

Provost

During academic year 2009–2010 MIT continued to pursue new initiatives in education and research, some with international dimensions, with an ongoing aim toward developing the best academic opportunities for our students and faculty both at home and abroad. The year marked the opening of a major new campus facility devoted to media arts and sciences and saw steady progress toward completion of two additional academic buildings on campus. Several faculty-led committees submitted reports this year that promise to have a significant, positive impact on various Institute activities, policies, and procedures. This report attempts to describe some of the noteworthy events and accomplishments that took place across the Institute during the past year.

People

John Reed '61, SM '65, was elected as the new chair of the MIT Corporation, succeeding Dana Mead PhD '67, who stepped down after serving in this role since 2003.

Christine Ortiz, professor of materials science and engineering, was named dean for graduate education effective August 1, 2010, replacing Steven Lerman '72, SM '73, PhD '75, who departed MIT to become provost and executive vice president for academic affairs at George Washington University.

Institute Professor Isadore Singer retired at the end of the academic year.

We were greatly saddened this year by the deaths of professor Michael Feld of the Department of Physics; Dr. Howard Johnson, former MIT president and chair of the MIT Corporation; professor William Mitchell, former dean of the School of Architecture and Planning; Institute Professor emeritus Paul Samuelson of the Department of Economics; professor emeritus Arthur Smith of the Department of Electrical Engineering and Computer Science and former dean for undergraduate education and student affairs; and professor Richard Yamamoto of the Department of Physics.

Academic Programs and Activities

Many new developments took place in the academic areas during AY2010, with several of these reflecting domestic or 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 January, MIT finalized an agreement with the newly formed Singapore University of Technology and Design (SUTD) establishing a partnership between the two institutions that builds on MIT's history of collaborative activities in Singapore and represents the Institute's most significant educational collaboration to date. MIT will share its expertise with SUTD in such areas as curriculum design and deployment, faculty recruitment, and research program development, with an emphasis on fostering educational and research programs that encourage innovation and entrepreneurship. Under the agreement, MIT faculty and research staff will spend time in Singapore in a range of activities, such as developing joint research projects and coteaching courses with SUTD faculty. Also

expected are numerous opportunities for student exchanges and collaborations. A key component of the research program will be the establishment of an International Design Center where faculty and students from MIT and SUTD will engage in technologically intensive design activities. The center will focus on developing systems and services that address regional needs as well as challenges of a global nature. Institute Professor Thomas Magnanti was named founding president of SUTD (a position he will hold while on leave from MIT), and professor Sanjay Sarma of the Department of Mechanical Engineering was named director of the MIT-SUTD collaboration.

The Emergent Behaviors of Integrated Cellular Systems Center (EBICS), a research partnership consisting of MIT, the University of Illinois at Urbana-Champaign, and the Georgia Institute of Technology, was established this past year with a \$25 million award from the National Science Foundation (NSF). The new center, to be headquartered at MIT, will focus on the advancement of research in complex biological systems, the development of innovative educational programs based on this research, and the engagement of underrepresented minority groups in the center's activities. Research activities will take place at all three partner institutions as well as at a number of other minority-serving schools. Attracting a diversity of talent to the center is considered central to the goal of developing new, interdisciplinary approaches to the study of biological science and engineering, and these engagements will ensure that the creative energy of the new center will reach significantly beyond the three primary partners. EBICS is one of five new NSF Science and Technology Centers resulting from a recent nationwide, merit-based competition. The center's founding director is Roger Kamm, who is the Germeshausen professor of mechanical and biological engineering at MIT.

MIT and the Skolkovo Foundation, a nonprofit organization sponsored by the Russian Federation, announced an agreement in June to evaluate options for collaborative activities in education and research. Such activities may include the establishment of joint research facilities bringing together researchers from MIT and Russia and the possible creation of a new academic institution in Skolkovo, a Moscow suburb. The agreement reflects a long-range goal of the Skolkovo Foundation to promote a culture of scientific and technological innovation within Russian universities and research institutions and to transfer new technologies to industry. The evaluation of possible activities is expected to conclude by the end of 2010, and if a decision is made to proceed with this initiative, a definitive agreement will be negotiated in early 2011.

MIT joined a consortium of area universities and corporations that is pursuing plans in partnership with the state government for the establishment of a high-performance computing center (HPCC) to be located in Holyoke, MA. The HPCC is intended to provide advanced infrastructure for research computing and to enable a collaborative research agenda involving advanced computing and applications (including life sciences, clean energy, and green computing) that promises to establish Massachusetts as a leader in the development of a new generation of computing technologies. MIT and its consortium partners—the University of Massachusetts, Boston University, and Northeastern University, along with corporate partners EMC, Cisco, and Accenture—have held discussions with the governor's office and the mayor of Holyoke with an aim toward securing approvals for construction of the facility beginning in fall 2010 and

for occupancy in late 2011. The establishment of the HPCC would represent the most significant partnership among the state government, leading research universities, and private industry in the history of Massachusetts and would serve as a stimulant for economic development in Holyoke and surrounding areas.

As part of a larger effort to address undergraduate curriculum reform, in spring 2009 the MIT faculty approved recommendations to change the structure of the distribution requirement within the Humanities, Arts, and Social Sciences (HASS) Requirement. This requirement is designed to help prepare MIT students for leadership opportunities across a wide range of fields and careers. This past year, the Committee on the Undergraduate Program's Subcommittee on the HASS Requirement determined that first-year students entering in fall 2010 and beyond will be subject to the revised distribution structure. The new system will move away from the current, more complex five-category distribution structure and will require that students take one HASS subject from each of three categories: Arts, Humanities, and Social Sciences.

In fall 2009, the Institute successfully completed the formal accreditation process that takes place at 10-year intervals. MIT is accredited by the New England Association of Schools and Colleges through its Commission on Institutions of Higher Education. The accreditation process provides the Institute with the opportunity for self-reflection and reassessment and requires a detailed self-study of the full range of its activities, including discussions of MIT's organization and governance, academic and research programs, physical and financial resources, and planning and evaluation strategies.

In October, MIT was honored to welcome President Obama to the campus. The president toured a group of laboratories and delivered an address on American leadership in efforts related to clean energy.

The Karl Taylor Compton Lecture was delivered in March by British foreign secretary David Miliband SM '90. The Compton Lecture Series was established in 1957 to honor the late Karl Taylor Compton, who served as president of MIT from 1930 to 1948 and as chairman of the Corporation from 1948 to 1954.

Facilities

Reflecting the Institute's commitment to the continuous renewal of its physical environment, one major new facility opened in 2010 and construction continued to move forward for two important new buildings on campus.

The Media Lab complex, a major physical extension of the MIT Media Lab, opened in March. The new complex provides a highly visible expansion of research and teaching facilities dedicated to art, design, and technology-related programs, drawing on a Media Lab tradition of bringing together a variety of disciplines that share a strong spirit of innovation.

Construction continued on schedule for two additional new campus facilities: the new building to accommodate the Sloan School of Management, with an expected completion date of late summer 2010, and the David H. Koch Institute for Integrative Cancer Research, planned for completion in December 2010.

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 fall 2009, the International Activities Committee (IAC) and the MIT Global Council submitted complementary reports addressing MIT's future international strategies. While the IAC report articulates a set of general principles and guidelines for developing and conducting international engagements, the Global Council report focuses on prescriptions for specific programmatic initiatives, particularly those designed to expand international educational opportunities for our students. Each report recognizes the critical importance of international activities to the advancement of faculty-led research and to the preparation of our students as future global leaders. While MIT has a long history of experience with international collaborations, these reports affirmed the need to strengthen and expand such engagements on an institutional level and to evaluate each potential engagement in the context of the Institute's comprehensive global strategy. The guidelines for international engagement recommended in these reports will provide MIT with a road map for pursuing global activities with the greatest potential for success in the decades ahead.

In January, MIT issued a report by its Initiative on Faculty Race and Diversity that examines how race affects the recruitment, retention, and professional careers of Black, Hispanic, and Native American professors at MIT; the report represents the culmination of two and a half years of research and analysis by a committee of nine faculty members. The report urges the Institute to strengthen the efforts of its schools and departments in recruiting and retaining underrepresented minority faculty members and to explore ways of working with other institutions to expand the pool of diverse talent across the country. The analysis concludes that MIT's success in hiring minority faculty has been uneven across the various areas of the Institute and could be improved by applying more consistent and effective policies and practices. A key finding of the report indicates that MIT tends to hire many of its faculty from its own pool of graduates and from a relatively small group of peer institutions, suggesting that broadening recruitment efforts could lead to greater success in minority hiring. The report also notes that the collegial experience of underrepresented members of the faculty can be different from that of other peers, due in part to the unsatisfactory mentoring experiences reported more frequently by minority faculty than by their nonminority colleagues. The report thus includes a more rigorous junior faculty mentoring system among its recommendations. Following his review of the report, the provost began a series of meetings with individual schools to discuss the report in detail and determine the best ways to implement its recommendations at the school and department levels.

The Environmental Research Council (ERC) produced a report in spring 2010 that sets out a vision for new environmental research and educational opportunities at MIT. The report points to areas where faculty and students can build on existing strengths in multiple disciplines at the Institute to reach for solutions to environmental challenges of global importance. An expanded ERC was then asked to design an implementation plan with detailed recommendations for developing a strong environmental initiative at MIT over the next several years, drawing on broad-based faculty input. It is expected

that new environmental activities will complement the MIT Energy Initiative and other related research efforts. The implementation report is expected in fall 2010, with implementation commencing in early 2011.

The Institute-wide Budget Planning Task Force, formed last year in response to the economic downturn's impact on MIT, released its final report in December. The report embodies several months of the collective efforts of roughly 200 task force members—faculty, staff, and students—aimed at proposing options and opportunities for reducing costs and increasing revenue while improving our operations. Many of the ideas generated by the task force were developed from suggestions made to an online “idea bank” that was open to all members of the MIT community. The report includes ideas ranging from incremental, simple changes to bold, long-term policy revisions. After reviewing the report, the provost, chancellor, and executive vice president and treasurer determined that a number of ideas suggested in the report would be incorporated in the Institute's FY2011 pro forma budget and that other ideas would be actively vetted for implementation subsequent to FY2011. The Task Force Coordinating Team is continuing to prioritize the proposed ideas and carefully assess the financial and operational impact of their implementation.

The Committee on Managing Potential Conflicts of Interest in Research and the related Committee on MIT Technology Transfer in the 21st Century continued to work toward the completion of their final reports, which are anticipated in fall 2010.

Following the earthquake in Haiti in January, MIT organized relief efforts on campus, including a meeting at MIT with the Haitian minister in charge of reconstruction. Faculty chair Thomas Kochan and associate provost Philip Khoury assumed responsibility for coordinating campus efforts to aid Haiti's recovery, especially those related to rebuilding the country's university system.

Faculty

Twenty-four faculty members retired from MIT in AY2010. Several of these individuals were participants in the Faculty Renewal Program, which enables eligible senior faculty members to retire voluntarily with a choice of retirement incentives. The program is in effect for a period of three years, through 2012.

Faculty recruitment continued at a strong pace this past year. A total of 49 new faculty members (31 men, 18 women; 4 members of underrepresented minority groups) began their MIT appointments during AY2010. Also this year, 18 faculty members were awarded tenure within MIT, including three women and one member of an underrepresented minority group. These promotions to tenure were effective July 2010.

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 recipient for 2009–2010 was Rudolf Jaenisch, professor of biology and a founding member of the Whitehead Institute. In May 2010 it was announced that Ronald Rivest, Andrew and Erna Viterbi professor in the Department of Electrical Engineering and Computer Science, is the Killian Award recipient for 2010–2011.

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 2009–2010 winner of the Edgerton Award was Markus Buehler, Esther and Harold E. Edgerton associate professor in the Department of Civil and Environmental Engineering.

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. These awardees were Anette (Peko) Hosoi of the Department of Mechanical Engineering, Krishna Rajagopal of the Department of Physics, Rajeev Ram of the Department of Electrical Engineering and Computer Science, and Norvin Richards of the Department of Linguistics and Philosophy. MacVicar Faculty Fellows are appointed for 10-year terms. These additions bring the total number of active fellows to 45, with 39 emeritus fellows, who together 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, to enhance their scholarship through intellectual interactions with MIT peers, and to enrich the intellectual life of MIT through their participation in MIT research and academic programs. The 2009–2010 Dr. Martin Luther King Jr. visiting professors were John Harkness, Chemistry; Ray O’Neal, Physics; Steward Pickett, Urban Studies and Planning; Quayshawn Spencer, Philosophy; and Latanya Sweeney, Electrical Engineering and Computer Science. In addition, three visiting scholars were sponsored by the program: Donal Fox, Music and Theater Arts; Carl Paris, School of Humanities, Arts, and Social Sciences; and Ricardo Pitts-Wiley, Literature.

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

Angelika Amon, professor of biology, and Barbara Imperiali, professor of chemistry, were elected to the National Academy of Sciences.

JoAnne Stubbe, professor of chemistry and biology, was awarded the National Medal of Science and the Benjamin Franklin Medal in Chemistry and was cowinner of the Welch Award in Chemistry.

Elected this year to the National Academy of Engineering were Cynthia Barnhart, professor of civil and environmental engineering and engineering systems; Gang Chen, professor of mechanical engineering; Robert E. Cohen, professor of chemical engineering; Andrew Whittle, professor of civil and environmental engineering; and Alan Willsky, professor of electrical engineering and computer science.

Esther Duflo PhD ’99, professor of economics, was the recipient of a MacArthur Fellowship and also was selected as the winner of the John Bates Clark Medal, which recognizes the top economist under age 40.

Sally W. (Penny) Chisholm, professor of civil and environmental engineering and professor of biology, was awarded the Alexander Agassiz Medal by the National

Academy of Sciences. The medal recognizes original contributions in the science of oceanography.

Professor Ernest Moniz, director of the MIT Energy Initiative, was named by the US Department of Energy to the Blue Ribbon Commission on America's Nuclear Future.

Fred Moavenzadeh, professor of civil and environmental engineering, was appointed president of the Masdar Institute of Science and Technology, located in Abu Dhabi. During his term at Masdar, Professor Moavenzadeh will be on leave from MIT.

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 AY2010, this program awarded a total of 122 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.

- Agencourt Bioscience Corporation/Alnylam Pharmaceuticals
- Akamai Technologies Inc. (Mathematics and Electrical Engineering and Computer Science)
- 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
- The 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, and 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 fellows, the Society of Presidential Fellows hosted several events during the academic year, including beginning- and end-of-year receptions and a lecture and dinner series cosponsored by the Sidney-Pacific Graduate Residence.

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

Finances

MIT tuition increased by 3.8% to \$37,510 in AY2010. Approximately 59% of all undergraduates received need-based MIT scholarships this year. MIT 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 financial aid commitment increased at a higher rate than rising tuition.

The Institute continued to take an aggressive approach to cost savings in response to the financial constraints brought about by the recent global economic downturn. The general Institute budget was reduced by approximately \$58 million in FY2010, resulting from the determined efforts of units across the Institute. A roughly similar level of reduction is planned for FY2011. As mentioned earlier in this report, the Institute-wide Budget Planning Task Force proposed a number of ideas for both cutting costs and raising revenue, and the most immediately applicable ideas have already begun to impact next year's budget. Further development in the coming year of the most promising task force ideas is expected to yield a continued strengthening of the Institute's long-term financial position.

The market value of investments in the Institute's endowment at the end of AY2010 was approximately \$8.32 billion, representing an increase of 5.5% above the AY2009 value of \$7.88 billion. The endowment income distribution rate will decrease by 18% from FY2010 to FY2011.

Research

Expenditures on sponsored research conducted on campus totaled \$626.6 million in AY2010, representing a decrease of 12.8% from the 2009 volume of \$718 million. The decrease reflects the separation of the Broad Institute from MIT last year and the accompanying removal of Broad research volume from MIT's total research expenditures. Excluding Broad, campus research volume increased by 13.7% from 2009 to 2010, due in part to awards from programs sponsored by the American Recovery and Reinvestment Act (ARRA) of 2009. As of July 2010, MIT had received a total of 164 ARRA awards, with anticipated cumulative funding of approximately \$134 million. The expenditures from these awards will be spread over several fiscal years.

The federal government continues to be the largest sponsor of campus research funding, accounting for approximately 70% 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 approximately a 23% 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 (15%), the Department of Energy (12%), and NSF (11%).

Lincoln Laboratory research volume was \$753 million in AY2010, an increase of 11% over the 2009 volume of \$678 million.

This report marks the completion of my fifth year as provost.

L. Rafael Reif

Provost

Fariborz Maseeh Professor of Emerging Technology