APPENDIX 9

Technology Transfer Performance of USM Institutions

Prepared by

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&

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As required by the Joint Chairmen's Report of the General Assembly

2006 Session

January 2009

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Introduction

The Joint Chairmen's Report (JCR) of the 2006 General Assembly session tasked the Maryland Technology Development Corporation (TEDCO) and the University System of Maryland (USM) with reporting on the technology transfer performance of USM institutions and university-affiliated research parks and incubators. This report provides a current snapshot of USM and affiliated research park performance in technology transfer.

USM Institutions Technology Transfer

Metrics

Successful technology transfer is not dependent on any one factor but instead on the confluence of multiple factors inside and outside the academic institution. [1] In summarizing the activities of institutions that have achieved an amount of success in the technology transfer process, The Innovation Associates Technology Transfer and Communization Partnerships wrote, "Technology transfer and commercialization are as much an art as a science, and personal relations between technology transfer agents and faculty, corporate licensees and business and investment communities were key to successful efforts. In most exemplars, the university president showed leadership and commitment to technology transfer, and it was actively embraced by the deans and department chairs. These academic leaders set the tone and instituted incentives to create an academic culture that reward technology transfer and entrepreneurship." [2]

Among the USM institutions, four have active technology transfer programs: University of Maryland Baltimore, University of Maryland Baltimore County, University of Maryland Biotechnology Institute and University of Maryland College Park.[3] All of these institutions have been compiling technology transfer metrics using definitions used by the Association of University Technology Managers (AUTM) in their annual survey of over 150 universities and non-profit research institutes since the late nineties. These metrics do not measure the art of technology transfer but the outcomes. And though the AUTM metrics are not universally accepted as ideal metrics for technology transfer, they are widely viewed as reasonable and are readily available as a national benchmark for comparison.

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[1] Innovation Associates Technology Transfer and Commercialization Partnerships October 2007 page vi

[2] Ibid

[3] Towson University, University of Maryland Eastern Shore, Salisbury University, Morgan State University, and Bowie State University have conducted or are conducting technology transfer activities.

The AUTM survey includes numerous detailed parameters. TEDCO, in consultation with the four USM institutions compiling AUTM metrics, has selected a small subset of the AUTM metrics for a performance status report. These annual metrics are shown in Table 1.

Metric Name	AUTM Definition
Research Expenditures	Expenditures made in the survey fiscal year by the institution in support of its research activities.
Invention Disclosures	Disclosure to the institution of an invention made by a member of the faculty or staff.
New Patent Applications Filed	New Patent Applications Filed is the number of first patent applications filed on the patentable subject matter of an invention disclosure.
Patent Expenditures	Patent Expenditures are the amount spent by an institution in external legal fees for patents and/or copyrights. These costs include patent and copyright prosecution, maintenance, and interference costs, as well as minor litigation expenses that are included in everyday office expenditures.
Licenses and Options	A License Agreement formalizes the transfer of technology between two parties, where the owner of the technology (licensor) permits the other party (licensee) to share the rights to use the technology. An Option Agreement grants the potential licensee a time period during which it may evaluate the technology and negotiate the terms of a License Agreement.
FTE Licensing Staff	Person(s) employed in the Technology Transfer Office whose duties are specifically involved with the licensing and patenting processes.
Start-up Company	A Company formed around university technology for which a license has been issued.

Table 1. AUTM Technology Transfer Metrics

TEDCO has been tracking AUTM metrics since 2002 to assist it in designing programs to fill gaps in the technology transfer process. To avoid inappropriate comparisons of institutions with varying amounts of research funding, the TEDCO outcome measures, shown in Table 2, are rates normalized to the level of research expenditures. Normalizing the technology transfer

outcomes by research expenditures is a widely accepted strategy for evaluating program infrastructure between institutions of varying size.

Normalized Metric Name	Normalized Metric Definition
Invention Disclosure Rate	Invention disclosures per $10 million research expenditures.
Patent Application Rate	New patent applications per $10 million research expenditures.
License/Option Rate	Licenses/options concluded per $10 million research expenditures.

Table 2. TEDCO Technology Transfer Metrics

In addition to TEDCO's outcome measures, the USM institutions that operate technology transfer offices have collected and analyzed additional metrics derived from AUTM data which are shown in Table 3.

USM Metric	USM Metric Definition
Aggregate Portfolio Costs	Cumulative patent expenditures: FY 1999 through FY2007. This metric reflects the amount of investment that institutions have made in securing intellectual property.
Aggregate Portfolio Reimbursements	Cumulative patent reimbursements: FY 1999 through FY2007. Since it is customary for a university to receive reimbursement for patent expenses when a patent is licensed, this metric reflects the portion of intellectual property assets that have been licensed.

Table 3. USM Technology Transfer Metrics

Overall, the AUTM-based metrics allow comparisons between and among institutions engaged in technology transfer. Both TEDCO[4] and the USM[5] technology transfer managers have defined

[4] TEDCO-defined USM peer universities: University of Illinois Urbana Champaign, University of Minnesota, University of North Carolina, Chapel Hill, North Carolina State University, and Penn State University

[5] USM technology transfer manager-defined USM peer universities: Penn State University, Stanford University, SUNY Research Foundation (data unavailable for Stanford and SUNY in 2005), University of Michigan, University of Pennsylvania, and WARF - University of Wisconsin Madison

a set of peer universities for comparison. The lists of selected peer universities are not identical, but both represent appropriate choices for comparison peers to the USM. Comparisons have also been made between USM institutions and the national average for all 150+ universities and nonprofit research institutions reporting to AUTM ("the AUTM institutions").

Research Expenditures

The research expenditures reported by each AUTM respondent provides a basis for normalization of other performance metrics. The research expenditures reported by each institution drive the amount of research, which in turn should determine to a great extent the technology transfer outcomes: invention disclosures, patent applications, licenses and revenues, and number of start-up companies. In the period under study, FY1999 through FY2007[6] (the most recent year for which full reports are available), the USM campuses have experienced significant growth in their research expenditures. As shown in Figure 1, the USM research expenditures as a whole have grown at a substantially higher rate than the TEDCO peer campuses and the national average (AUTM Institutions). The USM tech transfer manager peer campuses have generally kept pace with USM funding since FY 2002.

[6] The metrics for 2006 are actual AUTM numbers. The numbers for 2007 are unofficial ATUM numbers supplemented where data is available from the USM institutions.

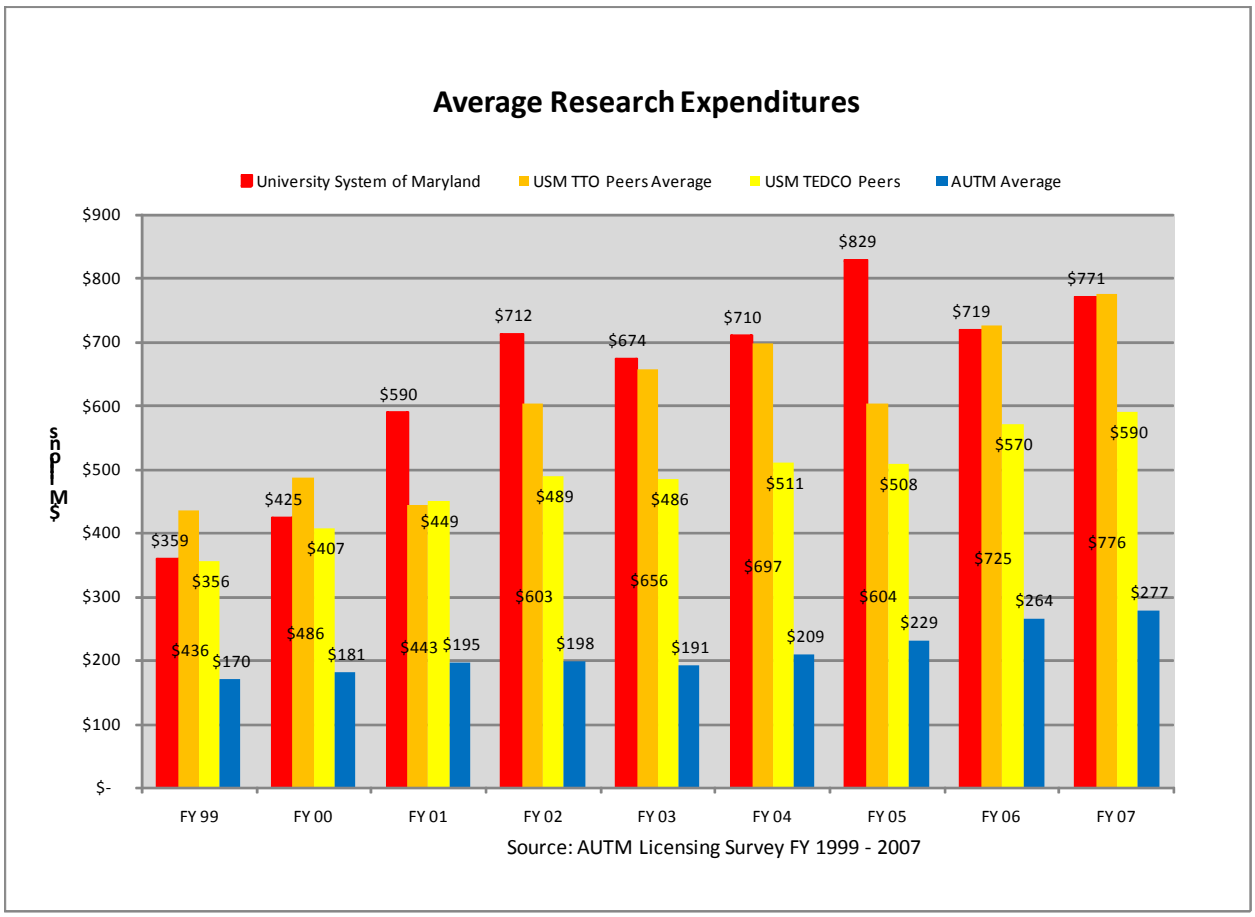

Figure 1. Research Expenditures for the USM, USM tech transfer manager peers, TEDCO peers, and AUTM Institutions

This research expenditure data should suggest all other variables being the same, the technology transfer outcomes of the USM institutions should also be growing during the period under study and should substantially exceed the outcomes of selected TEDCO peer institutions and perform on par with USM tech transfer manager peer institutions.

Invention Disclosure Rate

The invention disclosure rate (invention disclosures per $10 M in research expenditures) for the combined USM institutions is shown below in Figure 2 together with the average disclosure rate for USM tech transfer manager peer universities, TEDCO peer institutions, and the national average (AUTM institutions).

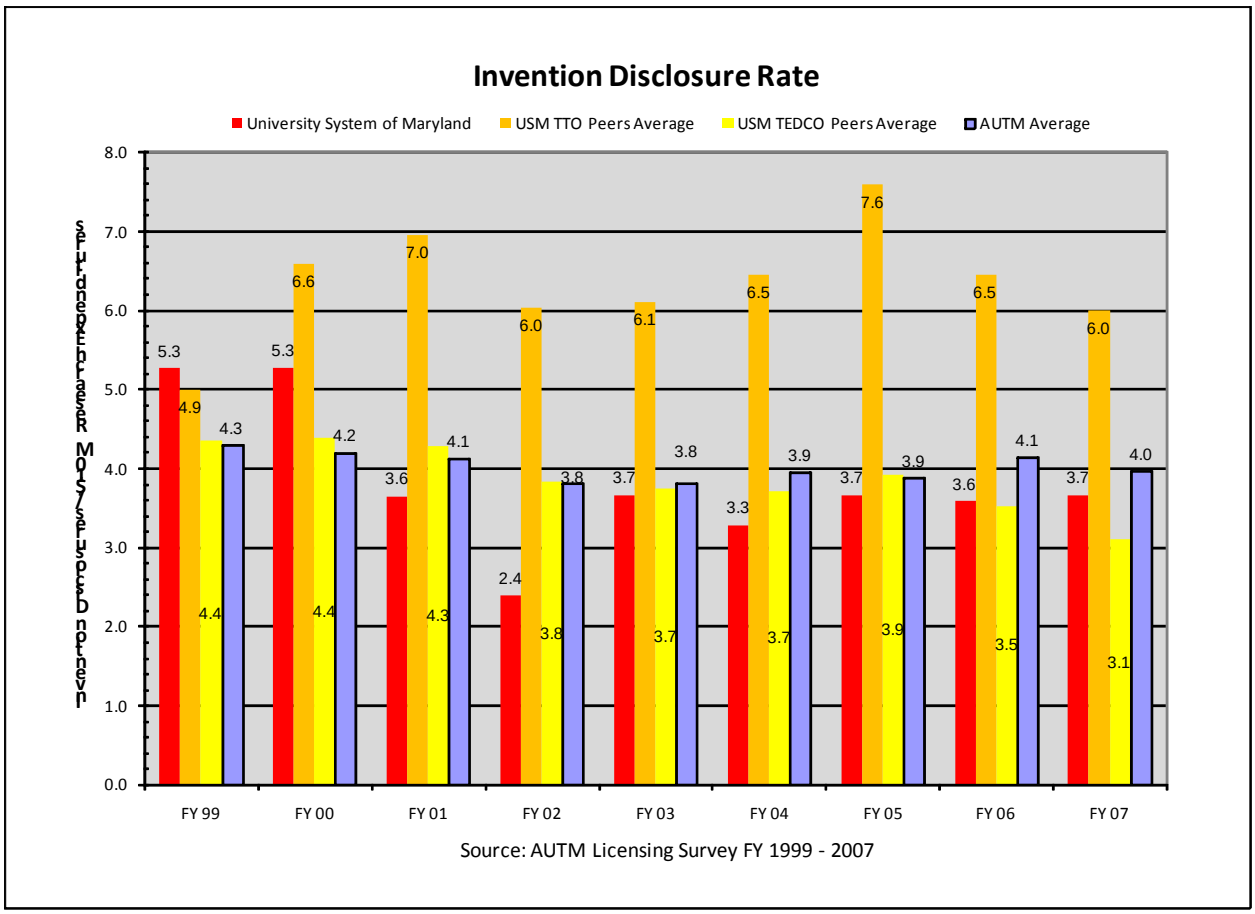

Figure 2. Invention Disclosure Rates for the USM, USM tech transfer manager peers, TEDCO select peers, and AUTM Institutions

Figure 2 indicates that the USM institutions do not disclose inventions with the frequency of the USM tech transfer manager peer institutions even though funding levels are about equal, revealing a significant gap.

As noted in Figure 1, the USM institutions have significantly more funding than both the TEDCO peer universities and the ATUM institutions. However, the invention disclosures rates of the USM have only recently exceeded the TEDCO peer institutions disclosure rate, and the ATUM institutions disclosure rate has generally exceeded the USM disclosure rate since 2001. A number of concerns can be raised from this data; however, the data does not lend itself to conclusions. The data reveals that the Principal Investigators on USM campuses do not disclose inventions with the frequency of the USM TTO peers or the ATUM institutions.

This begs a question: are these research dollars being spent on the social sciences disproportionally relative to the peer universities? Research dollars spent on the social sciences do not generally lead to invention disclosures. Is the result because federal research dollars flow easily to USM and much more basic research is pursued by USM than by others? Or does the federal money come so easily that Principal Investigators move from project to project, rarely building upon early funded work. In other words, are dollars chased for the sake of research dollars at the expense of technology creation? Or is there a lack of creativity, lack of familiarity with the process, lack of buy-in from the administration? As discussed later in this report, the technology transfer infrastructure in the USM (in terms of personnel and funding available for patent expenses) has not grown proportionally with the growth in research expenditures, and therefore, has resulted in an infrastructure that is unable to maximize the benefit (in terms of invention disclosures, and ultimately, licensing revenues) of the research conducted at the USM.

Patent Applications

Technology transfer offices review invention disclosures and make decisions on whether or not to pursue patent protection for the inventions disclosed. On a positive finding of a commercial market or on uncovering a positive patent position, a U.S. patent application is typically filed. AUTM has been tracking the number of U.S. patent applications in its annual survey and TEDCO has been tracking the USM institutions through its normalized metrics. Figure 3 below shows the rate of patent applications filed by USM, USM tech transfer manager peers, USM TEDCO peers and the ATUM institutions.

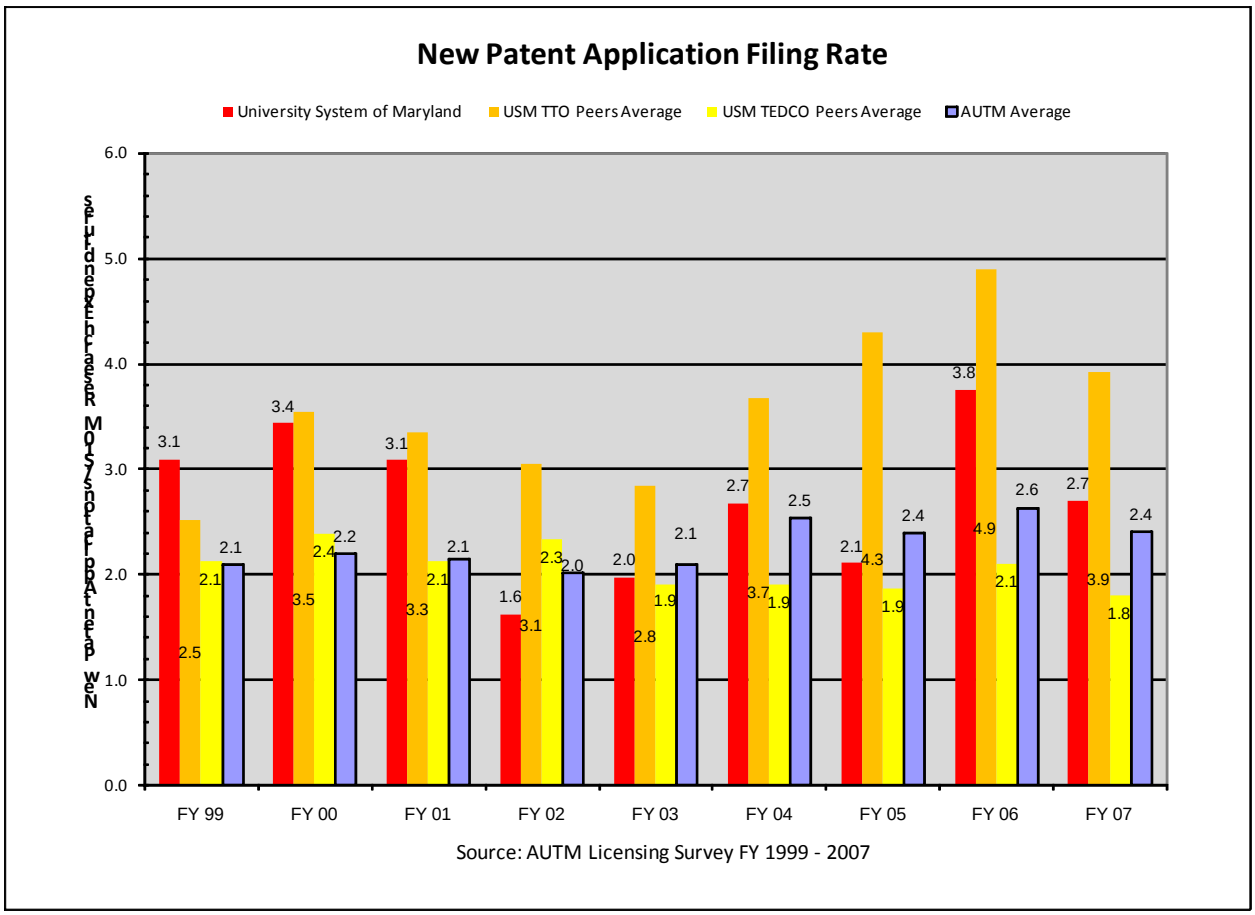

Figure 3. Patent Applications Filed vs. Research Expenditures for USM, USM tech transfer managers peers, TEDCO peers, and AUTM Institutions

Figure 3 reveals that the USM patent filing rate has generally been greater than the filing rate of USM TEDCO peer universities. The USM rate of filing is also greater than that of the ATUM institutions, but the rate difference is not as large relative to the USM TEDCO peer universities. It is worth repeating that both of these comparison groups, USM TEDCO peer universities and ATUM institutions, receive more invention disclosures than the USM and thus an anomaly appears. One can conclude that the USM is filing more patent applications from a pool of disclosures not as diverse as these two comparison groups. The third comparison group however, the USM tech transfer manager peer universities, have been filing many more patents than USM since about 2002. This appears completely consistent with the disclosures rates set forth in Figure 2. The USM tech transfer manage peers receive more invention disclosures than any aggregated group highlighted in this report and subsequently file more patent applications.

The greater of number of disclosures provides a pipeline or basis for filing more patents and executing more licenses.

Figure 4 shows over the entire reporting period that the financial resources devoted by USM institutions to the filing of patent applications are a standard deviation lower than those of selected peer universities. While the USM patent filing rate has been higher than some of the selected peers and lower than other selected peers, the expenditures per patent have been substantially lower.

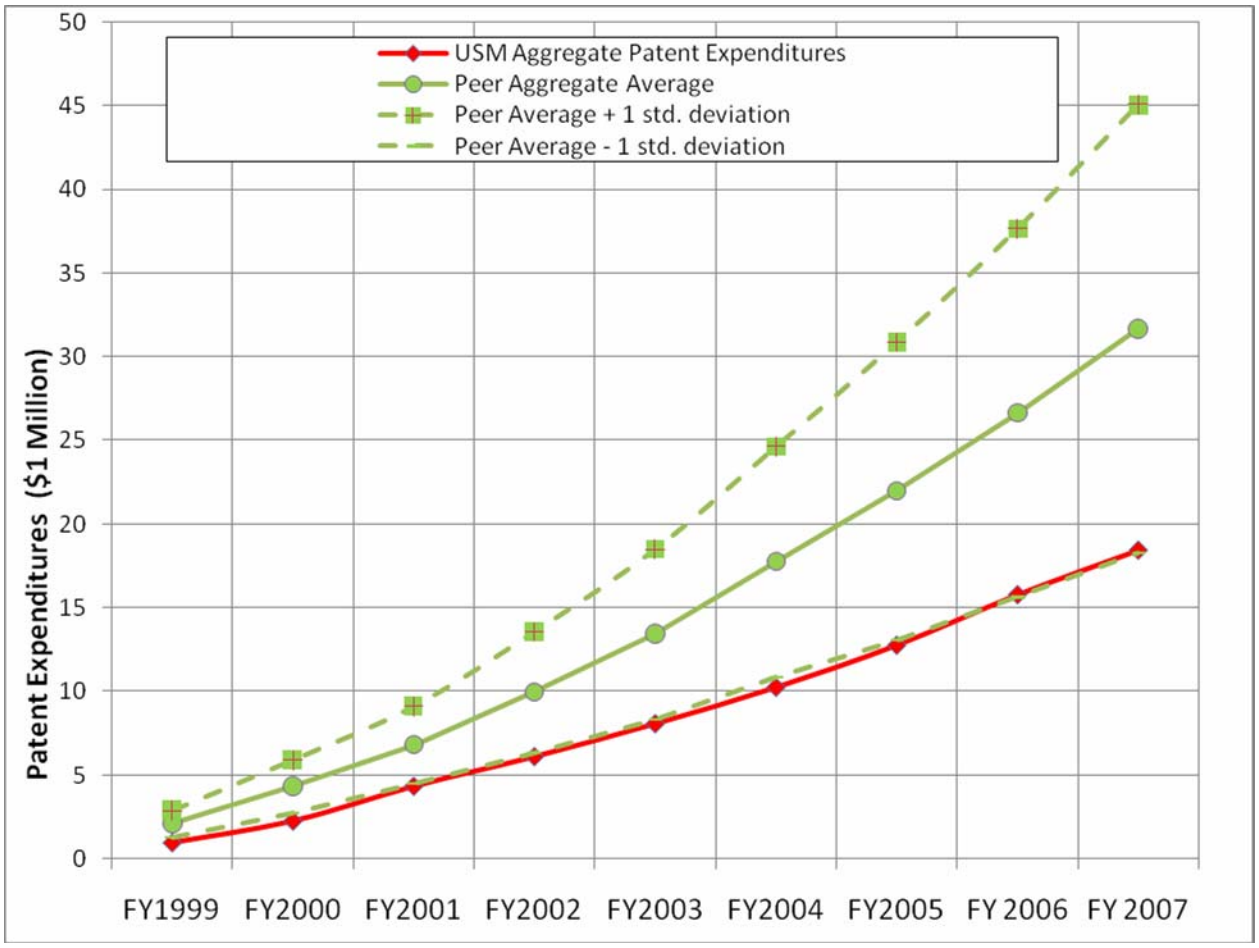

Figure 4. Patent Expenditures

Obtaining an appropriate level of intellectual property protection requires an aggressive approach that at times includes filing several patents around one technology. In many cases, a lone patent might not offer a potential licensee sufficient value for it to pursue a license.

Licensing Rates

In general, technology transfer offices, on receipt of an invention disclosure begin marketing the technology to potential licensees for commercial development of the invention.

Although issuance of a patent enhances the probability that a technology will be licensed, an issued patent is not necessarily required to license or option a technology. Thus, the licensing rate is based on invention disclosures received. The licensing rate per invention disclosure for USM institutions, USM tech transfer manager peers, USM TEDCO peers, and the AUTM institutions average is shown above in Figure 5.

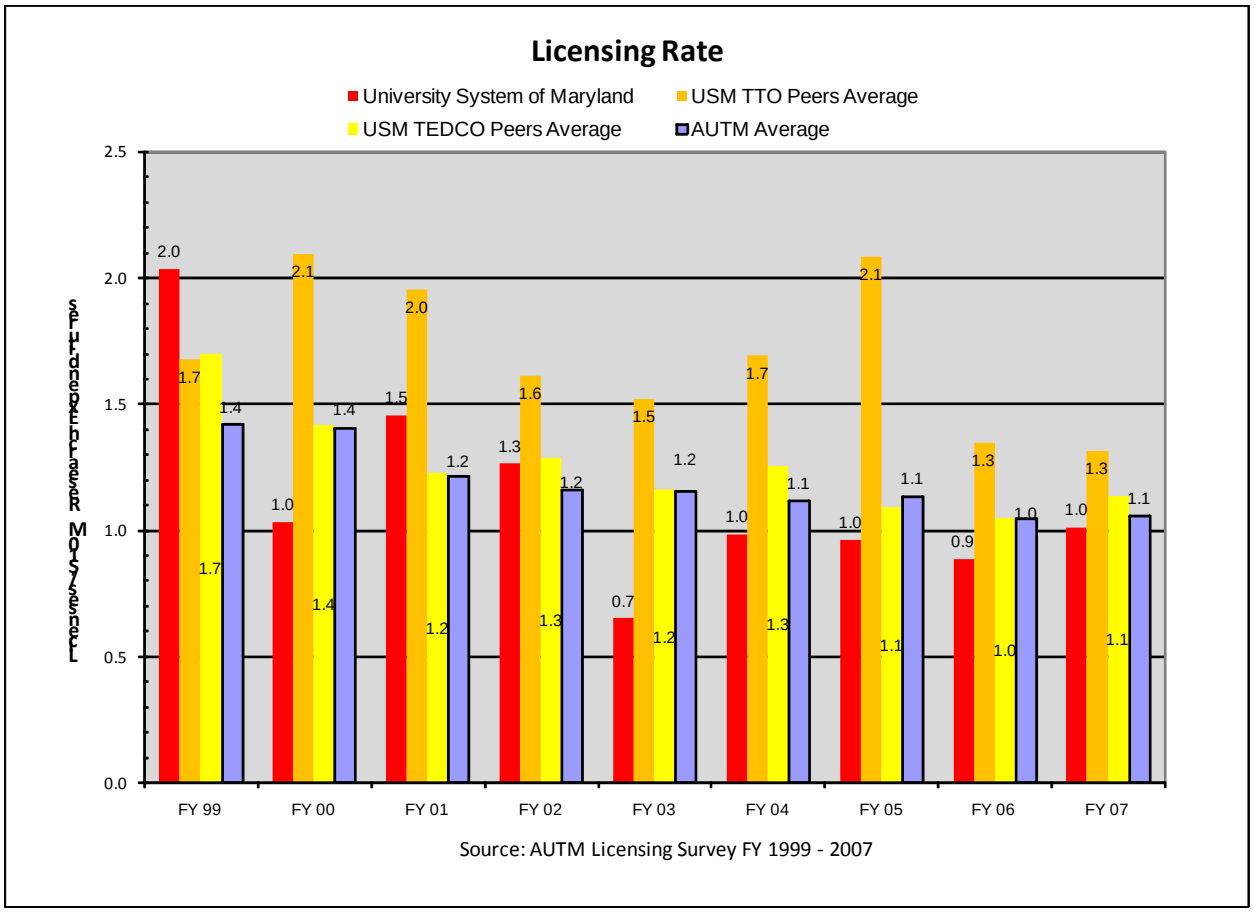

Figure 5. Licensing Rates for the USM, USM tech transfer manager peers, TEDCO peers, and AUTM Institutions

The plots indicate that the USM licensing rates have been below all three comparison groups since 2003 and the greatest gap exists in comparison of the USM to the USM tech transfer manager peers. This is consistent with the data shown in Figure 2, the Invention Disclosure Rate.

Patent Reimbursement

A metric proposed by the USM technology managers is based on reimbursed patent expenditures. Since it is customary for an institution to receive reimbursement for patent costs when a license agreement is signed, such a metric reflects, to a certain extent, licensing activity. Figure 6 plots aggregate patent reimbursements against those of peer universities defined by USM technology transfer offices.

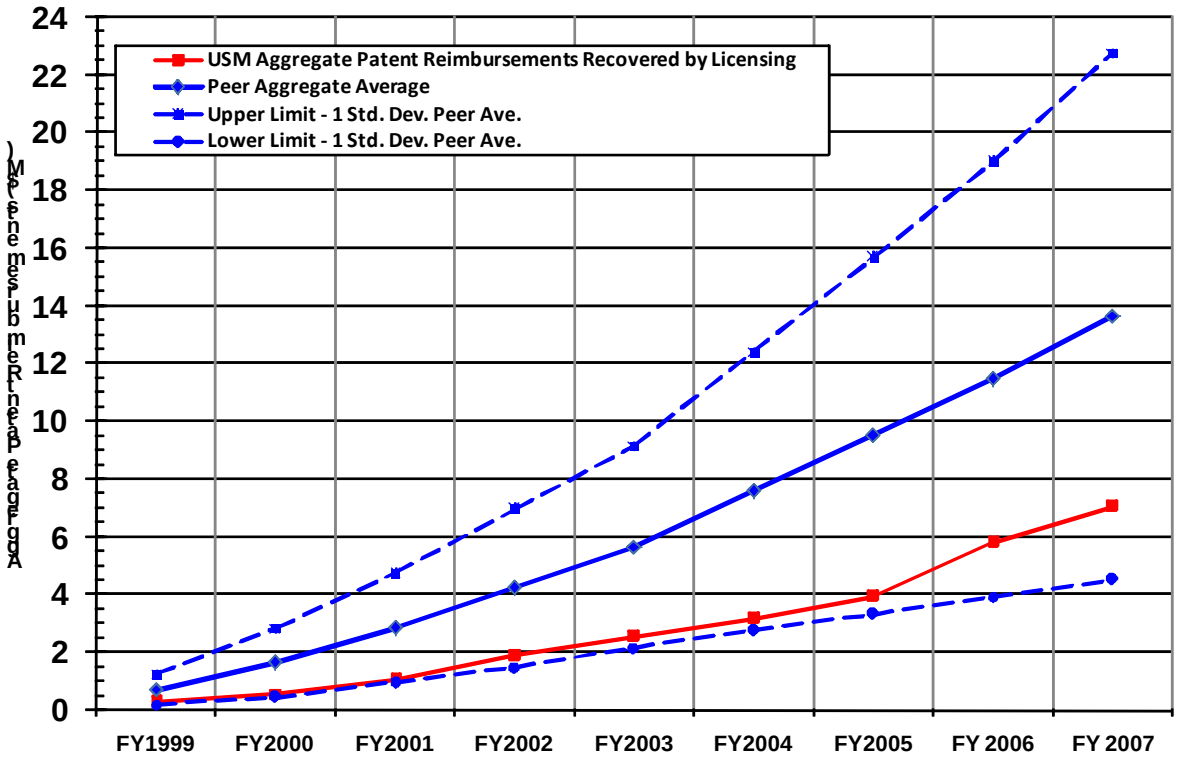

Figure 6. Patent Reimbursement

An overall evaluation of licensing activity from this data shows that the USM lags far behind the average of the USM tech transfer manager peer universities. In fact, when Figure 4 is taken into consideration with Figure 6, a strong correlation between investment in patents and licensing activity becomes evident. In both cases, the USM lags the tech transfer manager peer's average by a standard deviation. This might suggest that an increase investment in patents would correlate to an increase in licensing activity. It may also suggest, in combination with Figure 8, that a good part of USM licensing is devoted to start-up activity where upfront money and patent reimbursement dollars are non-existent.

Staffing

"AUTM asserts that technology transfer success is largely dependent on staffing and we also found the number and quality of staff appears to be a significant factor in an institution's success." [7]

Staffing at USM technology transfer offices is also a key component of resource allocation. A technology transfer office must be adequately staffed to be effective in developing relationships internally with inventors who are receiving an increasing level of research funding as well as development of external relationships with commercial partners. Figure 7 shows the number of full-time equivalent licensing officers employed at USM technology transfer offices vs. research expenditures.

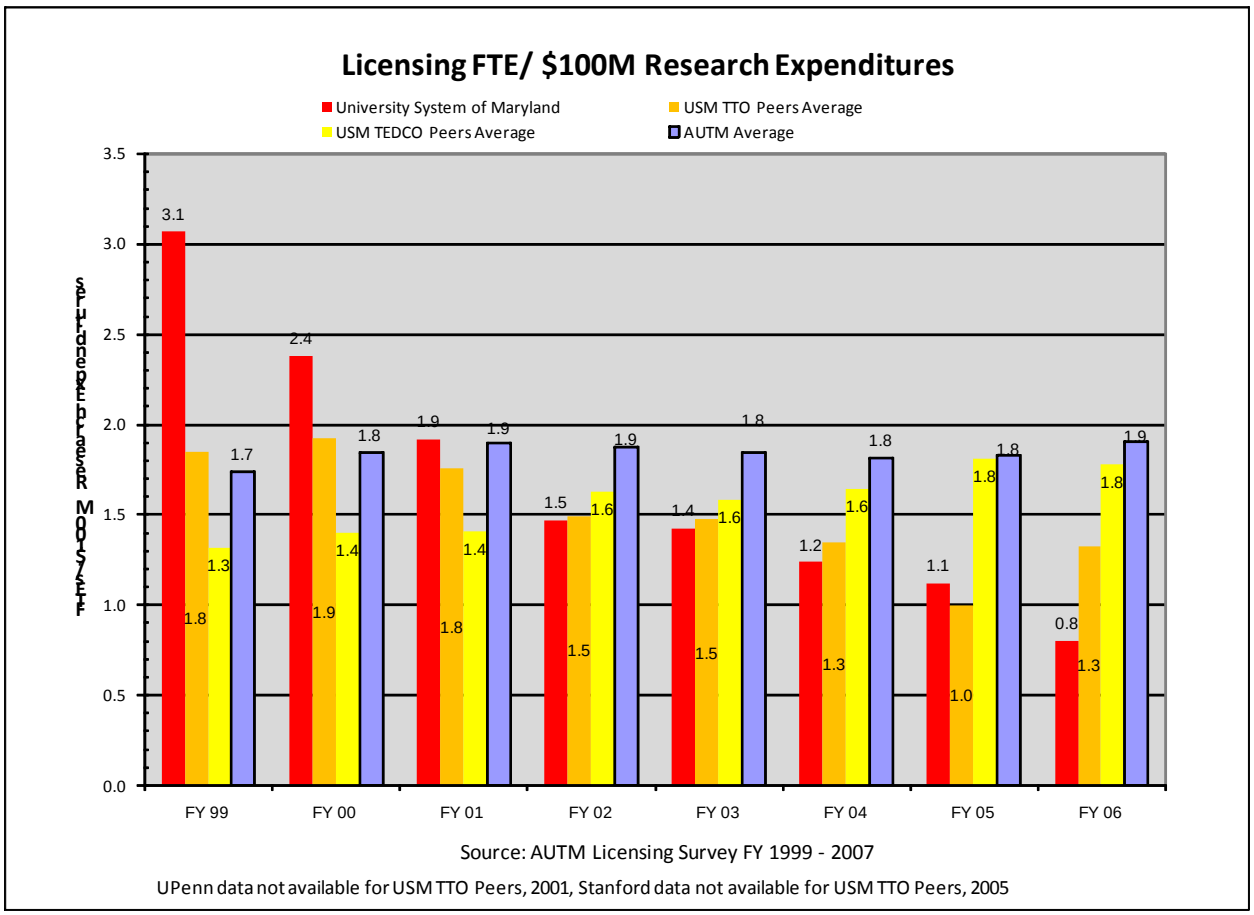

Figure7. Licensing Staff/$100 M Research Expenditures, USM tech transfer manger peers, TEDCO peers, and AUTM Institutions

[7] Innovation Associates, Technology Transfer and Commercialization Partnerships, pg 15, Oct 2007; quoting AUTM U.S. Licensing Survey: FY 2005 page 18.

Figure 7 shows that in FY 1999 and FY 2000, the rate of USM licensing staff exceeded the rate of the three comparison groups. It is also interesting to note that the only instance in which the USM out preformed all comparison groups in licensing rates was in 1999 when USM staffing was at a peak and greater than all other aggregated groups reported here. This is consistent with the AUTM assertion appearing at the beginning of this section.

Figure 7 also shows over the study period that professional staffing of all three comparison groups has remained generally flat. One can also argue, reviewing Figure 5 *Licensing Rates,* that the licensing rates of the TEDCO peers and the AUTM institutions has remained flat over the study period. Such comparisons again appear to support the AUTM assertion.

Figure 7 also reveals a dramatic march to decline in the number of full-time licensing professionals at the USM. As Figure 1 *Research Expenditures* shows research expenditures climbed at a hefty rate at the USM over the reporting period and Figure 7 reveals professional staffing numbers did not keep pace. In fact, the number of professionals at USM has declined *every year* over the reporting period. These declines may indicate more than a pattern. What is remarkable is the fact that the USM licensing rates (Figure 5), like the comparison groups have remained flat, and did not decline as one might have predicted with such a decline in FTEs. Understaffed technology transfer offices cannot meet internal or external demands and this resource-deficit undermines marketing efforts, licensing efforts and commercialization success in Maryland. If the downward trend in numbers of professional licensing staff continues, or does not increase, one can predict that licensing rates will eventually decline.

Start-ups

A metric added to this report in 2007 highlights start-up activities. Creating new start-up companies to commercialize University Intellectual Property fits well with national and local government economic development initiatives. "If circumstances are favorable, a positive impact on the region may also be seen through the creation of regional clusters, increased inward investment by larger companies and new highly skilled jobs being created in technology-related sectors...benefits are only achievable if the start-up companies created are of sufficient quality to survive in a commercially competitive market."[8]

[8] How to Build and Invest in Successful University Spinouts, Dr. Kenny Tang, page 24, copyright 2004

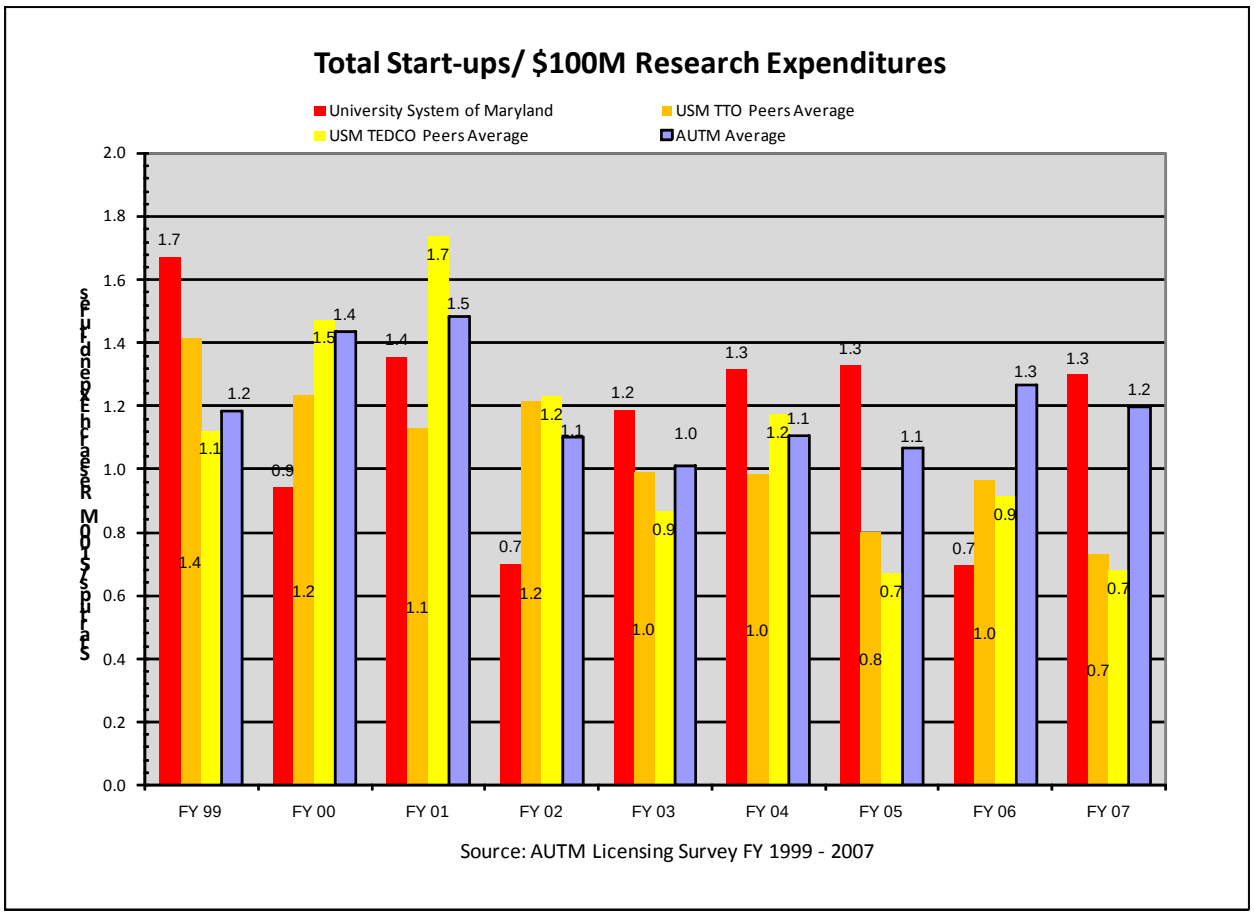

Figure 8. Start-up companies formed/$100M Research Expenditures for USM, USM tech transfer peers, TEDCO peers, and AUTM Institutions

Figure 8 shows that USM start-up activity is variable over the years but this variability is generally consistent in activity with peers and the AUTM institutions. Notably, the USM activity exceeds that of the USM tech transfer manager peers, TEDCO peers and AUTM institutions every year starting with FY 2003. TEDCO's TechStart Program, inaugurated in FY 2008 and designed to facilitate university start-ups, should be of assistance in maintaining and increasing this USM edge.

This metric suggests that the technology transfer offices of USM are aware of the quality of invention disclosures that they do receive and that they are sensitive to USM's economic development contribution to the State. This metric, like the Figure 7 metric, also highlights the challenging job the tech transfer offices are doing. The metric does not speak to the quality of the companies created.

Miscellaneous

Additionally, institutions within the USM are experimenting with different approaches to commercialization strategies. UMCP, College of Engineering launched a venture-oriented program called Venture Accelerator (VA) to promote spin-out companies. However, results could be improved with better collaboration between the VA program and the technology transfer office. Ideally, these two offices should be co-located and report to the Vice President of Research. Separation of these functions supports neither cooperation nor efficiency. As an example of cooperation and efficiency, UMB has appointed the former head of the Maryland Venture Fund as Director of Strategic Investments and she, along with the Assistant Vice President of Technology Commercialization, report to the Vice President of Research.

UMBC has developed the ACTiVATE Program. This is a formal hands-on entrepreneurial program from which twelve (12) women-owned start-up companies have been created.

UMBI has implemented a Proof of Concept Fund that supports the further development of early-stage technology.

All of the technology transfer offices in the State have banded together to create a newsletter and to populate a website called InvenioIP. In theory all available intellectual property of the USM can now be found at one source. See www.InvenioIP.org. The site also provides a market presence for those in the USM system that do not have a direct access to a technology transfer office.

Summary

TEDCO and USM metrics derived from the AUTM raw data clearly show that the USM institutions can convert invention disclosures to patent applications and patent applications to licenses, and that start-up companies are generated on a better than equal basis as efficiently as their peers and the AUTM institutions. However, the value derived from these licenses, measured both directly by licensing income and indirectly using patent reimbursement as a measure of returned value, lags far behind that of both sets of selected peer universities and the AUTM institutions.

Figures 4 and 7 show clearly that the USM institutions devote far less resources to technology transfer than their peers, both in patent funding and in professional staffing. Outcomes measured by patent reimbursement are proportionately lower.

These measures show that the resources devoted to technology transfer have been significantly lower at USM institutions than at their selected peer universities and the outcomes have been lower as well. It is also evident that staffing has not kept pace with rising research expenditures.

At the same time the metrics, such as the number of licenses, the conversion of invention disclosures to patents and the formation of start-up companies, and the initiatives of the technology transfer offices highlight the fact that those employed in technology transfer offices are industrious and are making do with what has been handed to them.

The key conclusion reached in this analysis, and which is the same conclusion reached in prior years, is that the USM devotes substantially fewer resources to technology transfer, measured both by patent expenditures and staffing, than their peers and the outcomes reflect the lack of commitment. For the USM institutions to achieve parity with their peers, the System should consider additinoal resources to the technology transfer function.

Technology Business Incubators and University-Affiliated Research Parks

The Joint Chairman's Report also tasked TEDCO and USM with reporting on the performance of affiliated business incubators and the university-affiliated research parks. This task is made difficult by the lack of a national organization like AUTM that collects statistics for university-affiliated research parks. There are currently twenty (20) technology incubators in Maryland, many with connections to university facilities.

Technology Business Incubators

Since introducing the "Maryland Technology Incubator Program" in 2001 as part of TEDCO's statutory requirements, successful programs have been created and investments have been made in the State's technology business incubators. Programs have included the Incubator Development Fund (capital incubator projects requiring a minimum 1:1 match); Feasibility Study Grants (to study potential new or expanded facilities; grants require a minimum 1:1 match); Best Practice Grants (for incubator managers to evaluate, analyze and document their best practices); Intensive Business Assistance Grants (initially funded with a grant from the U.S. Department of Commerce's Economic Development Administration (EDA), these grants provide incubator managers with discretionary funding to provide needed and direct assistance to tenant companies); and other grants and programs supporting the annual Incubator Company of the Year Awards, the Legal Resource Center, and activities of the Maryland Business Incubation Association.

To date, nearly $12 million in State and Federal funding for these programs has resulted in significant leverage, positive exposure, and increased square feet of technology business incubator facilities in the State. Twelve current and pending Incubator Development Fund

facility projects have leveraged over $29 million from local jurisdictions and institutions, yielding an additional 300,000+ square feet of incubator space. Twenty-six feasibility study grants have yielded over $670,000 in matching funds from local jurisdictions and institutions, resulting in four of capital projects funded by TEDCO and other new local technology initiatives. Best Practice Grants, only offered FY2001 through FY 2003, yielded over $450,000 in matching funds and supported thirteen projects. EDA and TEDCO funded Intensive Business Assistance grants, totaling over $1M, have provided incubator tenant companies with invaluable assistance in negotiating strategic investments and partnerships, raising venture funding, recruiting top management, reviewing business plans, developing market strategies, and so on.

In addition, the annual Incubator Company of the Year Awards has honored and recognized the superb efforts of the incubator managers and their staff, as well as the finalists and winners of these coveted awards. Each of eight years running, hundreds of incubator companies have been deemed, by a committee of distinguished economic development and venture capital professionals, as the best in their respective categories, whether a new or graduate incubator company, or expert in their field of technology.

In total, the investment of State and Federal funding of over $12 million has resulted in a leverage of over $30 million, a ratio of $2.50 : $1. The significance of the Technology Business Incubator Program in Maryland is validated by its very inclusion in Governor Martin O'Malley's Bio 2020 Initiative. The initiative calls for investment in Maryland's Technology Incubator Network of $60 million over the next 10 years and leveraging twice that from other entities.

University-Affiliated Research Parks

"The country's oldest research parks have been around a half-century; many were built two decades ago, according to the Association of University Research Parks." [9] Tenants of university research parks are primarily private sector companies. A "typical park has an operating budget of less than $1 million year, and most parks have limited profitability."[10]

University-affiliated research parks generally have no common set of operating principles. For example, the role, history, and business attraction approach of North Carolina's Research Triangle Park is quite different than that of Centennial Park at North Carolina State University,

[9] *The Baltimore Sun* April 24, 2007 http://www.baltimoresun.com/business/bal-bz.umbc27apr27,0,759977.story?coll=bal-business-headlines

[10] Characteristic and trends in North American research Parks 21st Century directions, Executive Summary, prepared by Battelle, October 2007 see http://www.aurp.net/more/ExecutiveSummaryBattelle.pdf

despite these two parks being within a few miles of each other. Thus, it appears in order "to compete in technology development, a region or a state must differentiate itself and cultivate and sustain specialized areas of expertise where it can become a word leader."[11]

Finally, research parks are large scale physical developments, and thus take many years for development. In particular, many of the parks in Maryland are in the earlier stages of development, either in the planning stages (such as the Montgomery College research park) or in the land assemblage/land development stage (such as the East Baltimore Life Sciences Park).

There are currently six University-affiliated research parks in Maryland:

- East Baltimore Life Sciences and Technology Park
- Johns Hopkins University Montgomery Campus
- Montgomery College Science and Technology Park
- University of Maryland Baltimore County bwtech@UMBC
- University of Maryland M Square Research Park in College Park
- University of Maryland Baltimore BioPark

The first two parks listed are associated with Johns Hopkins and the third is with Montgomery County; these three parks will not be discussed.

In 2006, the five entities banded together to form a statewide association, Research Parks Maryland (RPM). The objectives of RPM include developing best practices for university-affiliated research parks and establishing performance metrics.

University Maryland Baltimore County; bwtech@UMBC

UMBC was the first research institution in the state to build a research park adjacent to any of the USM campuses. This research park will ultimately comprise a 41-acre research and technology community having a total development capacity of 350,000 square feet of office and laboratory space and it will comprise five buildings.

The first building at 5521 Research Park Drive houses the headquarters of RWD Technologies headquarters. This is a 62,000 square foot three-story building.

A second building, with three stories and 60,000 square feet, located at 5523 Research Park Drive, "is fully occupied by several companies, including BDMetrics, Solvern Innovations, [Next

[11] Characteristic and trends in North American research Parks 21st Century directions, Executive Summary, prepared by Battelle, October 2007 see http://www.aurp.net/more/ExecutiveSummaryBattelle.pdf

Breath], Convergent Technologies, Med-IQ, Goddard Earth Science and Technology Center (GEST), Erickson School of Aging Studies, Joint Center for Earth Systems Technology (JCET), ACTiVATE®, and Invoke Systems. Both buildings are owned and managed by Merritt Properties, LLC."[12] Next Breath and Solvern are listed among the top 50 growing businesses in the region by SmartCEO Magazine. [13]

The third building in the park is one-story, 23,500-square-foot building located at 5522 Research Park Drive. It "houses the United States Geological Survey (USGS) MD-DE-DC Water Science Center, with which UMBC's researchers have collaborated over the years in analyzing the region's water resources and how to preserve them. Corporate Office Properties Trust (COPT) developed the USGS building..."[14]

This year, COPT also completed the fourth building in the park; a 110,000 square-foot multi-tenant facility located at 5520 Research Park Drive. RMF Engineering, currently headquartered in downtown Baltimore, will move into the building's third floor in January 2009 and has plans to collaborate with UMBC's College of Engineering and Information Technology.[15] "RMF will assist in curriculum development, consulting with faculty and guest lecturing in engineering courses. In addition to its work with students and faculty, RMF intends to take advantage of the professional development courses offered by UMBC Training Centers at bwtech@UMBC."[16]

"Erickson Retirement Communities is developing a $20million building, located at 5525 Research Park Drive, the fifth building in the Research Park." [17] This building is almost completed and some of the Erickson IT Team occupies space in the building. [18] "Erickson will move its information technology department, adult living national broadcast network Retirement Living TV (RL-TV) and private charitable foundation to the 100,000 square-foot building, expected to be completed in 2008. The move will increase research collaboration and internship opportunities between the Erickson organization and UMBC students and faculty in The Erickson School and visual arts, communications and information technology programs."[19]

[12] http://www.bwtechumbc.com/home.php

[13] http://www.explorebaltimorecounty.com/business/6042/research-park-firms-growth-cited/

[14] Ibid

[15] Private communication, August 4, 2008

[16] Ibid

[17] http://www.bwtechumbc.com/home.php

[18] Private communication Dec 30, 2008

[19] http://www.bwtechumbc.com/home.php

University of Maryland, College Park; M Square

Located adjacent to the University of Maryland an d the University of Maryland/ College Park subway station the University of Maryland M Square Research Park is a joint venture being developed by COPT, the University of Maryland, and Manekin, LLC ., to co-develop, lease and manage approximately 750,000 square feet of new office space in 8 buildings. The 124 acre site is owned by the University of Maryland.[20] The project when fully built out will encompass 2 million square feet and will employ 6,500 people making it the largest research park in the region. The project is set to be completed in ten years.

The focus areas of the research park include global climate change and prediction; food safety and food security; national intelligence technologies, culture and language; and public health.

Current tenants of M Square include the Center for Advanced Study of Language (CASL) at 7005 52nd Ave; The Earth Systems Science Interdisciplinary Center, Fraunhofer Center for Software Engineering, and the Joint Global Climate Change Research Center all located at 5225 Research Court.

Construction is underway and scheduled to be completed in 2009 of a 120,000 square foot building located at 5250 Research Court. This building will house the headquarters of the Intelligence Advanced Research Project Activity (IARPA). "…the new facility will serve as a magnet, continuing to attract to M-Square a range of public and private organizations that want to be close to IARPA and the University because of the opportunities for collaboration."[21]

Affiliated tenants[22] in the park include the American Center of Physics at One Ellipse, the FDA Center for Food Safety, the USDA Animal and Plant Health Inspection Service, and the NOAA National Weather and Environmental Prediction Centers, all on River Road and Raytheon Corporation on Rivertech Court.

University of Maryland, Baltimore; UMB BioPark

Established in 2004 and located on the academic medical center campus of the University of Maryland, Baltimore, the University of Maryland BioPark will offer 1.8 million square feet of wet lab and office space for biomedical companies and research institutes at final build-out. As of 2008, two multi-tenant buildings totaling 350,000 square feet have been completed and a third 180,000 square foot building is under development. Additionally, the State of Maryland began construction on a new 110,000 square foot Forensic Medical Center in the BioPark scheduled for completion in July 2010. In 2007, the Association for University Research Parks

[20] http://www.reuters.com/article/pressRelease/idUS119265+05-Jun-2008+BW20080605

[21] http://www.newsdesk.umd.edu/uniini/release.cfm?ArticleID=1561

[22] http://www.president.umd.edu/policies/docs/VI-2800A.pdf references the University of Maryland Policy on Access to University Facilities, resources and Privileges by M-Square Research Park Affiliates.

(AURP) named the Biopark the 'Emerging University Research Science Park' of the Year. Amenities in the BioPark include a BioInnovation Center) that offers short-term, pre-built lab space for emerging companies, a well-equipped conference center and a fitness center.[23]

About 350 people are employed at the BioPark including Ph.D. level scientists, laboratory technicians and administrative workers. The following companies are now tenants of the BioPark.

Building One, 801 West Baltimore Street (215,000 sq feet), includes:

Alba Therapeutics Corporation
Center for Vascular and Inflammatory Diseases
FASgen, LLC
Harbor Bank
IRAZÚ BioDiscovery, LLC (an affiliate of Paragon Bioservices)
University of Maryland, Baltimore Human Protections Office
SNBL Clinical Pharmacology Center, Inc.

Building Two, 800 West Baltimore Street (180,000 square feet), which also houses the BioInnovation Center technology business accelerator, includes:

Biomere LLC
Gliknik, Inc.
Institute for Genome Sciences
Paragon Bioservices
Westat

[23] http://www.umbbiopark.com/campus.aspx?details=4

Future Directions

The lack of currently available national benchmarks for comparison makes it impossible to report definitively on a comparative performance of Maryland's Research Parks.

USM and TEDCO propose a two-part effort to develop appropriate measures of performance.

1. Identification of existing national performance standards and benchmarks for research parks to the extent they are available and relevant; and
2. Developing within RPM a set of performance metrics consistent to the extent possible with national standards by which research park performance can be measured. Measures that could be considered include:
    - Total square feet constructed
    - Total square feet rented
    - Total square feet occupied by private industry
    - Total number of companies occupying space in Park
    - Total employment in Park
    - Total square feet occupied by University
    - Amount of sponsored research dollars to University contributed by Park occupants
    - Number of licenses for University technology signed by Park occupants
    - Average salaries of Park tenants relative to salaries in region
    - Post Docs retained in the state as a result of Park.

Some of these metrics reported herein highlight the accomplishments of Maryland's Research Parks.