

Provost

MIT's activities continued to expand across traditional boundaries in AY2012, with notable focus on online learning initiatives and on research and educational collaborations with international partners, along with a wide range of other significant activities. This report describes some of the prominent events and accomplishments that took place across the Institute during the past year.

AY2012 also marked the completion of Susan Hockfield's tenure as MIT's president. This was an important milestone in the Institute's timeline that prompted reflection on the numerous accomplishments of President Hockfield's administration, as well as provided inspiration for MIT to embrace the challenges and exciting opportunities that lie ahead. I personally have been privileged to have had the opportunity to serve as provost for the past seven years, working closely with President Hockfield and benefiting extensively from her valuable and generous mentorship. It is with a great sense of gratitude to her that I submit this report.

I also wish to recognize the support and advice of the deans and other members of the Academic Council from which I have so greatly benefited while serving as provost. The wisdom and collegiality of this group helped sustain many of my efforts over the last several years, and I look forward to continuing these relationships in the years ahead.

People

In June 2012 Susan Hockfield stepped down from the presidency of MIT, having held this position since December 2004. President Hockfield, MIT's first female president, leaves a legacy of outstanding institutional leadership, strengthening MIT's position as a leading research university while preserving the Institute's financial security during a period of severe global economic downturn.

Israel Ruiz '01 began his appointment in October 2011 as executive vice president and treasurer, succeeding Theresa M. Stone '76. Mr. Ruiz had previously served as vice president for finance.

Michael Howard '86 was appointed vice president for finance effective December 2011, following several years of experience in corporate finance and operations.

The Institute was greatly saddened this year by the deaths of professors Alice Amsden of the Department of Urban Studies and Planning; Robert J. Silbey of the Department of Chemistry and former dean of the School of Science; and David H. Staelin, of EECS.

Academic Programs and Activities

Many new developments took place in MIT's academic areas during AY2012, with several of these reflecting the Institute's continuing involvement in international collaborations; some of these activities are described below. Please refer to the separate reports of individual academic units for detailed information about these and other programs.

In July 2011, the new Center for Complex Engineering Systems (CCES), representing a collaboration between MIT and King Abdulaziz City for Science and Technology, opened in the Saudi Arabian capital of Riyadh. On the MIT side, the center is housed in the Engineering Systems Division, and Olivier de Weck, professor of aeronautics and astronautics and engineering systems, serves as its codirector. The CCES is focusing initially on three areas of research: modeling and shaping the urban environment across a range of Saudi Arabian cities; investigating ways in which these cities are linked to each other and to the rest of the world by a variety of transportation systems; and analyzing ways in which energy, water, food production, and other resources can be integrated to improve sustainability and reduce Saudi Arabian dependence on non-renewable sources and imports. The center offers MIT faculty and students opportunities to work collaboratively with Saudi Arabian counterparts on research projects related to these emerging areas of complex engineering systems.

Following a preliminary agreement signed in June 2011, MIT began a formal collaboration in October 2011 with the Skolkovo Foundation and the Skolkovo Institute of Science and Technology (known as SkTech) in Russia. The Skolkovo Foundation is a nonprofit organization charged by the Russian government with developing SkTech, a new private graduate research university in the Moscow suburb of Skolkovo. Under the agreement, MIT will collaborate with SkTech as it organizes its education and research around multidisciplinary programs focused on five distinct areas: energy science and technology; biomedical science and technology; information science and technology; space science and technology; and nuclear science and technology. MIT will also assist in the development of a center at SkTech devoted to entrepreneurship and innovation. SkTech intends to enroll its first class of masters and doctoral students in 2014. Shortly after the announcement of the MIT/Skolkovo agreement, MIT's Ford professor of engineering Edward Crawley was appointed as SkTech's first president.

In December 2011, the Institute launched an online learning initiative, named *MITx*, based on an interactive learning platform that organizes and presents course materials in a way that allows students around the world to learn at their own pace and to interact among themselves and with instructors. *MITx* was designed to operate on an open-source, scalable software system so that other educational institutions may use it free of cost and contribute to its continuous improvement. The first course offered by *MITx*, Circuits and Electronics, became open to online students in March 2012. In May, MIT and Harvard University announced their creation of edX, a new partnership in online education that builds on *MITx* and Harvard's distance learning and is designed to promote a global community of online learners. This joint venture also promises to enhance campus-based teaching and learning as part of its overall initiative, in part by enabling research on how students learn. The edX program enables individual assessment of student work and is planned to offer certificates of completion to non-resident students who demonstrate mastery of certain course materials. Like *MITx*, edX operates on an open-source technology platform designed specifically for web-based interaction. EdX aims to move beyond traditional models of online learning by leveraging the educational and research strengths of both MIT and Harvard, in order to expand global access to education through the use innovative technology. We expect that, in time, other universities will join MIT and Harvard on the edX platform, with an

eventual goal of enabling global learners to access any participating university's course materials through a single website.

In February 2012, the provost and the vice president for research announced the establishment of the Institute for Medical Engineering and Science (IMES) at MIT. The creation of this new institute, to be formally launched on July 1, 2012, follows the recommendations of the of the Ad Hoc Committee to Explore Options for the Structure of the Harvard-MIT Health Sciences and Technology (HST) Efforts at MIT. This committee concluded that the visibility and effectiveness of research and education in medical engineering and science would be strengthened by an institute at MIT focused on these efforts. IMES will be based administratively in the School of Engineering and will include the HST program. It was also announced that Arup Chakraborty, the Robert T. Haslam professor of chemical engineering, chemistry, and biological engineering would serve as the first director of IMES.

In March 2012, the David H. Koch Institute for Integrative Cancer Research at MIT and the Dana-Farber/Harvard Cancer Center announced their joint support of clinical research aimed at understanding and treating two particularly challenging forms of cancer. The collaboration, called the Bridge Project, is focusing its efforts on improving the prognosis for patients affected by pancreatic cancer and a particular form of brain cancer. The initial grant recipients, representing researchers from both institutions, were selected on the basis of research proposals judged to hold the most promise for making an impact on the clinical outcomes of these diseases. Funding for the initiative has been provided by private donors and from national nonprofit cancer research organizations.

Facilities

Following the opening of two major new buildings in 2010, activity related to new campus facilities during AY2012 was moderate, while numerous renovations and upgrades took place within existing buildings in order to accommodate the needs of various academic programs.

Maseeh Hall, a new undergraduate residence near the center of campus, opened in August 2011. The building, formerly a graduate student residence known as Ashdown House, was extensively renovated and renamed to recognize the support of a generous donation by Fariborz Maseeh ScD '90. This facility accommodates 460 students and represents an additional living and learning campus community. It also is intended to help the Institute reach a planned 4,500 undergraduate student population by 2014.

Reflecting the Institute's collaborative activity in the area of biotechnology research, in November 2011 ground was broken for a new multidisciplinary research center to be built on MIT property by Pfizer Inc. The new building will house Pfizer's Cardiovascular, Metabolic and Endocrine Diseases and Neuroscience Research Units, and will provide a venue for Pfizer and MIT scientists to collaborate on research projects in these areas that are aimed at the development of new drugs. This facility will be situated near such MIT research facilities as the Picower Institute for Learning and Memory, the McGovern Institute for Brain Research, and the Broad Institute of MIT

and Harvard University and is expected to reinforce the strength of life science research activities in the Kendall Square neighborhood of Cambridge.

Council, Committee, and Task Force Activities

Reports were received this year from a number of councils and committees that were focused on issues of particular importance to the MIT community.

In April 2012, the Environmental Research Council (ERC), chaired by professor Dara Entekhabi, submitted its final report, putting forth a vision of MIT's role in advancing sustainability and addressing pressing environmental issues. Entitled *Implementing the MIT Global Environment Initiative*, the report recommends a focus on six complex and interrelated research themes connected with sustainable human development: global climate change; health of the oceans; fresh water supply; resilience of ecosystems; environmental contamination; and sustainability of societies. These strategic research themes transcend disciplinary boundaries and aim to integrate scientific understanding, engineering solutions, and social research as a way of approaching the world's environmental challenges. Following the receipt of the ERC report, professors John Lienhard and Maria Zuber were appointed to co-lead the Global Environment Initiative planning group, with a goal of producing a proposal for specific ways to act on the recommendations contained in the report, including resource development in support of MIT's activities in these areas. We expect that exciting opportunities in research and education will arise across the Institute as a result of these discussions in the coming year.

Also in April, a report was issued on the Institute Diversity Summit, which was held in February. The summit, a full-day program focusing on a theme of "Diversity and Excellence," brought together faculty, staff, and students for the purpose of discussing the Institute's efforts in achieving a culture of diversity and inclusion, and the challenges related to these goals. The summit report emphasized the perceived need for strong, ongoing institutional leadership in the pursuit of diversity and for greater communication and guidance on these topics. The report reminds us that diversity and excellence go hand-in-hand at all levels of the Institute, and that faculty, students, and staff must continue to work together toward a continuously strengthened climate of inclusion at MIT. To this end, the Committee on Race and Diversity and the Council on Staff Diversity and Inclusion are committed to organizing events for the entire community in the coming year that will continue to address these issues.

The formation of a committee to examine all current MIT employee benefits programs was announced in May 2012. The Employee Benefits Oversight Committee will be responsible for overseeing all employee benefits issues, including cost, competitiveness, and benefits philosophy, while considering proposals for changes to MIT's benefits programs. This group, which is chaired by vice president for human resources Alison Alden, will initially be organized around three standing subcommittees comprised of both faculty and staff members. These three subcommittees will focus separately on health, wellness, and medical care; work-life issues; and the full range of retirement benefits. Each of these groups is beginning its work in 2012.

Faculty

Nineteen faculty members retired from MIT in AY2012. Some of these were participants in the third and final year of the Faculty Renewal Program, which enabled eligible senior faculty members to retire voluntarily with a choice of retirement incentives. Faculty recruitment continued at a strong pace this past year. A total of 47 new faculty members (34 men and 13 women, one a member of an underrepresented minority group) began their MIT appointments during AY2012. Also this year, 22 faculty members were awarded tenure within MIT, including three women. These promotions to tenure will be effective July 2012.

The James R. Killian, Jr. Faculty Achievement Award is the highest honor bestowed by the MIT faculty on one of its own members. It was established in 1971 “to recognize extraordinary professional accomplishments by full-time members of the MIT faculty.” The Killian Award for 2011–2012 was presented to JoAnne Stubbe, Novartis professor of chemistry and professor of biology. Professor Stubbe delivered the annual Killian Lecture in March. In May, it was announced that Maria Zuber, the E.A. Griswold professor of geophysics and head of the Department of Earth, Atmospheric, and Planetary Sciences (EAPS), was selected as the Killian Award recipient for 2012–2013.

The Harold E. Edgerton Faculty Achievement Award is the highest honor bestowed by the MIT faculty on one of its own junior faculty members. The Edgerton Award, a tribute to the late beloved inventor and photographer “Doc” Edgerton, recognizes exceptional distinction in teaching and research. The 2012 Edgerton Award was presented to Tanja Bosak, who is the Hayes career development associate professor in EAPS.

Four faculty members were appointed as Margaret MacVicar Faculty Fellows this year in recognition of their outstanding contributions to the quality of undergraduate education at MIT. The awardees are: William Broadhead, History Section; Leslie Pack Kaelbling, EECS; David Kaiser, Program in Science, Technology, and Society (STS); and Nancy Lin Rose, Department of Economics. MacVicar Faculty Fellows are appointed for 10-year terms. These additions bring the total number of active fellows to 42, with 46 emeritus fellows remaining at MIT; together they form a small academy of scholars committed to excellent teaching and innovation in education.

The Dr. Martin Luther King, Jr. Visiting Professor Program was established in 1995 to recognize the many contributions of outstanding minority scholars in the academy, as well as to enhance their scholarship through intellectual interactions with MIT peers and enrich the intellectual life of the Institute through their participation in MIT research and academic programs. The 2011–2012 Dr. Martin Luther King, Jr. visiting professors were: Paul Ampadu, EECS; Andra Gillespie, Department of Political Science; Keivan Guadalupe-Stassun, Department of Physics; Juana Mendenhall, Department of Chemistry; Susan Perkins, MIT Sloan School of Management; and Sean Seymore, STS. In addition, three visiting scholars were sponsored by the program: Eilaf Ahmed, Chemistry; and Sophia Inzunza and Chanda Prescod-Weinstein, Physics.

The following represent some of the numerous faculty who were honored with outside awards or appointments this past year:

Rudolf Jaenisch, professor of biology, was awarded the National Medal of Science.

Four faculty members were elected to the National Academy of Sciences: Barbara Liskov, Institute Professor in EECS; Subra Suresh, professor of materials science and engineering; Robert Townsend, professor of economics; and Richard Young, professor of biology.

Elected this year to the National Academy of Engineering were: Mary C. Boyce, professor and head of the Department of Mechanical Engineering; Elazer R. Edelman, professor of health sciences and technology; Mujid S. Kazimi, professor of nuclear engineering and mechanical engineering; and K. Dane Wittrup, professor of chemical and biological engineering.

Mriganka Sur, Paul E. Newton professor of neuroscience and head of the Department of Brain and Cognitive Sciences, and Li-Huei Tsai, Picower professor of neuroscience and director of the Picower Institute for Learning and Memory, were elected to the Institute of Medicine.

Three faculty members were awarded Guggenheim Fellowships: Scott Hughes, Department of Physics; Keeril Makan, Music and Theater Arts Section; and Stephen Yablo, Department of Linguistics and Philosophy.

Amy Finkelstein, professor of economics, was awarded the John Bates Clark Medal by the American Economic Association, which annually recognizes an economist under age 40 who has made the most significant contribution to economic knowledge.

Graduate Student Fellowships

The Presidential Graduate Fellowship Program provides full financial support to many of the Institute's most promising first-year graduate students. In AY2012, this program awarded a total of 102 fellowships over a wide range of MIT's academic departments. Following is a list of existing fellowships that are named for individual and corporate donors, some indicating specific areas of support that have been designated by the donor.

Akamai Technologies, Inc. (Mathematics, and Electrical Engineering and Computer Science)

Agencourt Bioscience Corporation/Alnylam Pharmaceuticals

Homer A. Burnell (Architecture and Urban Planning)

Richard A. Denton

Morton E. Goulder '42

Herbert and Dorothy Grier

Robert T. Haslam (Chemistry and Chemical Engineering)

Irwin Mark Jacobs and Joan Klein Jacobs

J. Kenneth Jamieson
 Grayce B. Kerr Fund, in honor of Charles M. Vest
 Kurtz Family Foundation, in honor of Charles M. Vest
 James A. Lash
 William M. Layson (Physics)
 Edward H. Linde (Civil and Environmental Engineering)
 Curtis Marble
 Samuel H. and Luleta Maslak
 Momenta Pharmaceuticals
 Neurometrix, Inc.
 The Picower Foundation, in honor of Norman B. Leventhal
 Charles A. Piper
 Praecis Pharmaceuticals, Inc. (Biology and the School of Science)
 Walter A. Rosenblith
 Kenan Sahin (Humanities, Arts, and Social Sciences)
 Henry E. Singleton (Brain and Cognitive Sciences)
 Stata Family Presidential Fellowship Fund
 Craig and Rose Tedman, for Robert M. Rose
 Edward Clark Walsh (Chemical Engineering)

In addition, the Lemelson Foundation provided funding for eight underrepresented minority students with interests in engineering innovation; these fellowships were intended for incoming students. The School of Engineering designates the Lemelson Foundation Fellowships as part of the Presidential Fellowship Program. Also, five students (one in each school) held Provost's Women and Minority Fellowships.

In order to build community among the fellows, the Society of Presidential Fellows hosted a lecture and dinner series, cosponsored by the Sidney-Pacific Graduate Residence.

Fundraising for support of the Presidential Fellowship Program continued to be a high priority of the Institute.

Finances

MIT tuition was increased by 3.9% to \$40,460 in AY2012. Approximately 62% of all undergraduates received need-based MIT scholarships this year. The Institute remains committed to a policy of need-blind admissions and to meeting the full financial need of all undergraduates it admits. Again this past year, MIT's total financial aid commitment increased at a higher rate than rising tuition.

The Institute's budget process returned to a more normal exercise in FY2012, following a two-year series of budget reductions stemming from the turbulence of global financial markets. This past year, the Institute was able to make strategic investments in new or expanded academic programs and provide added support of fundraising activities. A modest operating surplus at the end of the fiscal year reflected the Institute's position of financial strength and stability.

The market value of investments in the Institute's endowment as of June 30, 2012, is approximately \$10.3 billion, representing an increase of roughly 6% above the June 30, 2011, value of \$9.7 billion.

Research

Expenditures on sponsored research conducted on campus totaled \$681.1 million in AY2012, representing an increase of 3.1% from the 2011 volume of \$660.8 million.

The federal government continues to be the largest sponsor of campus research funding, accounting for approximately 69% of the total volume. The National Institutes of Health, part of the Department of Health and Human Services, is the single largest sponsor of campus research, with an approximate 20% share of total research expenditures, reflecting the continuing strength of research activities in the life sciences and neuroscience, and the collaboration of these disciplines with areas of engineering. The Department of Defense accounted for approximately 17% of total research expenditures, followed by industrial sponsors (16%), the Department of Energy (13%), and the National Science Foundation (12%).

Lincoln Laboratory research volume was \$846 million in AY2012, an increase of 5% over the 2011 volume of \$806 million.

This report marks the completion of my seventh and final year as provost. I will succeed Dr. Hockfield as MIT's seventeenth president in July 2012.

L. Rafael Reif

Provost

Fariborz Maseeh Professor of Emerging Technology