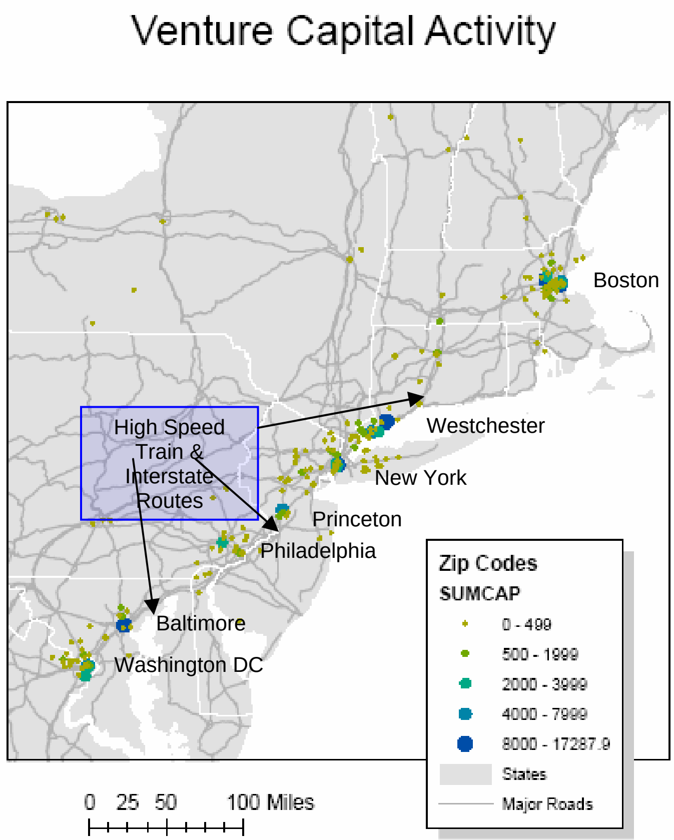
$250 – 5000MM

> $5000MM

Available VC funds:

Source: Thomson Financial: Venture Economics Database

Figure 2: The availability of Venture Capital along the NE transportation Corridor.



SUMCAP = total available VC capital $MM by zip code, 2005, source, Thomson Venture Economics