

## **Provost**

Academic year 2008–2009 witnessed a number of advancements in the Institute’s research and educational programs, and several major campus development projects moved closer to completion. Ongoing success with new faculty recruitment, a range of awards and honors garnered by our existing faculty, committee-led assessments of our internal policies and procedures, and a continuing commitment to graduate student support were some of the additional elements contributing to the strength of our academic areas. The Institute ended the fiscal year in a positive financial position, in terms of both the general budget and research revenues, even as we formed long-range strategies for reducing overall expenses in response to a general economic downturn. This report attempts to describe some of the important events and accomplishments that took place across the Institute during the past year.

## **People**

Costantino “Chris” Colombo was appointed dean for student life in August, 2008, succeeding Larry Benedict.

Cecilia D’Oliveira ’77, SM ’79 was named executive director of MIT OpenCourseWare in fall 2008.

Barbara Liskov, Ford professor of engineering in the Department of Electrical Engineering and Computer Science and associate provost for faculty equity, and Ann Graybiel, Walter A. Rosenblith professor of neuroscience in the Department of Brain and Cognitive Sciences, were appointed Institute Professors, the highest honor MIT bestows on members of the faculty.

Thomas Kochan, George M. Bunker professor of management, became the new chair of the MIT Faculty in June, succeeding Bish Sanyal, Ford International professor of urban development and planning, who completed a very productive two-year term as chair.

We were greatly saddened by the deaths of professor David Schauer of the Department of Biological Engineering; Alex D’Arbeloff, former chairman of the MIT Corporation; and Margaret Warner, special assistant to the executive vice president and treasurer.

## **Academic Programs and Activities**

Many new developments transpired in the academic areas during AY2009, with several of these reflecting MIT’s expanding level of international engagements. Described below are some of the most prominent activities. Please refer to the separate reports of individual academic units for detailed information about these and other programs.

The Singapore-MIT Alliance for Research and Technology Centre (SMART Centre), began three new programs related to education and research. The SMART Centre, located in Singapore, embodies a major research partnership between MIT and the National Research Foundation of Singapore, creating an intellectual hub for scientific and technological innovation. The first of the new programs is a graduate fellowship

program designed to attract and support the most talented doctoral students from Singapore and surrounding regions to the SMART Centre, providing the opportunity to become directly involved with research conducted jointly by faculty from MIT, the National University of Singapore, and Nanyang Technological University. The second program provides undergraduates from these same three institutions opportunities to participate in research projects at the SMART Centre and to interact with faculty members, researchers, and other students. The third program is a highly selective postdoctoral research fellows program, designed to attract outstanding recent PhD graduates to the SMART Centre to pursue research topics of their own choosing. Also this past year, BioSystems and Micromechanics was added as an interdisciplinary research group at the SMART Centre.

A seven-year research and educational collaboration between faculty in the Department of Mechanical Engineering and King Fahd University of Petroleum and Minerals (KFUPM) in Dahrán, Saudi Arabia, was launched in fall 2008. This joint program is intended to lead to the creation of the Center for Clean Water and Clean Energy at MIT and KFUPM, focusing on issues of desalination, solar energy, and advanced manufacturing. Approximately 20 faculty from each institution are expected to participate in the first year of the program. The planned new center includes a unique outreach activity that will bring Saudi women engineers and scientists to MIT to pursue collaborative research and educational projects.

In February the presidents of MIT, Harvard University, and Massachusetts General Hospital announced the creation of the Phillip T. and Susan M. Ragon Institute, a collaborative research entity focused on bringing scientists and clinicians together with engineers to find ways of preventing and curing human disease through a greater understanding of how the body's immune system fights infections. Made possible by a gift from the Phillip T. and Susan M. Ragon Foundation, the institute will focus initially on the need for an effective vaccine against AIDS, and will develop an interdisciplinary team of experts who will jointly direct their research efforts to understanding a wide range of infectious diseases and cancers. Administration of the Ragon Institute will be based at Massachusetts General Hospital.

The Masdar Institute of Science and Technology, located in Abu Dhabi, became the inaugural founding public member of the MIT Energy Initiative (MITEI), with an aim toward expanding the research and development of alternative and renewable energy technologies. The Masdar Institute, which will begin its instructional programs in fall 2009, was developed in cooperation with the MIT Technology and Development Program to be the world's first graduate-level institution dedicated to the study of advanced energy-related technologies. Masdar's partnership with MITEI will build upon its existing relationship with MIT in these areas.

MIT was chosen as the home of two multimillion-dollar Energy Frontier Research Centers funded by the US Department of Energy. These centers, which are being established at universities, national laboratories, nonprofit organizations, and corporations across the nation, are devoted to advanced scientific research on energy. One of the new centers at MIT will focus on developing new systems for converting

solar energy to electricity and for electrical energy storage. The other center's objective is to create new solid state materials for the conversion of sunlight and heat into electricity.

MIT submitted multiple proposals for research funding in response to the American Recovery and Reinvestment Act (ARRA) of 2009, which is a major investment by the federal government in innovative research and development programs designed to promote jobs and stimulate the economy. The Institute has already received several awards with ARRA funding during the first stages of the program.

Launched by a generous gift from the Bernard M. Gordon Foundation, the Bernard M. Gordon–MIT Engineering Leadership Program has begun its mission as an undergraduate program that will undertake new approaches to preparing students for leadership positions in engineering. The program includes exposure to extensive project-based learning activities, including internships and other close interactions with industry leaders.

A new joint effort drawing on the resources of three of MIT's schools was initiated this year to address the world's increasing demand for transportation. Transportation@MIT, a collaboration involving the School of Engineering, the School of Architecture and Planning, and the Sloan School of Management, will take an interdisciplinary approach to the development of new ideas for sustainability, technology, business practices, and public policy related to all types of transportation. A two-year pilot program includes plans for the development of two laboratories, one in Cambridge and one outside the US, where new transportation processes, technologies, and policies can be tested.

In November, MIT held a Diversity Leadership Congress, bringing together hundreds of academic, administrative, and student leaders from across the Institute for the purpose of sharing ideas on promoting diversity and inclusion across all areas of MIT. The day-long event was highlighted by remarks by President Hockfield and a keynote address by former US secretary of labor Alexis Herman. Participants were inspired to leverage MIT's traditional problem-solving culture toward finding new ways to improve diversity among its faculty, students, and staff.

The Global Education and Career Development Center was established this past year within the Office of the Dean for Undergraduate Education to provide students with a central resource for programs and services related to international educational experiences. Available resources include classroom instruction, workshops, pre-professional advising, connections to employers, and internships. The center's ultimate goal is to help students to develop the skills to become effective leaders in a diverse society and to meet the challenges of a competitive global economy.

MIT's OpenCourseWare, a program that freely shares course materials from virtually all of the Institute's classes, reached a milestone this past year of 50 million individuals having visited its website since the program's inception in 2002. Visitors use the site in a variety of ways to pursue formal and informal learning. Approximately 60% of the visits to the OpenCourseWare site originate from outside of North America, with significant usage coming from East Asia, Europe, and South Asia.

In early 2009, the MIT faculty reviewed recommendations proposed by the Educational Commons Subcommittee (ECS) related to the General Institute Requirements (GIRs) that govern the undergraduate curriculum. ECS had been charged with refining the comprehensive set of proposals for curricular reform produced by the Task Force on the Undergraduate Educational Commons in 2006. Although the full package of ECS's recommendations did not obtain a sufficient number of faculty votes to gain approval, faculty efforts to improve the content of the GIRs are continuing, particularly in the area of the Humanities, Arts, and Social Sciences Requirement and in core science subjects.

In July 2009 the Eli and Edythe L. Broad Institute of MIT and Harvard, which began in 2004 as a collaborative, inter-institutional center of biomedical research, was established as a permanent nonprofit scientific research institute with the support of a \$400 million private endowment. This action effectively separates the Broad Institute financially from MIT and establishes it as a separate entity, whereby it will continue to maintain a close and productive affiliation with Harvard and MIT.

Karl Taylor Compton Lectures at MIT were delivered in fall 2008 by Paul Kagame, president of the Republic of Rwanda, and in spring 2009 by Steven Chu, US secretary of energy. 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 renewal of its physical environment, construction moved forward on several new buildings on campus, and renovations of some of our existing facilities also took place.

New Ashdown House, a 441-bed graduate student residence at 235 Albany Street, was opened in summer 2008. The original Ashdown House is undergoing a phased renovation to convert it to living quarters for approximately 460 undergraduate students, with major exterior renovations scheduled for completion in 2010.

Construction continued on schedule for three important new campus facilities: a major extension of the Media Lab facility, scheduled for completion in late 2009; the new building to accommodate the Sloan School of Management, with an expected completion date of early summer 2010; and the David H. Koch Institute for Integrative Cancer Research, to be completed in December 2010.

## **Council, Committee, and Task Force Activities**

A number of new councils and committees were formed in fall 2008, each focused on a particular issue of current importance to the MIT community.

The MIT Global Council was given the charge of examining and assessing existing efforts in international education at the Institute, and developing a long-range plan for the creation of a globally active undergraduate educational program as well as for a distinctive global program that combines education and research. The Global Council, comprised of faculty from a wide range of academic disciplines at MIT, will build on

the work of the International Advisory Committee (IAC), whose final report is expected to be released in early fall 2009. The IAC will continue to advise the president and provost on global institutional strategies and on specific proposals for major institutional partnerships between MIT and countries and institutions abroad. The Global Council will also coordinate its efforts with the Global Education Office under the dean for undergraduate education, and with various existing programs administered by each of MIT's five schools. A report from the council is expected later in 2009.

The MIT Environmental Research Council was appointed following the recommendations of the Committee to Assess Environmental Activities at MIT, as expressed in the committee's final report submitted the previous year, entitled "Creating a Sustainable Earth: An MIT Research, Teaching, and Public Service Initiative for Understanding, Restoring and Managing the Environment." This new faculty council will take a global perspective on the environment, considering new insights into Earth's natural systems that can lead to advances in managing environmental sustainability. The council will also build on the ongoing work of the MIT Earth System Initiative established in 2002. For the coming year, the council is specifically charged with developing a high-impact environmental research prospectus that would form the basis of a major new fundraising initiative.

Two new faculty committees, the Committee on Managing Potential Conflicts of Interest in Research and the Committee on MIT Technology Transfer in the 21st Century, are working in parallel to address issues of growing importance to our research activities. The committee on conflicts of interest was asked to review the kinds of individual and institutional relationships that could give rise to the perception or reality of conflicts of interest; assess regulations, legal requirements, and best practices at other major institutions; and examine written and practiced policies and procedures related to conflicts of interest. The committee is also expected to recommend any changes to strengthen our policies and procedures; review mechanisms for monitoring and reporting conflicts of interest; examine relevant procedures within current research groups; and recommend programs for ongoing education and information exchange regarding research integrity and conflict of interest. The Committee on Technology Transfer will explore ways in which MIT's policies, procedures, and practices can enhance and accelerate technology transfer to contribute to the economy and the welfare of the nation and the world; review industrial partnerships and the principles on which they rest; learn from best practices at peer institutions; and recommend appropriate changes to MIT's policies and procedures to enable the formation of beneficial, strategic partnerships with industry while preserving MIT's fundamental values and principles. The two committees are working cooperatively in addressing issues that complement their respective charges.

The global economic downturn that began to unfold in 2008 has generally required institutions to develop strategies for operating with sharply reduced financial resources in the years ahead. At MIT, an Institute-wide Planning Task Force was established in spring 2009 and charged with assessing how our university's mission is translated into day-to-day operations and to explore ways to maximize the efficiency and effectiveness of these operations in the context of the Institute's need to significantly reduce its level of expenses. A total of nearly 200 faculty, staff, and students are members of the task force,

divided among nine distinct working groups that are examining a range of issues across academic, administrative, and student-related areas. The working groups submitted their preliminary reports in June, and their initial findings were discussed with the Academic Council. A final report is expected in October 2009.

## **Faculty**

Twenty faculty members retired from MIT in AY2009. Several of these were participants in the Faculty Renewal Program, which enables eligible senior faculty members to retire voluntarily with a choice of retirement incentives. The program will be in effect for a period of three years, through 2012.

Faculty recruitment continued at a strong pace this past year. A total of 43 new faculty (31 men, 12 women, 5 members of underrepresented minority groups) began their MIT appointments during AY2009. Also this year, 35 faculty members were awarded tenure within MIT, including 10 women and one member of an underrepresented minority group. These promotions to tenure were effective July 2009.

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 2008–2009 was awarded to Rafael Bras, a former professor in the department of Civil and Environmental Engineering, and now dean of engineering at the University of California at Irvine, who delivered the 37th annual Killian Award lecture in March 2008. In May 2009, it was announced that Rudolf Jaenisch, professor of biology and a founding member of the Whitehead Institute, is the Killian Award recipient for 2009–2010.

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 winner of the Edgerton Award was Krystyn Van Vliet, the Thomas J. Lord Foundation associate professor in the Department of Materials Science and 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 Vladimir Bulovic and Daniel Jackson, Department of Electrical Engineering and Computer Science; Diana Henderson, Literature Section; and David Jones, Program in Science, Technology, and Society. MacVicar Faculty Fellows are appointed for 10-year terms. These additions bring the total number of active fellows to 46, with 33 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 2008–2009 Dr. Martin Luther King Jr. visiting professors were: Dolores Acevedo-Garcia, Urban Studies and Planning; Leonard Daniel, Aeronautics and Astronautics; Thomas Glave, Writing and Humanistic Studies; and Latanya Sweeney, Electrical Engineering and Computer Science. In addition, one visiting scholar was sponsored by the program: Carl Paris, Women's Studies.

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

Mildred Dresselhaus, Institute Professor, won the Vannevar Bush Award, presented by the National Science Board to recognize outstanding contributions to the nation through public service activities in science and technology.

Eric Lander, professor of biology and founding director of the Broad Institute of MIT and Harvard, was named by President Obama as a cochair of the President's Council of Advisors on Science and Technology.

Robert Langer, Institute Professor, received a Max Planck Research Award, a major science prize supported by the German government.

Barbara Liskov, Institute Professor, won the Association for Computing Machinery's A.M. Turing Award for pioneering work in the design of computer programming languages.

Adèle Naudé Santos, dean of the School of Architecture and Planning, received the Topaz Medallion for Excellence in Architectural Education, given by the American Institute of Architects and the Association of Collegiate Schools of Architecture.

### **Graduate Student Fellowships**

The Presidential Graduate Fellowship Program provides full financial support to many of the of the Institute's most promising first-year graduate students. In AY2009, this program awarded a total of 124 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 (1942)
- 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
- Ralph Landau
- 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 three 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. The DuPont-MIT Alliance supported 10 fellowships, which were also designated as Presidential Fellowships and were allocated to science and engineering disciplines. In addition, five students (one in each school) held Provost's Women and Minority Fellowships.

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. The MIT Campaign for Students, announced in fall 2008, includes graduate student fellowships among its fundraising goals.

## Finances

MIT tuition was increased by 4% to \$36,140 in AY2009. Following a policy begun in 2007, the level of self-help the Institute requires of students who receive federal Pell grants was again reduced, so that the students who rely most heavily on financial aid were protected from an increased financial burden. 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. Each year for the past decade MIT's financial aid commitment has increased at a higher rate than rising tuition.

Financial planning at the Institute acquired a new urgency this past year, as the global economic downturn caused the value of endowment funds to decrease sharply, which in turn required that academic units develop strategies for reducing their operating costs in the coming years. MIT announced plans to reduce operating budgets by a cumulative percentage of 10–15% over the next three years, beginning in AY2010. A significant operating surplus at the close of fiscal year 2009 provided some cushion against the impending budget reductions.

The market value of investments in the Institute's endowment at the end of AY2009 is expected to be finalized in September 2009, although we anticipate a significant drop in value from the AY2008 year-end level of \$10.11 billion. The endowment income distribution rate will remain unchanged from fiscal year 2009 to 2010.

As mentioned earlier in this report, an Institute-wide Task Force was formed to explore structural changes to Institute operations that could lead to significant reductions in costs while improving the efficiency and effectiveness of these operations. Recommendations from the Task Force will inform our budget planning process for fiscal year 2011 and future years.

## Research

Expenditures on sponsored research conducted on campus rose to \$718 million in AY2009, an increase of 11.7% over the 2008 volume of \$643 million. The federal government continues to be the largest sponsor of campus research funding, accounting for approximately 73% 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 36% 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. Industrial sponsors and the Department of Defense each accounted for approximately 14% of total research expenditures, followed by the Department of Energy (9%) and the National Science Foundation (9%).

Looking ahead, the financial separation of the Broad Institute from MIT mentioned earlier in this report will result in research expenditures at Broad no longer being

included in the total MIT research volume as of AY2010. This loss of reportable expenditures is expected to be offset to some degree by the Institute's receipt of grants funded through the American Recovery and Reinvestment Act of 2009.

Lincoln Laboratory research volume was \$678 million in AY2009, an increase of 11% over the 2008 volume of \$610 million.

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

**L. Rafael Reif**

**Provost**

**Fariborz Maseeh Professor of Emerging Technology**