To:
President Barack Obama
The White House
1600 Pennsylvania Avenue NW
Washington, DC 20500

Dr. Lawrence H. Summers
Director, National Economic Council
Executive Office of the President
The White House
1600 Pennsylvania Avenue, NW
2nd Floor, West Wing
Washington, DC 20500

Dr. John P. Holdren
Director, Office of Science and Technology Policy
Executive Office of the President
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Washington, DC 20502

Submitted Through: NEC_General@who.eop.gov

From: Susan Hockfield
President, Massachusetts Institute of Technology (MIT)

Date: May 26, 2010

Subject: Recommendations Concerning Commercialization of University Research; Request for Information

Dear President Obama, Dr. Summers, and Dr. Holdren:

I am writing in response to the National Economic Council and Office of Science and Technology Policy's March 25, 2010 Request for Information (RFI) on Commercialization of University Research.

A passion for innovation and entrepreneurship pervades MIT's history and culture. In 1861, the act of the Massachusetts State Legislature that launched the Institute charged MIT with the "development and practical application of science in connection with arts, agriculture, manufactures, and commerce." Even our motto, *mens et manus* — mind and hand — underscores our distinctive commitment to serving society through the practical fruits of university research.

Our history also teaches us, however, that — without expert guidance and support — the path from laboratory discovery to world-ready product can be long, circuitous and frustrating. Brilliant scientists and engineers may know next to nothing about protecting their intellectual property or starting and managing a business; even breakthrough technologies can languish without funding at sufficient scale or a clear vision of their application. With its longstanding focus on problem solving and its constructive relationship with industry, MIT has long instilled in students and faculty an entrepreneurial attitude; in recent decades, we have also worked to provide the practical tools and advice to help their entrepreneurial ventures succeed. The result is an "Innovation Ecosystem" that helps good ideas traverse the "valley of death" to reach the distant heights of market success, and it has served us so well that we believe it may serve as a useful model for others.

Based in part on MIT's experience, and after consultation with those involved with technology transfer across the Institute, this submission will focus on three areas:

- Specific suggestions for changes in federal policies, recommended targets for additional funding, and ideas regarding certain areas of technology transfer that may require additional focus;
- A detailed description of MIT's Innovation Ecosystem, along with recommended best practices for fostering commercialization and diffusion of university research; and
- The critical role the Bayh-Dole Act plays in the successful commercialization of federally-funded research.

I. Recommendations

I believe the following recommendations for government action would encourage increased investment in basic research, enhance the impact of federally funded research, and improve the process of transferring research in the lab to commercialization by the private economy. In Section II, I provide an in-depth description of MIT's Innovation Ecosystem, which provides additional details and best practices to support several of these recommendations.

- **Implement Model Innovation Centers.** Implement ten pilot model innovation centers across the U.S. at research universities to develop, document, and assist in nationwide dissemination of "best practices" for encouraging innovation and entrepreneurship by students, faculty, staff and alumni. These centers, similar to MIT's Deshpande Center (described below), would engage in a variety of activities including making connections to industry and capital; educating and mentoring; creating ties to regional businesses; providing grants or seed money; and connecting faculty and students. These centers would also disseminate best practices and form the nucleus of a community amongst U.S. universities enhancing innovation. The Administration is seeking modest initial funding for such an effort in its

Fiscal Year 2011 budget request for the National Science Foundation; this requires expansion.

- **Support On-Campus Mentoring Services.** Support expansion and escalation of mentoring services based on the proven MIT Venture Mentoring Service model (described below) at research universities across the U.S. Additionally, support formation of an Innovation Mentoring Consortium that would enable the sharing of knowledge, experiences, and best practices amongst mentoring organizations to enhance effectiveness and further increase innovation output.

- **Add Technology Transfer Costs to Indirect Cost Pool**. Many schools, particularly in the current economic climate, lack funding to build a patent portfolio and hire the staff to create successful technology transfer offices. Many existing offices are now facing cutbacks. Allowing technology transfer costs (e.g., patents and staff) to be included in the indirect cost pool for federally funded research (and perhaps excluded from the administrative cost cap) could provide schools with the resources to bolster and build their Technology Licensing Office (TLO) programs.

  At the same time, federal programs (including at the Departments of Energy and Agriculture) are increasingly asking for "matching funds" from non-profit universities for applied research. This is a very detrimental move in the wrong direction, and these cost-sharing policies should be reversed. University funding streams, unlike those in the private sector, do not have a profit pool that could be allocated to such sharing.

- **Promote Policies that Encourage Entrepreneurship**. Encourage government and universities to examine their rules and regulations to eliminate barriers to responsible faculty/staff entrepreneurship. Medical schools and teaching hospitals have especially high potential for entrepreneurship that could benefit society broadly, while also contributing to economic growth, consistent with high standards of integrity. In those institutions, policies that strongly promote openness of relationships, appropriately overseen by senior faculty committees, can ameliorate the potential problems that arise from the needed medical faculty connections to biomedical industry.

- **Host Technology Innovation Fairs**. Federal R&D agencies should consider holding bi-annual technology innovation fairs that bring groups of outstanding university inventors together with supporting government agencies, companies, venture capital (VC) firms, and financial institutions in emerging technology sectors. The inaugural Advanced Research Projects

Agency – Energy (ARPA-E) Energy Innovation Summit could provide a very useful model.[1]

- **Support Small Firm/University Collaborations**. Encourage research agencies, where appropriate, to adopt the Defense Advanced Research Projects Agency (DARPA)-hybrid model for a portion of their funding as part of their R&D portfolios. This approach provides awards for collaborative efforts involving small firms and university researchers.

- **Examine How to Attract More Venture Capital Investment.** Conduct an examination of the factors that induce Venture Capital firms (VCs) to invest in early-stage technologies. Typically, VCs only invest in physical-science-based technologies when they are near commercialization, and they invest in very few startups during economic downturns. We need to consider what factors are leading to the decrease in VC investment rates. If these issues are studied and better understood, incentive systems could be devised to influence these trends.

- **Encourage SBA Investment in New Technology Startups.** Examine the policies of the Small Business Administration (SBA) to be sure that adequate emphasis is placed upon new businesses with high growth potential (i.e., "gazelles"). In particular, there should be an explicit focus in agencies' administration of the Small Business Innovation Research (SBIR) Program for new technology startups and new business recipients that will accelerate technology implementation.

- **Enhance and Add Tax Credit Programs to Encourage Technology Transfer.** In addition to improving some of the structural problems in the research and development (R&D) tax credit and making it permanent, provide additional credit for funding for collaborations between industry and university researchers to accelerate technology transfer. Also consider dropping the incremental feature of the current credit, so it rewards significant, sustained R&D investments by firms.

- **Provide Post-Degree Visas**. Foreign-born immigrants have an unusually strong record of starting firms and bolstering our science talent base. This has long been an historic competitive advantage for the U.S. that few nations have been able to match. In order to preserve this strength, the U.S. should award five-year, post-degree visas to all foreign students in accredited university programs in STEM and management fields. These special visas should be converted easily into green cards, and their holders fast-tracked to U.S. citizenship if they continue employment in U.S. science and technology-

[1] ARPA- E Energy Innovation Summit (http://arpa-e.energy.gov/ConferencesEvents/tabid/69/vw/3/ItemID/12/d/20100301/Default.aspx)

based research and enterprises, or if they start their own U.S.-based companies.

II. The MIT Innovation Ecosystem

MIT takes a holistic and comprehensive approach to entrepreneurship and innovation that spans from education to business connections to the commercialization of university research. MIT's Innovation Ecosystem serves the entire MIT community, including students, researchers, faculty, staff, alumni, and members of the local business community. This ecosystem is founded on the concepts of: 1) nurturing and mentoring potential entrepreneurs; 2) pursuing patent protection for technological innovations resulting from MIT research to foster commercial investment in bringing such innovations to the marketplace to benefit the public; 3) engaging deeply with the surrounding business and VC community; 4) integrating entrepreneurship and innovation across all schools and departments; and 5) focusing on long-term relationships, rather than short-term gains.

The success of MIT's model is outlined in a 2009 Kauffman Foundation report that describes the Entrepreneurial Impact of MIT,[2] and documents the development of its Innovation Ecosystem. The report estimates that living MIT graduates have founded approximately 25,800 active companies, which employ approximately 3.3 million people and generate estimated annual world revenues of approximately $2 trillion — producing the equivalent of the world's 11th-largest economy.

As these numbers suggest, MIT's most important contribution to the innovation economy stems from the education that MIT provides to its students, who are the inventors and entrepreneurs it educates and inspires. The richest source of innovation is a deep understanding of fundamental science and engineering, which MIT has instilled in its students for decades. However, I also believe that MIT's entrepreneurial success flows in part from a number of initiatives that over the past fifteen years have created an Innovation Ecosystem centered on our campus and spilling into the surrounding region as well. As each of its components has taken shape and expanded over the years, the bonds between them have strengthened to form a true ecosystem that is imbued with MIT's culture of innovation and entrepreneurship. Although a host of additional factors strengthen our ecosystem, below I detail its main components:

A. The Technology Licensing Office
B. The Deshpande Center for Technological Innovation
C. The Entrepreneurship Center
D. The Venture Mentoring Service
E. Innovation Prizes

[2] Roberts, E. and Eesley, C; *Entrepreneurial Impact: The Role of MIT*; The Kauffman Foundation, February 2009 (http://www.kauffman.org/research-and-policy/mit-entrepreneurs.aspx)

F. The Industrial Liaison Program
G. Cross School/Cross Disciplinary Initiatives

A. The Technology Licensing Office[3]

MIT'S Technology Licensing Office (TLO) has a successful track record that spans decades of helping MIT faculty and researchers with patenting, licensing, and starting firms that build upon technology developed at MIT. In Fiscal Year (FY) 2009, MIT received 153 U.S. patents (second in the U.S. after the combined total of the ten universities in the University of California system) and filed 231 new U.S. patent applications. Approximately 20 to 25 new companies spin out of MIT each year.

MIT's TLO aims to benefit the public by moving results of MIT research into societal use via technology licensing, through a process that is consistent with academic principles, demonstrates a concern for the welfare of students and faculty, and conforms to the highest ethical standards. This process benefits the public by creating new products and promoting economic development. It also helps MIT:

- show tangible benefits of taxpayers' support for fundamental research;
- attract faculty and students;
- encourage industrial support of research;
- create discretionary revenue to support education and research;
- produce new job opportunities for graduates; and
- contribute to economic development locally and nationally.

While the TLO fosters commercial investment in the development of discoveries through licensing of intellectual property, MIT's TLO does not focus on short-term gains from licensing revenues. Rather, it focuses on the importance of building long-term relationships with companies, whether established firms or startups. This long-term approach has encouraged the development of an innovation cluster surrounding the Institute. Within easy walking distance of MIT, one can find some 150 biotech and pharmaceutical companies, a host of Information Technology (IT) and robotics firms, and now an emerging energy cluster.

In MIT's view, the following practices contribute to a successful TLO:

- Operate with a consistent mission that guides its activities, for example "impact not income" or "license as many technologies as possible, rather than focusing on income from a few."
- Be visible — particularly to the faculty — and have explicit senior administration support. Technology transfer should be seen as an important mission of the university.
- Encourage rational expectations, especially when it comes to expected income from licensed technologies.

[3] About the TLO (http://web.mit.edu/tlo/www/about/)

- Develop and communicate clear and simple policies — concerning publication, Intellectual Property (IP) ownership, conflict of interest, and promotion criteria — that are consistently followed by senior management.
- Work closely with the Office of Sponsored Programs with respect to IP to align sponsored research contracts with University policy and TLO mission.
- Encourage improved awareness in the academic community about creation of IP, its value, and implications.
- Provide sufficient financial support to the TLO to build a patent portfolio, with sufficient administrative support for licensing officers.
- Engage a talented, well-trained TLO staff, with positive staff retention. Candidates with business experience are preferable, as well as those with a real understanding of academic goals and principles.
- Work closely with and be responsive to the needs of faculty and students. The staff should be easy to contact and offer prompt follow-up.
- Develop strong relationships with the outside business community, including investors, lawyers, companies, etc., through participation in industry conferences and networking, and through recruiting volunteers from the business and technical community to help in mentoring, judging, speaking at the university, etc. Encourage informal contacts between business community and faculty. This includes a strong engagement with regional technology clusters.
- Minimize "review and approval" outside the TLO to streamline the process; delegate authority downward to complete transactions promptly.
- Develop and track relevant metrics such as the number of invention disclosures per million dollars of research; number of licenses; number of startups; and, if applicable, amount of industry-sponsored research. Licensing income is a poor measure of success.

B. The Deshpande Center for Technological Innovation[4]

University faculty and researchers are unlikely to be trained or skilled in forming companies and commercializing technologies, which can a major barrier in the technology transfer process. When it comes to recruiting investors, many also need help bridging the gap between basic research and a valid proof of concept. Equally important is reducing the technology and market risk so investors feel comfortable committing the resources to develop the technology outside of the university. To confront these issues, another fundamental component of MIT's Innovation Ecosystem has become the Deshpande Center for Technological Innovation. Established in 2002 with an initial donation by Jaishree and Desh Deshpande, the Deshpande Center is a Proof of Concept Center (POCC) that increases the impact of MIT technologies in the marketplace. Today, the Center depends on the financial and professional support of successful alumni, entrepreneurs, industry and investors to provide sustainable funding for innovative research and the expert guidance to help it reach the marketplace.

[4] About The Deshpande Center (http://web.mit.edu/deshpandecenter/)

The Deshpande Center supports focused translational research whose data can convince investors of an innovation's technical feasibility. The Center allows faculty and students to move from an idea and invention, through the innovation process, to a prototype product. It also fosters entrepreneurship and innovation among MIT faculty and students by providing early assistance and guidance to those with great ideas who are interested in commercializing them. It's a boot camp for innovators — they learn how to do milestone-focused research, understand market opportunities and needs, and are matched with mentors from industry and their specific technology field. The Center also connects them to resources in the external ecosystem including VCs and angel investors.

Since 2002, The Deshpande Center has funded more than 80 projects with over $10 million in grants – a process that involved more than 200 faculty and students and more than 100 volunteers. Twenty projects have spun out of the center into commercial ventures, collectively raising more than $180 million in outside financing and employing more than 200 people. Supporting projects across a wide range of emerging technologies (including biotechnology, biomedical devices, information technology, new materials, tiny tech, and energy innovations), the Deshpande Center achieves its mission through several programs including Grant Programs, Catalyst Program, Innovation Teams (i-Teams), and holding special events.

The Deshpande Center *Ignition Grant Funding* (up to $50,000 per grant) enables researchers and their students to pursue new avenues of market-driven research and participate in partnerships and programs that will help accelerate the commercialization process. Supporting work done by MIT faculty and in MIT research labs, these grants target novel, enabling, and potentially useful ideas in all areas of technology.

Innovation Grant Funding (up to $250,000 per grant) benefits projects that have progressed beyond their earliest concept stages — projects that have established proof of concept and identified a research and development (R&D) path and IP strategy. Ultimately, each grant will help a project build a package around the new technology that includes these elements to bring to VCs or companies that might invest in its technology.

The *Catalyst Program* brings together volunteers from the business community and MIT innovators to identify the best way to maximize market impact. "Catalysts" are a highly vetted group of individuals with experience relevant to innovation, technology commercialization, and entrepreneurship; they serve as mentors to faculty and student research teams. In their role as Catalysts, they provide individual contributions to the Center and do not represent any company interests.

The *i-Teams Course* is an educational collaborative effort between the Deshpande Center and the MIT Entrepreneurship Center (outlined below), where multiple research projects from within MIT are selected each semester to allow students to

evaluate their commercial feasibility and develop go-to-market strategies. The Deshpande Center also hosts a variety of *events* throughout the year to bring together MIT innovators and the surrounding ideas and business communities.

C. MIT Entrepreneurship Center[5]

MIT graduates start between 200-400 companies per year, and approximately 20 to 25 of these are started through the MIT TLO. The remaining spring to life because MIT students have acquired excellent skills in recognizing and commercializing other innovations. The MIT Entrepreneurship Center (E-Center) looks to develop precisely this in-depth grasp of the process in MIT students.

Proposed in 1990 by the then Dean of the MIT Sloan School of Management as a center to support entrepreneurship across the five Schools at MIT, the E-Center creates great value for it stakeholders by connecting technologists and business people and fostering an environment that helps them accelerate the creation of new companies together. Within MIT's decentralized Innovation Ecosystem, the E-Center 's programs help instill in students the skills and attitudes it takes to succeed as entrepreneurs.

The E-Center also builds alliances between MIT entrepreneurs and local corporate and venture capital leaders, building a community of academic, government, and industry leaders focused on entrepreneurial ventures. MIT uses the E-Center to connect with regional technology clusters in such areas as biotechnology, energy, and robotics. As part of its mission to train successful entrepreneurs who will drive the global high-tech economy, the E-Center also partners with institutions, companies, and individuals in other regions of the world interested in innovation-based entrepreneurship.

Home to many of the world's leading researchers on innovation-based entrepreneurship and the development of entrepreneurial ecosystems — including Professors Ed Roberts, Fiona Murray, Scott Stern, Antoinette Schoar, Michael Cusumano, and Matt Marx — the E-Center is also a center for rigorous research.

The following is a sampling of E-Center initiatives, programs, and activities that aim to educate students in entrepreneurship, nurture their development, leverage MIT's network to accelerate their growth, and celebrate their entrepreneurial efforts and successes.

Educate

- The E-Center coordinates more than 50 classes each year involving more than 20 faculty, which educate thousands of students in the basic skills of entrepreneurship.
- These include for-credit classes and non-credit classes that may be introductory, skill-specific, or sector-specific. Current classes are primarily

[5] About the Entrepreneurship Center (http://entrepreneurship.mit.edu/mission.php)

geared at the graduate level, with growing undergraduate participation.

Nurture

- The center provides physical facilities for students to meet other students, brainstorm ideas, and get projects off the ground, including a space designed like a start-up, with telephones, IT systems and common space to promote informal dialogue.
- Through the E-Center's Entrepreneur-in-Residence (EIR) program, students benefit from honest broker advice and support at the very earliest stages of venture creation from people who have founded companies before. Conducted through office hours, this service complements the more extensive mentoring support offered by the Venture Mentoring Service (VMS) or the Catalysts in the Deshpande Center once a project has developed to a more mature stage.
- To help students apply what they learn in the classroom, the E-Center uses its facilities, staff, contacts, and IT services to actively support the many clubs and activities related to entrepreneurship, including the MIT $100K Competition; the MIT Clean Energy Prize; the MIT Entrepreneurship Club; the MIT Venture Capital and Private Equity Club; the MIT Energy Club; the MIT Sales Club; the Sloan Women in Management Club; the MIT Sloan Energy & Environmental Club; the MIT Sloan Biomedical Business Club; and the MIT Entrepreneurship Review.
- The E-Center helps organize and sponsor a speaker series on entrepreneurship. This year, for example, the series focused in part on entrepreneurial opportunities in U.S. natural gas.

Network

- Believing that learning emerges from interactions with others and that entrepreneurs' capacity to get things done depends on the number and quality of their contacts, the E-Center actively seeks to build for its stakeholders a broad community of meaningful contacts.
- Networking occurs through formal receptions twice a year as well as through specific topic-focused conferences (e.g., Venture Capital, Energy, Private Equity, Sports Analytics, Sales, Biotech).
- In January of each year, the E-Center organizes and runs a one-week study tour of Silicon Valley to allow students to meet entrepreneurs, funders, and government representatives. Other informal tours or treks are organized based on demand.
- The E-Center also promotes less formal interactions through brown bag luncheons with entrepreneurs and drop-by visits when people are in town. Students often find the greatest value in these informal interactions.

Celebrate

- The E-Center actively seeks to celebrate examples of entrepreneurial risk taking and success through a series of awards — the McGovern Award, the Anderson Fellows, the Heller Award, the Monosson Award — available to our

students, faculty and/or alumni.

- The E-Center also encourages and fully supports the celebratory aspects of activities such as the MIT $100K Competition, the MIT Clean Energy Prize and other awards and recognition by the student clubs.
- To generate positive exposure, especially with the community of MIT entrepreneurs, the E-Center will be launching a "Digital Shingle Project" to give instant visibility to students and alumni who start companies through special displays at the center and, more importantly, on our web site.
- This year, the E-Center launched the MIT Entrepreneurship Review, a prestigious student-run organization that produces an on-line publication that promotes and highlights thought leadership in the community and beyond. It also offers visibility and positive recognition for recent "success story" firms.

D. Venture Mentoring Service[6]

Many discoveries and inventions never make it to market because researchers lack the necessary knowledge, skills, and access to resources. The MIT Venture Mentoring Service (VMS) addresses this gap by providing MIT students, alumni, faculty, and staff with powerful advisory resources to both increase successful outcomes and accelerate the commercialization of university innovations.

The MIT VMS harnesses the knowledge and experience of volunteer alumni and other business leaders to help prospective entrepreneurs in the university community bring their ideas and inventions to market. Entrepreneurs receive practical education through a hands-on, team mentoring process that builds a trusted long-term relationship. MIT VMS offers its services without charge.

This un-biased, hands-on mentoring has proven effective in helping scientists and engineers who are passionate about their ideas learn how to be entrepreneurs – how to conceive of and perfect their products and services, identify markets, build business organizations, and seek funding. For potentially game-changing innovations, this process may take five to seven years or even more before a company and product are truly launched.

Furthermore, VMS's innovative experiential learning process is more efficient than traditional institutional approaches because it leverages university resources and the collective knowledge and capacity of a large pool of highly qualified volunteer mentors who commit many thousands of hours of time each year.

Since its launch in 2000, more than 1,400 entrepreneurs involved in nearly 800 ventures have enrolled in VMS mentoring. Of these, more than 130 have advanced to become real operating businesses. Currently, more than 175 ventures are participating (and we continue to enroll between 5 and 10 new ventures each month). Collectively, these ventures have raised more than $700 million in

[6] About the Venture Mentoring Service (http://web.mit.edu/vms/)

investments, grants, and other support — funding that flowed largely to employees, contractors, suppliers, and service providers in our community. Through mentoring and program leadership, MIT VMS mentors have contributed an aggregate of more than 60,000 hours of volunteer time.

Because the VMS model has attracted interest worldwide, we have sought to share with others the knowledge that VMS has gained, through an active outreach program including presentations, workshops and customized training. To date, 12 universities and economic development organizations have instituted programs based on the MIT VMS model.

Leaders from VMS participating organizations estimate that their VMS training likely saved them from one to three years in start-up time. Although these programs have only been in place for a few years, hundreds of ventures and entrepreneurs have enrolled and participated in mentoring programs based on MIT VMS practices.

E. Innovation Prizes

In addition to the initiatives detailed above, a number of prizes at MIT spur students and faculty to explore difficult problems, including the MIT $100K Entrepreneurship Competition[7] and The MIT Clean Energy Prize.[8]

The *X PRIZE Lab @ MIT*[9], founded in 2007 through the Deshpande Center, partners with the X PRIZE Foundation to engage leading thinkers in pinpointing areas ripe for breakthrough innovation. MIT students and faculty explore the strengths of prize philanthropy with academic rigor and the excitement of the X PRIZE model helps engage youth in the world's biggest challenges.

F. Industrial Liaison Program/Office of Corporate Relations[10]

MIT has long held that breakthrough research hinges on open, consultative dialogue. The Office of Corporate Relations' Industrial Liaison Program (ILP) was established in 1948, making MIT the first academic institution with a formal program designed to nurture university/industry collaboration. For six decades, the ILP has connected member companies with the latest research developments at MIT and enabled industry to support the Institute's research and educational activities. Industry-sponsored research at MIT totaled $116 million in FY09, or 16% of all MIT research funding.

For companies interested in pursuing significant, multi-year, multi-disciplinary involvement with MIT, the ILP provides professionally coordinated access to MIT experts, research facilities, and information resources to help them bring innovations to market. Each ILP member is assigned an Industrial Liaison Officer

[7] About the $100K prize (http://www.mit100k.org/)
[8] About the MIT Clean Energy Prize (http://www.mitcep.org/)
[9] About the X Prize Lab @ MIT (http://www.xprize.org/education-initiatives/x-prize-lab-mit)
[10] About the ILP (http://ilp-www.mit.edu/display_page.a4d?key=H1)

(ILO) who consults regularly with the corporate member to match their needs with relevant MIT faculty and resources. Having earned the respect and responsiveness of MIT faculty and armed with a deep understanding of the given industry, the ILO is ideally positioned to be an effective advocate for the member's needs and goals within MIT. By creating connections with the right MIT people and programs, the ILO helps members:

- stay abreast of new technology developments
- gain insight into a variety of issues related to their core business units
- learn about - and exploit - new opportunities
- anticipate changes in the marketplace
- sustain growth and profitability

Connections with established firms, such as those cultivated through the ILP, are also an important part of MIT's Innovation Ecosystem.

G. Cross School/Cross Disciplinary Initiatives

Our Innovation Ecosystem has grown most recently through two major cross-school, cross-disciplinary initiatives:

Established in September 2006, the MIT Energy Initiative (MITEI)[11] aims to help transform the global energy system to meet the needs of the future and to build a bridge to that future by improving today's energy systems. It connects all five MIT schools and numerous departments and has built an energy research portfolio of approximately $250 million for the next five years, including participation from a number of major companies in collaborative industry-Institute research projects.

MITEI also undertakes major cross-school, cross-disciplinary policy studies on energy issues, including such noted reports as "The Future of Nuclear Power," "The Future of Coal," and "The Future of Geothermal." Five more major energy policy studies are now under way. MITEI's policy efforts also help inform research directions. These cross-cutting, multi-disciplinary efforts have enlisted some 200 researchers and multiplied the opportunities for energy research advances.

MIT's second major cross-school, cross-disciplinary initiative is taking shape through the new David H. Koch Institute for Integrative Cancer Research, which builds on MIT's earlier Center for Cancer Research, founded by Nobel Laureate Salvador Luria. Soon to be housed in a state-of-the-art research building, the Koch Institute capitalizes on the convergence of the life, engineering, and physical sciences as a strategy for achieving medical breakthroughs.

Researchers from these fields will collaborate to target five areas of research at the intersection of biology, engineering and physical sciences, including: (1) defining the specific vulnerabilities of cancer cells by creating a complete "wiring diagram" of the

[11] About MITEI (http://web.mit.edu/mitei/)

key pathways that allow cancer cells to keep dividing and remain alive; (2) engineering entirely new nanotechnology paradigms for cancer treatment; (3) understanding how tumors evade immune recognition and developing methods to overcome these avoidance mechanisms, including more effective anti-cancer vaccines and other forms of immunotherapy; (4) using powerful new engineering tools to dissect the molecular and cellular basis for metastasis; and (5) shifting the curve of cancer diagnosis and prevention to earlier and earlier stages using advances such as genomics, novel imaging agents, and micro-scale monitoring devices.[12]

Such collaborative, cross-disciplinary, cross-school initiatives appear to be generating significant new opportunities for major research advances in the energy and life science fields. Not incidentally, both initiatives include a conscious focus on technology transfer.

III. University Role in Commercialization of Research

University discoveries have set the seeds of numerous new industries in the United States. We saw this with the emergence of the Information Technology (IT) and biotech industries, where universities, including MIT, played a central role. We are also beginning to see the initial signs of such growth in a new energy sector. In Massachusetts, approximately 90 new energy firms represent an emerging new cluster for the New England economy. A growing number stem from MIT's major energy initiative noted above.

Much of the success of these and other clusters can be attributed to the Bayh-Dole Act of 1980 (BDA), which gave universities the right to retain the patents — and therefore to license the technologies — developed from Federally funded research. While some now advocate modifying the Bayh-Dole Act (BDA) to curtail university rights to intellectual property stemming from federal research dollars, I believe this move could gravely damage technology transfer by hampering universities' commercialization efforts.

The BDA was intended to encourage the formal transfer of university-generated research results to the public. The MIT technology transfer system is based on decades of day-to-day experience on the ground with entrepreneurs, VCs, and small companies. This experience is exceptionally valuable to faculty, who would be much less willing or able to negotiate the highly complex and often expensive path to commercialization without support from an experienced TLO office and supporting ecosystem.

University technology transfer offices are also quite aware of their duties and obligations to the public good and to the U.S. government, which has invested its resources in their research, and are therefore in the best position to be neutral,

[12] About the Koch Institute (http://web.mit.edu/ki/about/index.html)

objective, and unbiased advocates of federally funded inventions with clarity, consistency, and transparency of policies and practices. Finally and very importantly, the proposed change to BDA would remove a key incentive for encouraging universities to promote economic clusters that are so important to local, regional, and national economic growth.

A New Survey of Best Practices

That being said, there are certainly practices that can be adopted by MIT and other universities to improve the performance of their TLOs. I have listed above what we have found to be our "best practices" for technology transfer, and many major universities have adopted similar rule sets. The university associations concerned with technology transfer have also attempted to broadcast the most successful university approaches, which require continual updating to keep pace with ongoing economic developments.

I have charged a group at MIT to survey and understand the current forces and trends in university-industry technology transfer. This group will not only review MIT's policies, procedures, and practices related to technology transfer and industrial sponsorship of research, but also identify best practices by reviewing similar policies, procedures, and practices at peer institutions. The survey will also solicit input and ideas from the MIT community and outside individuals in both the private and public sectors. The results of this survey will be recommended changes, if any, to MIT's policies, procedures, or practices to enhance, simplify, and accelerate technology transfer and to enable the formation of beneficial strategic partnerships with industry while preserving MIT's fundamental values and principles. When this report is completed, I would be pleased to forward it to the Administration.

In closing, I would like to underscore two points. University technology transfer has come a long way since the BDA was passed, delivering remarkable advances for our society. Improvements certainly can be made in technology transfer. But the Bayh-Dole Act provides a critical foundation for university-based Innovation Ecosystems, and it should continue to do so.

I want to express MIT's appreciation for the President's recognition of the importance of commercialization of university research to local, regional, and national economic growth. I hope you find this submission useful in identifying possible recommendations. MIT's faculty and staff stand ready to assist you as you move forward in these efforts. If your offices have any follow up questions, please contact William B. Bonvillian in MIT's Washington, DC Office at (202) 789-1828.

Sincerely,

Susan Hockfield