Section 6
MIT and Industry

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MIT and Industry

Since its founding in 1861, MIT has fostered a problem-solving approach that encourages researchers to work together across departments, fields, and institutional boundaries. The resulting collaborations have included thousands of fruitful partnerships with industry.

- Industry sponsored R&D at MIT totaled $140.8 million in FY2016.

- Over 700 companies provided R&D/gift support to MIT; 40 companies funded $1 million+, 219 companies funded $100 thousand–$1 million.

Entrepreneurial Ecosystem

MIT also understands the fastest path from innovation to commercialization is often lead by young, entrepreneurial start-up companies, and the Institute has taken great care to design and build a unique, highly effective entrepreneurial ecosystem. It brings the world’s best and brightest into a culture of “Mens et Manus,” i.e. “mind and hand” focused on discoveries of real, practical impact and strong commercial value.

MIT’s vibrant entrepreneurial ecosystem benefits from its historical entrepreneurial culture, supported by specialized entrepreneurship programs and classes, student clubs, and networking across all MIT departments and schools and between MIT and the surrounding entrepreneurship and venture capital community. Formal MIT institutions like the Technology Licensing Office, Venture Mentoring Service, and the Deshpande Center for Technological Innovation are committed to the continued health and growth of the MIT entrepreneurial ecosystem. The substantial economic impact of MIT’s alumni entrepreneurs was quantified by a 2015 report on entrepreneurship and innovation that found:

- MIT alumni have launched 30,200 active companies, employing roughly 4.6 million people, and generating roughly $1.9 trillion in annual revenues—a figure greater than the gross domestic product (GDP) of the world’s 10th-largest economy.

- 25 percent of MIT alumni have founded companies, with more than 40 percent of these labeled as “serial entrepreneurs” (founding two or more companies).

- Alumni are engaged in entrepreneurship and innovation (E&I) at ever-increasing rates. In the 2000s, alumni launched around 12,000 new companies; halfway through the current decade, the number of new firms started has already reached 9,100.

Partnering at MIT

Industry partners at MIT are global industry leaders who understand that technological advantage and innovation are key drivers to their competitive advantage. These are leaders who have created and defined industries, who quickly grasp the implications of breakthrough technology. Industry managers engage fully in MIT’s collaborative, interdisciplinary culture, and join big thinkers who are perpetually focused on wringing practical applications from excellent ideas.

Strategic Partnerships

In 1994, MIT began to build new kinds of research partnerships, creating longer-term alliances with major corporations that would allow these companies to work with MIT to develop programs and strategies that address areas of rapid change. In return for their research and teaching support, the corporations share ownership of patentable inventions and improvements developed from the partnership. In a number of these alliances, funds are earmarked for specific education projects.
A selection of these partnerships are described below.

**ExxonMobil**
In 2014, ExxonMobil became a founding member of the MIT Energy Initiative (MITEI), a unique collaboration aimed at working together to advance and explore the future of energy. ExxonMobil has had a long and productive relationship with faculty and students at MIT, and in its most recent agreement collaborates on a wide range of projects, including research to improve and expand renewable energy sources and find more efficient ways to produce and use conventional hydrocarbon resources. The agreement also establishes 10 graduate energy fellowship appointments each year at MIT (ExxonMobil Energy Fellows). These fellowships will support operating costs and expenses for talented graduate students while they pursue their selected areas of study and research.

**Novartis**
Novartis and MIT have launched a long-term research collaboration aimed at transforming the way pharmaceuticals are produced. The partnership, known as the Novartis-MIT Center for Continuous Manufacturing, will work to develop new technologies that could replace the conventional batch-based system in the pharmaceuticals industry—which often includes many interruptions and work at separate sites—with continuous manufacturing processes from start to finish. The Novartis-MIT Center for Continuous Manufacturing combines the industrial expertise of Novartis with MIT’s leadership in scientific and technological innovation.

**Philips**
In May 2015, Philips announced an alliance with MIT that will ultimately support MIT research in the company’s core areas of health care and lighting solutions technology. The agreement follows the company’s recent decision to move its North American research headquarters to Kendall Square, citing the area’s concentration of startups and research labs—especially in the biomedical area—and for its proximity to MIT. Research projects under the alliance are expected to focus on areas such as lighting for green buildings and cities; clinical decision support; clinical informatics; interventional guidance, planning, and assessment; and medical ultrasound, photonics, and bioinformatics.

**RIKEN**
RIKEN is a nonprofit corporation with financial support furnished by the Japanese government and industry. It has funded research at MIT in learning and memory, neuroscience of higher order cognition, and plasticity of the developing and mature brain. Since its 1998 “Agreement for Collaboration in Neuroscience Research, the fruitful RIKEN collaboration has created the RIKEN-MIT Neuroscience Research Center, the RIKEN Brain Science Institute (BSI), and the RIKEN-MIT Center for Neural Circuit Genetics, directed by Nobel Laureate Susumu Tonegawa.

**Samsung**
Samsung chose MIT for its energy research focus and the decision to embark on this collaboration was made in parallel with the establishment of its Advanced Materials Lab in Cambridge. Current project topics include energy storage, all-inorganic quantum dot photovoltaics, computational materials design (materials genome), and functional layer-by-layer synthesis.

**Tata**
The MIT Tata Center for Technology + Design was founded in 2012 with generous support from the Tata Trusts. The Center’s research and education mission is to develop solutions to challenges facing resource-constrained communities globally, with an initial focus on India. Center-affiliated faculty and graduate student Tata Fellows engage in hands-on projects, with an approach that is rigorous and relevant to societal, economic, environmental, and political factors. The Tata Center brings together technical, pedagogical, and organizational expertise from across MIT to provide holistic support to more than 40 projects in the developing world, focused on agriculture, energy, environment, health, urbanization, and water. See page 104 for more information.
Desalination gets a graphene boost
A billion people around the world lack regular access to clean water, and that’s expected to more than double in the next 25 years. Jeffrey Grossman and the Grossman Group have demonstrated strong results showing that new filters made from graphene could greatly improve the energy efficiency of desalination plants and reduce costs. Grossman estimates the use of graphene filters would use 15 percent less energy for seawater and up to 50 percent less energy for brackish water. The Grossman Group is pursuing the challenge of creating high volumes of nonporous graphene membranes through chemical and thermal energy processes.

http://ilp.mit.edu/newsstory.jsp?id=21289

Leveraging digital technology to improve healthcare access, cost, and quality
As a serial entrepreneur and MIT researcher, Zen Chu embraces what he calls tectonic shifts in healthcare, not just the changing incentives in the United States but also consumer healthcare in emerging markets where smartphones and connectivity are increasingly ubiquitous. As the co-founder and lead faculty director of MIT Hacking Medicine, a program focused on healthcare transformation through technology, Chu convenes technologists, entrepreneurs, clinicians, and life scientists to review and assess new models and new ventures in digital healthcare at the core of these shifts. MIT’s Hacking Medicine Initiative applied the long history of hackathons in software and tailored it to the complexities and unique challenges of healthcare. Over 10,000 attendees at 40 events on 4 continents have learned the process of pitching healthcare problems, assembling teams around those problems, and attacking business models, experience design, and solutions with technology. As a result, Hacking Medicine has convened “a small army of some of the world’s best clinicians and health technologists” to judge and rate the best of the best apps, connected medical devices, and healthcare services.

http://ilp.mit.edu/newsstory.jsp?id=21964

Partnership of government, industry, and academia pursue integration of optical devices with electronics
MIT is a key player in a $600 million public-private partnership announced in 2015 that aims to spur the twin goals of improving integration of photonic systems while revitalizing U.S. manufacturing. MIT faculty manages important parts of the program: Michael Watts, an associate professor of electrical engineering and computer science, leads the technological innovation in silicon photonics. And Lionel Kimerling, the Thomas Lord Professor in Materials Science and Engineering, leads a program in education and workforce development. One expected impact of the new initiative is the development of a corridor along Interstate 90, from Boston to Rochester, New York, of industrial firms building on the base of new technology to develop related products and services, much as Silicon Valley emerged in California around companies such as Intel and their chip-making technology.

http://bit.ly/2d2ma1C

New institute will accelerate innovations in fibers and fabrics
An independent nonprofit founded by MIT was selected in 2016 to run a new, $317 million public-private partnership named the Advanced Functional Fabrics of America (AFFOA) Institute. The partnership is designed to accelerate innovation in high-tech, and U.S.-based manufacturing involving fibers and textiles. Yoel Fink, director of MIT’s Research Laboratory of Electronics (RLE), who will lead the new manufacturing initiative, says we are the dawn of a “fabric revolution.” New technology—some of it developed in Fink’s own laboratory—is making it possible to integrate many materials and complex functional structures into a fabric’s very fibers, and to create fiber-based devices and functional fabric systems. These new fabrics will do everything from storing energy to gathering “clinically meaningful information” about your health and where it’s heading.

Campus Research Sponsored by Industry

Industry Campus Research Expenditures (in U.S. Dollars)
Fiscal Years 2012–2016

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<td>Campus research</td>
<td>109,744,829</td>
<td>106,447,700</td>
<td>112,379,455</td>
<td>119,238,077</td>
<td>128,308,988</td>
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<td>Constant dollars*</td>
<td>114,910,250</td>
<td>109,633,200</td>
<td>113,962,442</td>
<td>120,043,783</td>
<td>128,308,988</td>
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*Constant dollars are calculated using the Consumer Price Index for All Urban Consumers weighted with the fiscal year 2016 equaling 100.

Leading Departments, Laboratories, and Centers Receiving Support in Fiscal Year 2016
(shown in descending order of expenditures)

MIT Energy Initiative
Media Laboratory
Computer Science and Artificial Intelligence Laboratory
Chemical Engineering
Mechanical Engineering
Koch Institute for Integrative Cancer Research
School of Management
Biological Engineering
Aeronautics and Astronautics
Chemistry

MIT is a leader in conducting research sponsored by industry. Over 250 industrial sponsors supported research projects on the MIT campus in FY2016, with over $128 million in expenditures. Companies often join together in these collaborations to support multi-disciplinary research programs in a wide range of fields.
Managing the Industry/University Interface

Drawing on decades of successful industry collaboration, MIT has assembled a coordinated team of professionals who expertly manage the important industry/university interface, leveraging and exploiting proven pathways for two-way knowledge transfer.

Industrial Liaison Program
Officers at MIT’s Industrial Liaison Program (ILP) help company managers by scheduling and facilitating face-to-face meetings with MIT faculty, coordinating on-campus networking activities, and advising company managers on how to navigate, adapt and benefit from the dynamic, interdisciplinary MIT environment. Over 225 of the world’s leading companies partner with the Industrial Liaison Program to advance their research agendas at MIT, and ILP member companies account for over 40 percent of all single-sponsored research expenditures and corporate gifts/grants at MIT (FY2016).

Office of Corporate Relations
MIT’s Office of Corporate Relations (OCR), the organizational parent of the ILP, aids and directs companies interested in pursuing significant, multi-year, multi-disciplinary involvement with the Institute. OCR works with MIT senior administration, faculty, and company executives to structure and define individualized alliances that mutually benefit the company and MIT. The result is a holistic industry/university relationship that addresses broad needs and interests, from specific research projects and initiatives, to executive education, technology licensing, and recruitment.

Office of Sponsored Programs
The Office of Sponsored Programs’ mission is to conduct the centrally organized administrative, business, and financial functions related to award administration and to assist faculty, principal investigators, and their administrators in the identification of resources for and the management of individual sponsored projects consistent both with MIT’s academic and research policies and with the stewardship requirements of and obligations to external sponsors.

Technology Licensing Office
The MIT Technology Licensing Office (TLO) is a world class model of excellence in university technology licensing. Its staff is especially attuned to the needs of pre-competitive research and promotes an Intellectual Property protocol that accelerates commercialization, and, at the same time, honors MIT’s obligations to education and research. The TLO oversees a vibrant flow patenting/licensing activity.

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<th>Technology Licensing Office Statistics for FY2016</th>
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<td>Total number of invention disclosures: 800</td>
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<tr>
<td>Number of U.S. new utility patent applications filed: 323</td>
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<tr>
<td>Number of U.S. patents issued: 279</td>
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<tr>
<td>Number of licenses granted (not including trademarks and end-use software): 110</td>
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<tr>
<td>Number of options granted (not including options as part of research agreements): 24</td>
</tr>
<tr>
<td>Number of software end-use licenses granted: 37</td>
</tr>
<tr>
<td>Number of companies started (number of new license or option agreement to MIT technologies that serve as the foundation for a start-up company): 25</td>
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Entrepreneurship

MIT is recognized as one of the most entrepreneurial universities in the world. Its faculty ranks include hundreds of serial startup founders, and its hands-on approach to education encourages students to make a difference in the world by discovering and exploiting new technologies. The science-based ventures coming out of MIT helped transform Kendall Square into a major hub of biotech innovation, and the area thrives today with startups representing an array of industries from energy, to healthcare, to nanotech to advanced manufacturing.

$100K Entrepreneurship Competition

The MIT $100K Entrepreneurship Competition (student group) is the leading business plan competition in the world. The competition was founded in 1990 to encourage students and researchers in the MIT community to act on their talent, ideas, and energy to produce tomorrow’s leading firms. Entirely student-managed, the competition has produced hundreds of successful ventures that have created value and employment.

Deshpande Center for Technological Innovation

The Deshpande Center for Technological Innovation was established at the MIT School of Engineering in 2002 to increase the impact of MIT technologies in the marketplace, and support a wide range of emerging technologies including biotechnology, biomedical devices, information technology, new materials, tiny tech, and energy innovations. Since 2002, the Deshpande Center has funded more than 80 projects with over $9 million in grants. Eighteen projects have spun out of the center into commercial ventures, having collectively raised over $140 million in outside financing. Thirteen venture capital firms have invested in these ventures.

Martin Trust Center for MIT Entrepreneurship

The Martin Trust Center for MIT Entrepreneurship is committed to fostering and developing MIT’s entrepreneurial activities and interests in three primary areas: education and research, alliance, and community. The Center educates and nurtures students from across the Institute who are interested in learning the skills to design, launch, and grow innovation-based ventures. The Center facilitates business and technology partnerships by combining breakthrough academic research with practical, proven experience. The people of the Center cultivate and nourish a thriving network that unifies academic, government, and industry leaders around the vision of entrepreneurial success.

MIT Startup Exchange

MIT Startup Exchange (STEX) connects industry to startups from across the MIT innovation ecosystem, fostering interactions that lead to strong partnerships. ILP members can engage the STEX community including 1000 active MIT-connected startup companies at all stages of development and representing seven technology clusters: ICT, Biotech, Nanotech, Energy Tech, Advanced Manufacturing, Healthcare, and Hybrid Innovation. STEX runs monthly workshops on topics in technology and innovation including robotics, mobility, biotech, energy, food, and cybersecurity. MIT STEX is a service of MIT’s Industrial Liaison Program (ILP).

Venture Mentoring Service

Venture Mentoring Service (VMS) supports innovation and entrepreneurial activity throughout the MIT community by matching both prospective and experienced entrepreneurs with skilled volunteer mentors. VMS uses a team mentoring approach with groups of 3 to 4 mentors sitting with the entrepreneur(s) in sessions that provide practical, day-to-day professional advice and coaching. VMS mentors are selected for their experience in areas relevant to the needs of new entrepreneurs and for their enthusiasm for the program. VMS assistance is given across a broad range of business activity, including product development, marketing, intellectual property law, finance, human resources, and founders issues. VMS services are offered without charge to MIT students, alumni, faculty and staff in the Boston area.
Learning

Leaders for Global Operations
The Leaders for Global Operations (LGO) program is an educational and research partnership among global operations companies and MIT’s School of Engineering and Sloan School of Management. Its objective is to discover, codify, teach, and otherwise disseminate guiding principles for world-class manufacturing and operations. The 24-month LGO program combines graduate education in engineering and management for those with two or more years of full-time work experience who aspire to leadership positions in manufacturing or operations companies. A required six-month internship comprising a research project at one of LGO’s partner companies leads to a dual-degree thesis, culminating in two master’s degrees—an MBA (or SM in management) and an SM in engineering.

Professional Education
MIT Professional Education provides short courses, semester or longer learning programs and customized corporate programs for science and engineering professionals at all levels. Taught by renowned faculty from across the Institute, MIT Professional Education programs offer professionals the opportunity to gain crucial knowledge in specialized fields to advance their careers, help their companies, and have an impact on the world.

- Short Programs. Over 40 courses, in two-to-five day sessions, spanning the range of disciplines at MIT, are taught on the MIT campus each summer by MIT faculty/researchers and experts from industry and academia. Participants earn Continuing Education Units (CEUs) and certificates of completion.

- Digital Programs. These online programs address topics of high interest to industry, delivering timely, expert knowledge of MIT faculty and researchers to a global audience. The benefits of online learning include the ability of busy professionals to gain advanced knowledge at their own pace and convenience, without the need to travel to the MIT campus.

- Advanced Study Program. A unique, non-degree program at MIT that enables professionals to take regular, semester-long MIT courses, to gain specific knowledge and skills needed to advance their careers and take innovative ideas back to their employers. Participants earn grades, MIT course credit, and an Advanced Study Program certificate.

- Custom Programs. Professional Education offers customized programs tailored to meet the specific training needs of corporations. These MIT faculty-led programs can be a single week or several weeks over a year, with interrelated on-the-ground projects. These specialized programs can be delivered at MIT and/or at company sites.

- International Programs. Select courses from Professional Education’s Short Programs can be brought to international locations in Asia, the Middle East, Europe and Latin America. These globally-relevant courses enable professionals who cannot easily come to the MIT campus access to MIT knowledge and expertise in high interest topics, often with a local focus.

Sloan Fellows Program in Innovation and Global Leadership
This full-time, 12-month (June–June) immersive MBA program is designed for high-performing mid-career professionals. The program typically enrolls more than 100 outstanding individuals with 10–20 years of professional experience from at least two dozen nations, representing a wide variety of for-profit and nonprofit industries, organizations, and functional areas. Many participants are sponsored by or have the strong support of their employers, but the program also admits independent participants, many with unique entrepreneurial experiences and perspectives. The program is characterized by a rigorous academic curriculum, frequent interactions with international business and government leaders, and a valuable exchange of global perspectives.
Sloan Executive Education

MIT Sloan Executive Education programs are designed for senior executives and high-potential managers from around the world. From intensive two-day courses focused on a particular area of interest, to executive certificates covering a range of management topics, to custom engagements addressing the specific business challenges of a particular organization, their portfolio of non-degree, executive education and management programs provides business professionals with a targeted and flexible means to advance their career development goals and position their organizations for future growth.

System Design and Management

System Design & Management (SDM) is a master’s program in engineering and management. Jointly offered by MIT’s School of Engineering and the Sloan School of Management, SDM educates mid-career professionals to lead effectively and creatively by using systems thinking to solve large-scale, complex challenges in product design, development, and innovation.

Recruiting

Global Education and Career Development

The MIT Global Education and Career Development center assists employers in coordinating successful on- and off-campus recruitment of MIT students and provides students with opportunities to interact and network with professionals and obtain quality internships and full-time positions. MIT is proud to serve the needs of undergraduates (including Sloan), graduates and MIT alumni. (Departments that conduct their own recruiting include Chemistry, Chemical Engineering, and Sloan School of Management).

Sloan’s Career Development Office

Sloan’s Career Development Office (CDO) serves a vital role in connecting MIT Sloan’s innovative master’s students and alumni with the world’s leading firms. The CDO is dedicated to supporting employer recruiting goals and helping them identify the best candidates for their organization.