Provost

The academic areas continued to develop new initiatives in research and education in AY2017, with several of these efforts reflecting MIT's commitment to global engagement and to areas of scholarship that cross disciplinary boundaries. Important campus development and renewal activities continued.

This report describes some of the prominent events and accomplishments in academic and related areas that took place across the Institute during the past year.

People

In February 2017, Katie Rae was named president and CEO of The Engine, MIT's new start-up accelerator. Rae has an extensive background in managing start-up enterprises and business-innovation programs. Most recently, she was teh founder and co-director of Project 11, a pre-seed venture capital fund focused on technology-driven start-ups.

In April, Judith M. Cole, announced her plan to retire after eight years as CEO and executive vice president of the MIT Alumni Association (effective June 2017). A search is under way for her successor.

In May, David Goldston became director of the MIT Washington Office, succeeding William Bonvillian, who stepped down in January 2017 after 11 years of service in that position. Prior to joining MIT, Goldston was director of government affairs and director of the Center for Policy Advocacy for the Natural Resources Defense Council.

In June, Anantha P. Chandrakasan, the Vannevar Bush Professor of Electrical Engineering and Computer Science and department head of Electrical Engineering and Computer Science, was named dean of the School of Engineering, effective July 1, 2017. Professor Chandrakasan succeeds Ian Waitz, who stepped down as dean in June, and who was appointed to the newly created position of vice chancellor, with responsibility for leading and integrating the offices for undergraduate and graduate education, also effective July 1, 2017.

In spring 2017, Elizabeth Bramson-Boudreau was named chief executive officer and publisher of *MIT Technology Review*, succeeding Jason Pontin, who had served as editor-in-chief and publisher since 2005. Bramson-Boudreau was previously chief operating officer at *Technology Review*.

The Provost's Office was deeply saddened by the deaths this past year of Mildred (Millie) Dresselhaus, Institute Professor Emerita of physics and electrical engineering and computer science; Susan Lindquist, professor of biology and member and former director of the Whitehead Institute; Walter Morrow, former director of Lincoln Laboratory; and Stephen Ross, professor of financial economics in the Sloan School of Management.

Academic Programs and Activities

New activities in the academic areas continued to emerge throughout the year, reflecting the Institute's goals of continually improving its educational programs and engaging nationally and globally to foster innovative research. A small sample of these activities is described below. Please refer to the separate reports of individual academic areas for more detailed information.

In October 2016, MIT launched The Engine, an entity organized to help start-up ventures primarily based on science and technology bring their innovations to the marketplace. Acting as a start-up accelerator, The Engine focuses on serving locally based companies, particularly those that might require longer-term developmental support and that may be underserved by existing models of innovation investment. The Engine seeks to connect innovators who have breakthrough ideas—especially those with the greatest promise for improving society—with the resources needed to develop these ideas to the point of commercial success. Resources can include venture capital, work space, equipment, mentorship and expertise, and professional networking. The Engine, located in Cambridge's Central Square, is structured as an independent organization that works with innovators both inside and outside of MIT. Several MIT working groups were formed to develop practical policies and procedures for innovators to engage with The Engine, focusing on issues such as access to specialized equipment and expertise, efficient models of technology licensing, and mitigating potential conflicts of interest.

Also in October, MIT announced a collaboration with the Dubai Institute of Design and Innovation (DIDI) in which faculty from the School of Architecture and Planning will assist in the creation of a new undergraduate institution in Dubai focused on design. DIDI, scheduled to open in fall 2019, will offer the region's first undergraduate degree in design, with concentrations in products, media, arts, fashion, and management. The program will be accredited by the United Arab Emirates Ministry of Higher Education and Scientific Research. The New School's Parsons School of Design in New York has also established an agreement to help develop the DIDI curriculum.

In May 2017, MIT, jointly with Community Jameel International, an organization established by Mohammed Abdul Latif Jameel '78, announced the creation of the Abdul Latif Jameel World Education Lab (J-WEL), representing a global collaborative effort among universities, governments, and corporations to develop new ways to deliver education to learners around the world, with a particular focus on underserved populations, especially those in developing regions. The lab is organized around three main areas of interest: pre-K–12 education, higher education, and workplace leaning—each with a faculty leader. By leveraging MIT's expertise and resources, and through online and in-person collaborations, workshops, and conferences, J-WEL seeks to develop transformative educational tools and methods that can serve a global community of learners. Established as part of the Institute's open education initiatives that are under the direction of Vice President for Open Learning Sanjay Sarma, J-WEL draws on existing educational resources at MIT, including the MIT Integrated Learning Initiative and the Office of Digital Learning.

MIT's first-ever online MicroMasters program in supply chain management, launched in fall 2015, awarded certificates in June 2017 to more than 1,100 learners spanning a range of nationalities and backgrounds who completed the entire set of required online courses. This program complements the traditional one-year, on-campus master's program in supply chain management. The MicroMasters credential offers a new, "blended" pathway to a master's degree: learners who successfully complete the online courses, as well as pass an in-person final exam, have the opportunity to apply to an on-campus program leading to a full MIT master's degree in supply chain management.

In December 2016, a second MicroMasters program, based in the Department of Economics, was launched. This program was designed to lead to a new master's degree in data, economics, and development policy (DEDP)—a program of study that provides students with skills in empirical research and data analysis that can be applied to economic development policy, including poverty alleviation. While adopting the same blended learning approach as the supply chain management program, the DEDP master's degree is the first at MIT to be available solely to online learners who, in this case, have earned the MicroMasters credential in DEDP. Like the supply chain management blended program, it is available to anyone in the world.

During AY2017 the faculty approved the following new degrees:

- A Bachelor of Science in chemistry and biology that focuses on the intersection of these two subject areas, encompassing biochemistry and chemical biology. The joint curriculum prepares students for careers that involve applications of both subjects, including those in the pharmaceutical and biotechnology industries, and for further graduate study in biochemistry, molecular biology, and chemical biology. The interdepartmental major program also provides a strong foundation for advancement to clinical and research careers in medicine and related health professions.
- A Bachelor of Science in computer science, economics, and data science—a joint degree between Courses 6 and 14—that will provide students with foundational knowledge in economic analysis, computing optimization, and data science, as well as experience with applying empirical studies to real-world problems in both real and virtual settings. This experience can be applied to understanding market exchanges that involve complex human decisions.
- A new umbrella MIT degree, the Master of Applied Science, or MASc, designated for one-year master's programs that have no thesis requirement.

A Minor in Entrepreneurship and Innovation was established in 2016 as part of the MIT Innovation Initiative. The new minor seeks to provide students with the knowledge and skills to develop and deliver solutions to real-world problems, and to help them become leaders in the innovation economy. Last year, more than 80 students were enrolled in the required core introductory courses for the minor, with increasing enrollments projected for AY2018. A key element of the new minor is its connection with Project Manus, a program designed to enhance the link between education and practice whereby students gain hands-on experience with equipment and facilities in makerspaces across campus.

Last year, over half of MIT freshmen began training—and over a third completed training—on equipment such as 3D printers, laser cutters, and drill presses.

Strategic planning in the provost's area included two key reports this past year:

- The Task Force on the Future of Libraries issued a preliminary report in October 2016 that contained a set of proposals defining the type of library that will best serve the local MIT community, as well as engage collaboratively with the global academic community and the public domain. The report based its recommendations on the rapidly evolving ways in which information—particularly in the realm of research—is generated, accessed and used by faculty, students, and staff. One of the key challenges for research libraries is to find the right balance between analog and digital resources. The task force, led by the director of MIT Libraries, Chris Bourg, is continuing to consult widely with the broader MIT community to gain feedback on the report and refine its recommendations.
- "A Global Strategy for MIT,"a report recommending a framework of core principles to help guide the Institute's future international activities, was released in May 2017. The report recognized MIT's long-standing history of global engagement, and suggested ways to strengthen the Institute's regional outreach in research, education, and service—with particular focus on China, Africa, and Latin America. The report also identified a number of subject areas that represent important global challenges that MIT could help solve, such as health, education, the environment, and water security. Richard K. Lester, the associate provost who oversees MIT's international activities, authored the report. Also, the report emphasized the need to remain aware of geopolitical shifts and developments around the world when planning international engagements while recognizing the importance of periodically reviewing the Institute's strategy in this realm.

Campus Renewal

In September 2016, the Department of Urban Studies and Planning (DUSP) and the Center for Real Estate (CRE) celebrated the opening of the Samuel Tak Lee Building, the result of extensive renovations to Building 9 over the previous summer that created new classrooms, offices, and workshops. The new facility brings together all academic activities related to urban development and real estate in one location. Along with DUSP and CRE, the building includes new space for the Samuel Tak Lee MIT Real Estate Entrepreneurship Lab; the MIT Senseable City Lab, which explores the use of smart technology in urban development; the Community Innovator's Lab (CoLab), which studies ways to better integrate marginalized urban communities; the Special Program for Urban and Regional Studies, which sponsors international urban development fellows; and other smaller faculty research labs and centers.

In November 2016, MIT was selected by the federal government to be its partner in the redevelopment of the US Department of Transportation's Volpe National Transportation Systems Center site, a 14-acre parcel in Kendall Square. Under this agreement, MIT would help develop a new federal building on the site that would consolidate facilities that are currently spread among multiple buildings. In return, the Institute would

be allowed to develop the remainder of the property in ways that would contribute to the Kendall Square innovation ecosystem while also providing an increased base of support for MIT's academic and research activities. Next steps will involve close collaboration with the federal government, the City of Cambridge, the local Kendall Square community, and the MIT community, in order to develop the best vision for the redevelopment of this property.

Work began this past year to transform Building W97, a former warehouse on Vassar Street, into new space for the Theater Arts program. The renovated building will enable the program to consolidate most of its major activities in one location—including rehearsal space, faculty studios, costume and scene design spaces, dressing rooms, and a two-story theater performance space. The new facility is scheduled for completion in late 2017.

Construction continued throughout this past year on MIT.nano, a 200,000-square-foot, central-campus facility dedicated to nanoscale materials and processes, on pace for an expected completion in 2018.

Also last year, MIT announced plans to upgrade its campus-wide communications network, and in particular, to upgrade the Institute to the next generation of Internet addressing. This upgrade of network infrastructure will prepare the Institute to move from the existing IPv4 addressing system to IPv6, which will vastly increase the supply of Internet addresses as well as provide greater flexibility in how addresses are assigned to hosts. As MIT moves to IPv6, a large block of unused IPv4 addresses held by the Institute will be sold, and the proceeds will be used to help cover network upgrade costs and to provide an additional source of funds in support of the Institute's academic mission.

Faculty

Nineteen faculty members retired from MIT in AY2017, while faculty recruitment continued at a strong pace. A total of 46 new faculty members (35 men and 11 women, including four members of underrepresented minority groups) began their MIT appointments during AY2017. Also this year, 29 faculty members, including eight women, were awarded tenure within MIT. These promotions to tenure generally were effective July 2017.

The James R. Killian, Jr. Faculty Achievement Award is the highest honor bestowed by the MIT faculty on one of its own members. The award was established in 1971 "to recognize extraordinary professional accomplishments by full-time members of the MIT faculty." In May, it was announced that Richard Schrock, the Frederick G. Keyes Professor of Chemistry, was selected as the Killian Award recipient for 2017–2018.

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 Harold "Doc" Edgerton, recognizes exceptional distinction in teaching and research. The 2016–2017 Edgerton Award

was presented to Amos Winter, assistant professor in the Department of Mechanical Engineering and director of the Global Engineering and Research Lab.

Three faculty members were appointed Margaret MacVicar Faculty Fellows this year in recognition of their outstanding contributions to the quality of undergraduate education at MIT. The awardees were: Caspar Hare, professor of philosophy; Scott Hughes, professor of physics; and Maria Yang, associate professor of mechanical engineering. MacVicar Faculty Fellows are appointed for 10-year terms. These additions bring the total number of active fellows to 40, along with more than 60 emeritus fellows remaining at MIT, who together form a cohort of scholars committed to excellent teaching and innovation in education.

The Dr. Martin Luther King, Jr. Visiting Professors and Scholars 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 AY2017 MLK visiting professors were: Kishonna Gray, visiting assistant professor, Women's and Gender Studies and Comparative Media Studies/Writing; Ryan Hynd, visiting assistant professor, Mathematics; Ryan Preston-Roedder, visiting assistant professor, Philosophy; Steven L. Richardson, visiting professor, Chemistry; and Jacquelyn Taylor, visiting associate professor, Biology. In addition, one MLK visiting scholar was sponsored by the program: Kenneth Reeves, Urban Studies and Planning.

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

Six faculty members were elected to the National Academy of Sciences:

- Stephen Bell, professor of biology
- Sangeeta Bhatia, the John and Dorothy Wilson Professor of Biochemistry
- Christopher Cummins, the Henry Dreyfus Professor of Chemistry
- Esther Duflo, the Abdul Latif Jameel Professor of Poverty Alleviation and Development Economics
- Klavs Jensen, the Warren K. Lewis Professor of Chemical Engineering and professor of materials science and engineering
- Nergis Mavalvala, the Curtis and Kathleen Marble Professor of Astrophysics and associate head of the Department of Physics

Elected this year to the National Academy of Engineering were the following eight faculty:

- Paula Hammond, the David H. Koch Professor, head of the Department of Chemical Engineering, and member of the Koch Institute for Cancer Research

- Daniel Hastings, the Cecil and Ida Green Education Professor in the Department of Aeronautics and Astronautics and chief executive officer and director of the Singapore-MIT Alliance for Research and Technology
- Dara Entekhabi, the Bacardi and Stockholm Water Foundations Professor in the departments of Civil and Environmental Engineering, and Earth, Atmospheric and Planetary Sciences
- Dina Katabi, the Andrew (1956) and Erna Viterbi Professor in the Department of Electrical Engineering and Computer Science and a member of the Computer Science and Artificial Intelligence Laboratory
- Alexander H. Slocum, the Pappalardo Professor of Mechanical Engineering in the Department of Mechanical Engineering
- Michael S. Strano, the Carbon P. Dubbs Professor of Chemical Engineering in the Department of Chemical Engineering
- Mehmet Toner, professor of health sciences at the Harvard-MIT Division of Health Sciences and Technology and the Helen Andrus Benedict Professor of Surgery at Massachusetts General Hospital
- Ioannis Yannas, professor of polymer science and engineering in the Department of Mechanical Engineering

Eleven individuals at MIT were elected to the American Academy of Arts and Sciences:

- Angelika Amon, the Kathleen and Curtis Marble Professor of Physics
- Hari Balakrishnan, the Fujitsu Professor in Electrical Engineering and Computer Science
- Cynthia Barnhart, MIT Chancellor and Ford Foundation Professor of Engineering
- Edward Boyden, the AT&T Chair in the Media Lab and professor of biological engineering and brain and cognitive sciences
- Kerry Emanuel, the Cecil and Ida Green Professor of Earth and Planetary Sciences
- Joi Ito, professor of the practice in media arts and sciences and director of the MIT Media Lab
- Nergis Mavalvala, the Curtis and Kathleen Marble Professor of Astrophysics and associate head of the Department of Physics
- Earl K. Miller, the Picower Professor in the Picower Institute for Learning and Memory and the Department of Brain and Cognitive Sciences
- Mary C. Potter, professor emerita of psychology

- Daniela Rus, the Andrew and Erna Viterbi Professor of Electrical Engineering and Computer Science and director of the Computer Science and Artificial Intelligence Laboratory
- Paul L. Schechter, the William A. M. Burden Professor of Astrophysics, Emeritus

Bengt Holmstrom, the Paul A. Samuelson Professor of Economics, was awarded the 2016 Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel.

Tim Berners-Lee, the 3COM Founders Professor of Engineering, won the Association for Computing Machinery A.M. Turing Award.

Paula Hammond, the David H. Koch Professor and head of the Department of Chemical Engineering, was elected to the National Academy of Medicine.

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 AY2017, this program awarded a total of 115 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.

Edward A. Abdun-Nur '24

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

Agencourt Bioscience Corp. /Alnylam Pharmaceuticals

Ashar Aziz (1981)

Homer A. Burnell (Architecture and Urban Planning)

Richard A. Denton

Martin Deutsch

Morton E. Goulder (1942)

Herbert and Dorothy Grier

Robert T. Haslam (Chemistry and Chemical Engineering)

Heising-Simons Foundation

Irwin Mark Jacobs and Joan Klein Jacobs

J. Kenneth Jamieson

Grayce B. Kerr Fund in honor of Charles M. Vest

The Kurtz Family Foundation in honor of Charles M. Vest

James A. Lash

William M. Layson (Physics)

Liberty Mutual Foundation

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)

David S.Y. (1962) and Harold Wong

Five students held Provost's Women and Minority Fellowships, which are considered to be a part of the Presidential Graduate Fellowship Program.

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 Graduate Fellowship Program.

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

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

Diversity

The Provost's Office continued in the past year to develop and encourage activities that strengthen the diversity of the Institute's community. Much of this effort was

coordinated by the Institute Community and Equity Office (ICEO), led by Professor Edmund Bertschinger. The ICEO organized a number of community gatherings intended to facilitate dialogue on topics such as race and politics; provided training on unconscious bias to faculty search chairs in the School of Engineering; and advised several department heads, school deans, and other Institute leaders on matters of diversity and inclusion, among other activities.

In April, the provost provided his annual report on women and underrepresented minority faculty and students, noting that all of these populations have experienced percentage increases since the first report on this topic was issued in 2004. The report also discussed ongoing initiatives to enable faculty hiring outside the regular recruitment cycle as an effective mechanism for identifying candidates who would bring diversity to the hiring unit.

In addition, each academic department developed a formal statement affirming its commitment to diversity and inclusion and, in particular, to student well-being.

Finances

MIT tuition was increased by 3.75% to $48,140 in AY2017. The Institute remains committed to a policy of maintaining need-blind admissions and to meeting the full financial need of all of the undergraduates it admits. Approximately 56% of all undergraduates received need-based MIT scholarship aid this year. The undergraduate financial aid budget was increased by 10.4% in FY2017 to help offset the increase in tuition and the expected decrease in parental contribution. The graduate financial aid budget was increased by 2.8%. The Institute's undergraduate enrollment was 4,524 in AY2017, a decrease of three students from AY2016, while graduate student enrollment increased by 48 to 6,852.

A total of $10 million was made available in fiscal year 2017 for new academic programs ($7 million, which included $2 million for undergraduate financial aid) and administrative programs ($3 million), similar to the previous year's allocation. Because of an operating surplus at the end of the fiscal year, the Institute also was able to add funds to a reserve that is used for infrastructure renewal such as capital projects, building repair and maintenance, and information technology modernization—and for the support of budget flexibility and strategic initiatives in future years.

The market value of investments in the Institute's endowment as of June 30, 2017 was $14.8 billion, representing an increase of 12.5% over the June 30, 2016 value of $13.2 billion.

Research

Expenditures on sponsored research conducted on campus totaled $719.5 million in FY2017, representing a decrease of 1.2% below the 2016 volume of $728.1 million.

The federal government continues to be the largest sponsor of campus research funding, accounting for approximately 64.2% of the total volume. For the first time since the World War II era, industrial entities represent the single largest sponsor of

campus research, with an approximate 18.5% share of total research expenditures. The Department of Defense accounted for approximately 18.1% of total research expenditures, followed by the National Institutes of Health and other agencies within the Department of Health and Human Services (15.5%), private foundations and nonprofit organizations (12.1%), the Department of Energy (11.4%), and the National Science Foundation (11.2%).

Lincoln Laboratory research volume was $971.3 million in FY2017, an increase of 4.8% above the 2016 volume of $926.6 million.

Martin A. Schmidt
Provost