



**THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY**

**Cambridge, Massachusetts**

**Fifth-Year Interim Report to the  
New England Association of Schools and Colleges**

**August 2014**

## INTRODUCTION

The preparation of this interim report comes at a time of institutional introspection and transition. With the launch of *MITx* in December 2011 and edX just five months later, the educational model that has served MIT so well for more than 150 years has suddenly become the focus of comprehensive self-reflection and analysis.

As is described in detail in Standard 2, in February 2013, President L. Rafael Reif established the Institute-wide Task Force on the Future of MIT Education, a body whose charge is no less bold than its title suggests. Digital education is changing the landscape of higher education. A simple Internet connection now provides audiences around the world with the opportunity to learn from the best and brightest that MIT has to offer. The lessons that our faculty are learning as a result of their interactions with an online global audience are already beginning to have a major impact on how MIT teaches its residential students.

This report provides a summary of MIT's activity in the years since the Institute completed its 2009 institutional self-study. The report was prepared under the direction of the Vice President and Secretary of the Corporation, Kirk Kolenbrander, who also serves as the Institute's Accreditation Liaison Officer. Aaron Weinberger, Assistant Director for Institute Affairs, worked with a broad cross-section of the Institute to write or compile the text. Lydia Snover, Director for Institutional Research, prepared the data forms that informed the narrative.

The Office of the Executive Vice President and Treasurer and the Office of the Dean for Student Life largely prepared the responses to the first two areas identified for special emphasis (deferred maintenance and dining). The third area (understanding student learning), which is addressed in the reflective essay, is a collaborative effort representing input from the Office of the Dean for Graduate Education, the Teaching and Learning Laboratory, the Office of Institutional Research, the Office of Faculty Support, and the Office of Digital Learning. Those offices, along with the MIT Libraries, Information Systems and Technology, the Office of the Chair of the Faculty, the Office of Minority Education, the Office of the Registrar, the Admissions Office, and the Office of Undergraduate Advising and Academic Programming also contributed to the summaries that address the 11 standards.

## INSTITUTIONAL OVERVIEW

*The mission of MIT is to advance knowledge and educate students in science, technology, and other areas of scholarship that will best serve the nation and the world in the 21st century.*

*The Institute is committed to generating, disseminating, and preserving knowledge, and to working with others to bring this knowledge to bear on the world's great challenges. MIT is dedicated to providing its students with an education that combines rigorous academic study and the excitement of discovery with the support and intellectual stimulation of a diverse campus community. We seek to develop in each member of the MIT community the ability and passion to work wisely, creatively, and effectively for the betterment of humankind.*

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The Massachusetts Institute of Technology is an independent, coeducational, privately endowed research university. The Institute admitted its first students in 1865, four years after the approval of its founding charter. The opening marked the culmination of an extended effort by William Barton Rogers, a distinguished natural scientist, to establish a new kind of independent educational institution relevant to an increasingly industrialized America. Rogers stressed the pragmatic and practicable. He believed that professional competence is best fostered by coupling teaching and research and by focusing attention on real-world problems. Towards this end, he pioneered the development of the teaching laboratory.

Teaching and research — with relevance to the practical world as a guiding principle — continue to be MIT's primary purpose. The Institute is organized into five Schools that contain 31 academic departments and programs, as well as many interdisciplinary programs, laboratories, and centers whose work cuts across traditional departmental boundaries.

In academic year 2013-14, undergraduate enrollment totaled 4,528; graduate enrollment totaled 6,773. Forty-five percent of the undergraduate body and 31% of the graduate body were female. Fifty-one percent of the undergraduate body and 20% of the graduate body were comprised of US minority groups. Students came from all 50 states, the District of Columbia, three territories, and 114 foreign countries. International students comprised 10% of the undergraduate population and 41% of the graduate population.

Admission to MIT is highly selective at both the undergraduate and graduate levels. Of the 18,357 students who applied for admission to the undergraduate class of 2018, 1,447 (7.9%) were granted admission. Seventy-three percent of those admitted chose to enroll.

Members of the Institute's faculty instruct undergraduate and graduate students and engage in research. As of October 2013, there were 1,030 members of the faculty: 661 professors, 199 associate professors, and 170 assistant professors. MIT's teaching staff also includes 587 senior lecturers, lecturers, and professors *emeriti*; 156 instructors (including technical instructors); and 36 professors of the practice and adjunct faculty. The MIT faculty determines the Institute's educational policy. The faculty meets monthly and conducts much of its business through elected standing committees.

The Institute's chief executive officer is the President. The following senior officers report directly to the President: Provost, Chancellor, Chancellor for Academic Advancement, Executive

Vice President and Treasurer, Vice President and Secretary of the Corporation, Vice President for Research, Vice President for Resource Development, and Vice President and General Counsel. The Associate Provosts, the Deans of MIT's five Schools, the Director of the Libraries, and the Institute Community and Equity Officer, a position created in June 2013, report to the Provost. The Dean for Undergraduate Education, the Dean for Graduate Education, and the Dean for Student Life report to the Chancellor. The Director of Digital Learning, a position created in late 2012, reports jointly to the Provost and Chancellor. The Vice Presidents who manage the Institute's major administrative divisions report to the Executive Vice President and Treasurer.

The Institute's board of trustees, known as the Corporation, includes approximately 75 distinguished leaders in education, industry, science, engineering and other professions, and *ex officio* the President, Chair of the MIT Corporation, Executive Vice President and Treasurer, and Secretary of the Corporation, as well as three representatives of the Commonwealth of Massachusetts. The Corporation also includes approximately 34 life members *emeriti*.

This report deals with the programs of teaching and research based on the Cambridge campus. MIT's Lincoln Laboratory, located in Lexington, Massachusetts, is a Federally Funded Research and Development Center (FFRDC) focused on advanced electronics, with special emphasis on applications to national defense, worldwide communication, and civil air traffic control.

More information about MIT is available in *MIT Facts 2014*<sup>1</sup> and in the Institute's course catalog, the *MIT Bulletin*.<sup>2</sup>

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<sup>1</sup> <http://web.mit.edu/facts/>

<sup>2</sup> <http://web.mit.edu/catalog/>

## **AREAS IDENTIFIED FOR SPECIAL EMPHASIS**

As part of its decision to approve MIT for reaccreditation in 2010, the Commission on Institutions of Higher Education identified three areas of special emphasis for MIT to address in its interim report. These included:

1. Developing and implementing a sustainable approach to reducing MIT's deferred maintenance
2. Achieving its goals to increase student satisfaction with their dining options
3. Strengthening its understanding of what and how students are learning with respect to program- and Institute-wide goals

We address points one and two below. MIT's efforts to understand student learning with respect to program- and Institute-wide goals are described in the reflective essay later in this report.

### **1. Developing and implementing a sustainable approach to reducing MIT's deferred maintenance**

In its May 2010 letter confirming MIT's reaccreditation, the Commission on Institutions of Higher Education wrote, "We note the team's report that the backlog of deferred maintenance increased from \$400,000 to \$1.4 billion in 2008, based on 2007 dollars, and as reported recently, to close to \$2 billion...Through the interim report, the Commission looks forward to learning how MIT demonstrates that it 'identifies and plans the specified resolution of deferred maintenance needs' (8.4) as part of a 'basis of realistic planning and budget allocation' (8.6)."

The renewal of MIT's physical facilities is vital to the Institute's mission to advance knowledge and educate students to serve the nation and the world. The launch of "MIT 2030" in 2007 marked the beginning of MIT's renewed commitment to improve its long-term deferred maintenance issues. MIT 2030 is a flexible framework that helps the Institute make thoughtful, well-informed choices about its physical development and renewal in support of its mission. It is a responsive tool that provides guidelines for envisioning — and inventing — key physical changes on campus and in the innovation district close by.

Under the framework of MIT 2030, Institute leadership has outlined a planning approach that:

- Where possible, addresses programmatic facilities requirements through renewal and renovation;
- Accelerates systematic capital renewal programs (including the renewal of roofs, elevators, and other systems);
- Effectively deploys ongoing facilities maintenance projects for incremental improvements in appearance and functionality; and
- Considers new buildings only where technical requirements cannot be met in renovated space.

In May 2010, a comprehensive MIT 2030 website<sup>3</sup> was launched to communicate the process for ongoing campus development, renovation, and renewal, and to provide a vehicle for sharing ideas. This launch marked the start of an enhanced communication and engagement strategy.

MIT has developed and funded two new programs that focus on renewal and stewardship. These programs help Institute leadership to proactively manage and maintain the established infrastructure of MIT's campus.

First, the Accelerated Capital Renewal Initiative (ACR) is designed to substantially reduce the backlog of deferred maintenance on campus. This program started with \$250 million of funding over three years, a major increase compared to approximately \$20 million per year starting in 1999. In September 2013, the Executive Committee of the MIT Corporation endorsed \$150 million per year in funding beginning in fiscal year 2016 to continue and expand this important initiative to address mostly capital renewal needs.

The ACR goals are as follows:

- Maximize the impact of capital renewal investment by funding projects that provide the most benefits in terms of:
  - Improving the physical environment (including technical conditions, human comfort, user experience, and safety);
  - Improving the ability of a building or space to advance occupants' goals and, by extension, to advance MIT's mission; and
  - Leveraging an investment by combining system and infrastructure projects with changes that address program needs, and considering opportunities for future research and/or adaptation of space.
- Stabilize the physical environment in a selective manner, addressing buildings with the greatest need.
- Improve accountability and stewardship of MIT's physical assets.

MIT also established a governance structure comprised of representatives from all relevant areas of the Institute to oversee and guide the capital renewal efforts. Its working committee members assess funding requests and provide day-to-day management of the program, while the steering committee sets the direction for the program and oversees its implementation. The Executive Committee of the Corporation, Building Committee, and Committee for the Review of Space Planning (CRSP) provide oversight and program approval.

Projects are prioritized by scoring every building on campus independently based on each building's mission-enabling opportunities and on the physical environment. By assigning a rank to each building, leadership was able to align the Institute's academic and research missions with deferred maintenance needs.

A project delivery team comprised of approximately 50 individuals working across organizational units in collaboration with architects, engineers, and contractors in a coordinated way is moving

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<sup>3</sup> <http://web.mit.edu/mit2030/>

the renewal program forward. Planners designed Rapid Response Feasibility Studies to create an executive summary of a prioritized inventory of each building's deficiencies organized by system and investment/project options (base, best value, long term recommended). To create these studies, work started to confirm deficiencies in buildings, prioritize the deficiencies for each system, develop options for renovation, and create order of magnitude information for renovation options.

The campus building prioritization process identified 49 high-priority buildings representing 35% of the total buildings on campus at an estimated 4.9 million gross square feet. A dashboard was introduced to monitor the initial \$250 million ACR allocation. Just over half of the \$250 million in funds support significant building upgrades involving major systems and substantive programmatic changes. The second largest share of funding supports the replacement of core building systems that are reaching the end of their life cycles. Funding is also used to support the repair and replacement of utilities and to address system failure emergencies.

Second, the Comprehensive Stewardship Group (CSG) program creates and implements enhanced maintenance programs for MIT's newest buildings (approximately 25% of the campus gross square feet) to keep them in excellent condition. This program focuses on buildings constructed after 2002 or that have undergone a comprehensive major renovation in the past 10 years. Proactive stewardship of MIT's facilities will help the Institute to stay ahead of maintenance issues and prevent those issues from growing year after year.

In addition to the ACR and CSG programs, there are currently 13 capital projects<sup>4</sup> either in the planning, design, or construction stage. We describe two notable projects here.

First, based on feedback from the Deans of the Schools of Science and Engineering, and with an eye towards maintaining MIT's preeminence in science and innovation, Institute leadership has prioritized the building of a Nano-Materials, Structures and Systems facility, now known as MIT.nano. The planned new lab will consolidate and support the Institute's nanoscale research activities providing ultra-sophisticated technologies and facilitating accelerated scientific discovery. This new building, estimated at 200,000 gross square feet, is targeted for completion early in 2018, and will be centrally located on campus on the current site of Building 12, which will be demolished.

Second, in 2010, the Sloan School of Management moved from its original location, constructed in 1938, to a beautiful new facility that provides a nexus for academic and social exchange, promoting ease of interaction among all members of the Sloan community. By consolidating Sloan faculty, the building also promotes academic collaboration and enhances research efforts. This move vacated the Sloan School's previous home, Building E52, presenting great opportunities for renovation and renewal. The overhaul of E52 began in 2013, with an anticipated completion date of 2016. Once completed, Building E52 will offer high-quality academic space for the Department of Economics, student-focused administrative functions for the Sloan School, and an expanded conference facility on the sixth and seventh floors, including a glass-enclosed addition.

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<sup>4</sup> <http://capitalprojects.mit.edu/#gallery>

## 2. Achieving its goals to increase students' satisfaction with their dining options

In its 2010 letter, the Commission noted long-standing student dissatisfaction with the Institute's dining options. Unlike its peers, MIT does not employ broad-based mandatory meal plans. As a result, MIT faces unique challenges in providing desirable options to its student body at an affordable price. The 2009 report noted that a Blue Ribbon Committee on Dining (BRC), which had been formed to examine the dining program, produced a series of recommendations that were unpopular with students who perceived a lack of transparency in the process.

In spring 2010, the Dean for Student Life commenced a semester-long examination of MIT's dining operations, including both cook-for-yourself communities and house dining. This process included reviewing recommendations from three different dining reports issued in spring 2009: the BRC report, the Undergraduate Association student report, and a report from Envision Strategies, an award-winning food services consulting firm. This input was combined with ideas, commentary, and questions about community preferences for house dining solicited from students. The Dean for Student Life took steps to ensure that the examination and review process was transparent, thorough, and fair. To that end, in March 2010, the Dean formed a House Dining Advisory Group (HDAG) with the charge to arrange student forums in residence halls and to provide other routes for student input. There was also the opportunity to contribute ideas through an online forum in April 2010.

Based on this examination and review, the Division of Student Life developed a house dining plan for five residence halls: Baker House, Maseeh Hall, McCormick Hall, Next House, and Simmons Hall. The changes were implemented in fall 2011 and remain in effect today.

The plans four guiding principles are as follows:

- Student choice
- Health and nutrition
- Community and student development
- Financial stability

Preserving student choice was an important component to the development of the dining plan; student choice in general is a cherished value at MIT. The house dining plan allows students to select a residence that matches their living preference: a cook-for-yourself community, a dining dorm, and for upperclassman, a fraternity, sorority or independent living group (FSILG) with a board plan. All students who elect to live in a dining dorm are required to participate in that dorm's meal plan. All dining plans are "all-you-care-to-eat" and are structured by the number of meals per week, from a minimum of 10 to a maximum of 19.

With the new house dining plan, additional emphasis was placed on healthy and nutritious meals. MIT's Student Quality of Life Survey (SQL), conducted in spring 2013, found that 74% of meal plan participants eat fruits and vegetables at most meals at least four days a week, compared to 63% of non-meal participants. In the Blue Ribbon Committee's meal plan study, data showed that house dining students rated the importance of a hot traditional breakfast at 4.16 on a scale of 1 to 5, 5 indicating strong agreement about its importance. Therefore, a commitment was made to offer both hot breakfasts as well as grab-and-go breakfasts in all five dining halls. Usage data reveals that the house dining halls are serving over 850 students each morning.



Supporting and promoting the intellectual, social, and emotional development of students is perhaps the most important aspect of the house dining program. It helps build strong residential communities by giving students the opportunity to interact over a meal. Data show that this is having a positive effect, with 61% of students somewhat or strongly agreeing that the dining plan provides them with opportunities to meet and socialize. Because of the importance of promoting community and student development, the Division of Student Life would like to better understand how house dining is supporting and promoting this principle. To that end, the Office of the Dean for Student Life conducted a series of focus groups in spring 2014 with students from each of the five residence halls to collect information about what the program does well in this regard, what could be improved, and the nature of the learning opportunities promoted by the social environment of dining with peers, faculty, and staff.

Financial stability was one of the driving forces behind development of the current plan, spurred in part by the financial crisis of 2008-09. Before the plan was introduced, MIT's dining system relied on a subsidy in excess of \$600,000 annually. Since the plan was introduced in 2011, the need for a subsidy has been eliminated, and the dining program has been able to contribute funds toward future facility renewal needs. Currently, house dining prepares 22,500 meals a week for the 2,172 students on a meal plan. Plan participation has risen by 14% since the first year of the plan in 2011, due mostly to a rise in voluntary participants. In fact, voluntary participants comprise 20% of total plan participants, a 75% increase in volunteer membership since the plan's inception in 2011. Students use 74% of their plans' meals weekly, a figure that far exceeds the industry standard of 65%.

Since the implementation of house dining, student satisfaction also seems to be on the rise. According to the 2012 Senior Survey, student satisfaction with food services at MIT increased over a 10-year span by 20% when compared to responses in 2002. In addition, the results of the Student Quality of Life survey administered in the spring of 2013 indicate that students on a meal plan are much more likely to be satisfied with MIT's food services than non-meal plan participants: 61% of meal plan participants are "generally" or "very" satisfied with the food services MIT provides during the day and at night, compared to 48% of non-meal plan participants being satisfied with the day time food services, and just 28% being satisfied with the evening/nighttime food services.

MIT employs two methods to ensure an ongoing dialogue with students to support the long-term success of the dining plan. First, to monitor student satisfaction, several Institute surveys — the annual Senior Survey and the Enrolled Student Survey planned for 2015 — include detailed questions about the dining plan. Second, each house on campus has developed a house dining committee, comprised of student house leadership, the Housemaster, and Dining Services staff. These committees provide a direct channel between students and administrators for ongoing discussion. The surveys and house dining committees support a collaborative approach to campus dining that should allow MIT to address any dissatisfaction before serious problems emerge.

### **3. Strengthening its understanding of what and how students are learning with respect to program- and Institute-wide goals**

As described in detail in the reflective essay, MIT has made great strides in its understanding of student learning and achievement.

## STANDARDS

### 1. Mission and Purpose

Central to MIT's mission is a commitment to "*mens et manus*," or "mind and hand." MIT prides itself on applying the lessons learned in a traditional classroom setting to addressing the world's problems that most keenly need MIT's attention. Throughout its history, the Institute has developed a wide range of programs designed to imbue its students' education with meaningful opportunities to apply academic learning with real-world experience.

There have been no changes to MIT's mission over the last five years. The mission has served as a constant guide in informing decisions about a number of major issues described throughout this report — assessing opportunities for global partnerships, pursuing digital learning, and planning the campus of the future, for example. Time and again, institutional leadership returns to the mission as a reminder of MIT's principles.

### 2. Planning and Evaluation

The planning and evaluation of MIT's programs, finances, and campus involve the collective wisdom and insights of faculty, students, administrators, alumni, and trustees. One of MIT's great strengths is its commitment to inclusive planning and problem solving. In setting goals, executing plans, and assessing success, MIT draws on the expertise of its full community, a practice that tends both to generate thoughtful discussion and to build a sense of engagement and ownership in the Institute's future.

MIT as an organization is perhaps unique in that it has not articulated an Institute-wide strategic plan. However, strategic planning is central to the Institute's model of governance. As is described throughout this report, departments, laboratories, and centers regularly undertake comprehensive planning and evaluation processes to evaluate their strengths and weaknesses and to respond to new challenges and opportunities. Those plans are then typically shared with senior leadership and with departments' Visiting Committees, which provide valuable counsel to departments, laboratories, and centers on current activities and future directions. Each of the 31 Visiting Committees convenes every two years for a one-and-one-half day session.

While ongoing strategic planning occurs at a local level, Institute-leadership regularly launches community-wide strategic planning processes focused on specific issues, such as online learning, international engagement, and financial planning during the recent recession. These efforts are action-oriented and inform the Institute's academic goals and mission.

#### *Global*

Since the 2009 reaccreditation process, MIT has continued to develop new and interesting opportunities for students, faculty, and researchers to engage meaningfully with the world at large. This engagement has been guided in large part by two reports released in late 2009: "Guiding Strategies for MIT's International Activities,"<sup>5</sup> prepared by the International Advisory Committee,

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<sup>5</sup>[http://orgchart.mit.edu/sites/default/files/reports/20090903\\_Provost\\_IAC\\_Report.pdf](http://orgchart.mit.edu/sites/default/files/reports/20090903_Provost_IAC_Report.pdf)

and “Mens et Manus et Mundus: Global Education and Research at MIT,”<sup>6</sup> written by the MIT Global Council. The reports refine MIT’s role in interacting with the world, both in attracting the world’s finest talent and maintaining and establishing productive relationships with international partners.

MIT has developed fruitful collaborations in Abu Dhabi, Portugal, Russia, and Singapore. In each of these endeavors — and many others — the Institute seeks to expand its own reach and amplify its mission globally by working with local partners to establish new institutions that aim to generate knowledge and innovation themselves. Much of that effort, which must always be tied to the interests of MIT faculty, is designed to give support and expertise to international partners in creating first-rate research and teaching facilities.

### *The Future of MIT Education*

From MIT’s inception, educational innovation has been at the core of its mission. The Institute’s founding in 1861 was a grand and daring experiment in teaching: the kind of hands-on, science-based, problem-focused engineering education that remains MIT’s hallmark. Today, it is hard to imagine teaching engineering any other way, but at the time — when rote memorization was the norm in college classrooms across America — William Barton Rogers’ *mens et manus* approach to teaching was a bold departure.

Not surprisingly, MIT has a long history of embracing technological advances to enhance active engagement in teaching. In 1959, MIT faculty began offering lectures through closed-circuit television. In 1983, MIT launched Project Athena, a digital experiment in providing widely distributed client-server computing for education on campus. In 2002, MIT opened the Technology Enhanced Active Lecture (TEAL) classroom, which was designed to create an active learning environment in contrast to the lecture-style setting that dominates higher education.

That same year, MIT launched OpenCourseWare (OCW), a true game changer that served as an important signal of the Institute’s commitment to openly distributing its educational resources and sharing its knowledge with the world. OCW, a web-based publication of virtually all MIT course content, has served as a model in shaping MIT’s recent digital learning strategy. The platform shares MIT’s educational materials — including syllabi, lecture notes, assignments, and exams — freely and openly on the web. Since launch, the site has grown to include materials from nearly 2,150 courses across MIT’s undergraduate and graduate programs and has attracted 125 million users.

As digital technology has continued to develop, so too has the complexity of the world’s problems. Society faces grave challenges with regard to water and food, poverty and disease, and energy and climate. The product generated by colleges and universities is needed more than ever. As MIT President L. Rafael Reif noted in his inaugural address, “Just when the world needs us most, we find ourselves at the threshold of a historical transformation. This technological

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<sup>6</sup>[http://orgchart.mit.edu/sites/default/files/reports/20090901\\_Provost\\_GlobalCouncilReport.pdf](http://orgchart.mit.edu/sites/default/files/reports/20090901_Provost_GlobalCouncilReport.pdf)

transformation has the potential to reshape the education landscape — and to challenge our very existence.”<sup>7</sup>

These changes also come at a time of unsustainable increases in the cost of higher education. It costs MIT more than three times the cost of its net tuition to educate its students. For colleges and universities facing this challenge, and for families struggling to pay the cost of sending a child to college, change is inevitable.

In December 2011, MIT announced the launch of *MITx*, an online learning tool that supplements the on-campus educational experience and delivers MIT content to learners around the globe. This announcement was followed shortly thereafter by the launch of edX, a collaboration with Harvard University that provides an open-source platform for colleges and universities around the world to offer online courses.

The impact of *MITx* and edX, though still in their infancy, has been remarkable. The first *MITx* course, 6.002x (Circuits and Electronics), offered in the spring of 2012, attracted more than 155,000 students. Participants watched video lectures and demonstrations, worked with practice exercises, completed homework assignments, and participated in an online interactive lab specifically designed to replicate its real world counterpart. Students also took exams and were able to check their grades as they progressed through the course.

As of April 2014, *MITx* offered 37 active courses on the edX platform, which has grown to include 34 charter members and 13 contributors. 2.2 million learners, with representation from every country in the world, have enrolled in an edX class.

The numbers of worldwide learners who are benefiting from the revolution in digital learning is striking. But the impact for MIT’s residential learners is equally profound.

In March 2013, MIT and Harvard University convened a group of more than 200 academic leaders and online learning experts for a daylong summit titled “Online Learning and the Future of Residential Education.” This seminal event brought together faculty, university presidents, provosts, and deans from around the world, along with leaders in digital education, to discuss the future of higher education at the intersection of on-campus and online learning. The event provided a forum to share knowledge and perspectives across institutions, to stimulate thinking about the future, and to shed light on the emerging opportunities and challenges facing higher education during this time of tremendous potential.

Following the success of the summit, and building on his inaugural remarks, in February 2013, President Reif charged the Task Force on the Future of MIT Education<sup>8</sup> to experiment with ideas that would both enhance the education of MIT’s students and allow the Institute to offer some version of its educational experience to learners around the world. Specifically, President Reif asked the Task Force to:

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<sup>7</sup> <http://president.mit.edu/speeches-writing/inaugural-address>

<sup>8</sup> <http://president.mit.edu/speeches-writing/presidential-charge-task-force-mit-education>

- Propose an ecosystem for ongoing research, learning and innovation about the future of education.
- Recommend a range of possible experiments and pilot projects that will allow MIT to explore the future of MIT education both on the MIT campus and beyond.
- Evaluate the future strength and sustainability of MIT's current financial model.
- Develop a roadmap that will describe the work streams and the phases of work necessary to enable this ecosystem and implement these experiments.

The Task Force was comprised of three working groups: MIT Education and Facilities for the Future, Future Global Implications of edX and the Opportunities It Creates, and A New Financial Model for Education. Each group included faculty, student, and staff representation.

The Task Force undertook a collaborative process to gather community input to help inform its discussion. It launched an Idea Bank to encourage faculty, students, staff, trustees, and alumni to contribute ideas. It conducted a survey of faculty and instructional staff designed to gather information about educational resource needs and how interactions between students and instructors are changing. It also launched a survey of undergraduate and graduate students to better understand how students interact with faculty and what educational technologies they use, and to collect student perspectives about the potential impact of digital learning in coursework, research, and professional and personal development.

In addition, the Task Force co-chairs attended faculty meetings of 24 academic departments, and two Advisory Groups — the Corporation Advisory Group and the Alumni Advisory Group — were established to ensure that every segment of the MIT population was represented and engaged in this important discussion. The feedback collected through these various forums provided valuable insight into the community's current practices and preferences. This broad engagement also generated creative thinking that informed the Task Force's final recommendations.

Among the most frequent suggestions offered on the Idea Bank were the following:

- Promote greater faculty-student interaction on campus to offset online education.
- Actively promote group project and problem set work via expansion of group spaces.
- Reduce or adjust MIT's physical footprint to reflect a more online experience.
- Integrate living spaces with learning spaces.

Some of the most notable findings from the survey<sup>9</sup> of MIT faculty and instructional staff were as follows:

- Faculty and instructors identified 62% of undergraduate subjects and 37% of graduate subjects as being appropriate for *MITx*.
- Space on campus is inadequate for meeting the pedagogical needs envisioned for future educators and learners. Faculty and instructors want increased access to educational technology in the classroom, as well as additional flexible spaces.

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<sup>9</sup> <http://web.mit.edu/ir/surveys/pdf/FutureEduFaculty-Overall.pdf>

- Twenty-five percent feel that their subjects would benefit from being converted into smaller units (or modules).

Some of the most notable findings from the survey<sup>10</sup> of MIT students were as follows:

- As MIT's educational model evolves, students are most interested in developing competency in the areas of public speaking, negotiation, grant writing, and programming.
- The technologies that students hope to see incorporated into their classes are lecture capture, data visualization tools, fabrication technologies, and e-books.
- Seventy-five percent indicated that they learn most effectively in an environment with an online component.
- Overwhelmingly, students want instructors to devote more in-class time on problem solving and hands-on work, and less time on group projects and lectures.

The Task Force released a preliminary report<sup>11</sup> in November 2013 and its final report<sup>12</sup> in August 2014.

The possibilities that the Task Force has put forward in beginning this reimagining process encompass four themes: massive scale of adoption, increased potential and demand for modularity, blurring of boundaries, and affordability and access. Inherent in each of these themes is an element of flexibility — flexibility in what defines a class; in how one thinks of an MIT student; and in how, when, and where instructors teach and students learn.

Among the many possibilities presented, the Task Force notes the potential for leveraging opportunities created by edX to expand global education for MIT students. For example, the Task Force presented a number of ideas for students to gain real-world experience by teaching or conducting research in one of the more than 1,000 edX communities that have developed worldwide in just the last 16 months.

The Task force also noted the potential for unbundling elements of a residential campus experience, and even of individual classes. The report suggested taking a strategic approach in considering how classes might be reshaped depending on their content and on individual students' learning objectives.

The Task Force presented a number of space-related issues that the Institute will need to consider in accommodating future generations of learners. It suggested, for instance, that developing academic villages across campus might enhance interaction both inside and outside of the classroom and laboratory, promoting serendipitous interactions among students and faculty members.

The report presented the possibility of altering the relationship students have with MIT — both during and after their time on campus. For example, it examines the possibility of MIT developing stronger relationships with alumni to foster ongoing learning and apprenticeship

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<sup>10</sup> <http://web.mit.edu/ir/surveys/pdf/FutureEduStudent-Overall.pdf>

<sup>11</sup> [http://web.mit.edu/future-report/TaskForceOnFutureOfMITEducation\\_PrelimReport.pdf](http://web.mit.edu/future-report/TaskForceOnFutureOfMITEducation_PrelimReport.pdf)

<sup>12</sup> <https://future.mit.edu/final-report>

opportunities for current MIT students. Under this scenario, alumni might take classes through *MITx* long after graduation, and return to campus to collaborate on research projects or in teaching.

The report also considers ways to respond to the growing cost of higher education. The working group examining a new financial model for education constructed a series of historical data sets related to finances, people, and space at MIT to better understand how MIT's financial model has changed over time. The working group evaluated how students finance their education and developed approaches for modeling the scenarios that will emerge from the Task Force's work.

With these considerations in mind, the Task Force offered 16 action-oriented recommendations that are currently being discussed as part of a campus-wide comment period. At the highest level, the Task Force proposed launching an Initiative for Educational Innovation to provide a framework for continued educational experimentation, research, and learning. The initiative would also promote rigorous, data-driven analysis of the pedagogical and curricular innovations that are transforming higher education. Among the Task Force's additional recommendations are the following:

- Consider an expansion of MIT's cohort-based freshman learning community model. This recommendation is intended to mitigate the risk of isolation that online learning has the potential to create.
- Use online and blended learning to strengthen the teaching of communications and to improve graduate curriculum accessibility.
- Create an Undergraduate Service Opportunities Program (USOP) to tie service to the nation and the world directly to the residential learning experience.
- Analyze current teaching models with a focus on increasing modular offerings, exploring the role of game-based learning, and using open problems to seed discussions with a global community of learners.
- Define a K-12 strategy as a way to expand the pool of learners with access to MIT's educational programming, but also to improve the diversity of the Institute's applicant pool and to reach students who might otherwise disengage from learning.

Following the comment period, senior leadership will identify which recommendations to pursue and will begin laying the groundwork for further analysis and, as appropriate, implementation.

### **3. Organization and Governance**

#### *Senior Leadership*

Over the last five years, MIT's senior leadership has undergone significant change. From the Chair of the MIT Corporation to the Provost to the Chancellor to the Executive Vice President and Treasurer, nearly all of MIT's senior leadership positions are occupied by different incumbents than when MIT submitted its 2009 report.

Most notably, in February 2012 President Susan Hockfield announced her intention to resign. The process that followed to identify President Hockfield's successor was both swift and effective. Shortly after the announcement, 12 Corporation members and 10 faculty members

were named to form a Presidential Search Committee. Leadership also appointed a Student Advisory Committee to gather student input to inform the work of the Search Committee.

The process for community engagement during such a short search process was an example of MIT at its finest. MIT launched a website that provided information about the search process, and also created a mechanism for collecting input from the MIT community and beyond. In the months that followed, members of the Search Committee met with all corners of the Institute to ensure broad input and a thorough understanding of the issues facing the next president.

In May 2012, just three months after President Hockfield's announcement, the Corporation elected L. Rafael Reif, then Provost, to assume the presidency, effective July 2, 2012.

Over the last five years, three new senior positions have been established to respond to new challenges and opportunities facing the Institute. First, to lead the integration of new models of online instruction into MIT's residential education experience, in November 2012, President Reif appointed Professor Sanjay Sarma as MIT's first Director of Digital Learning. Professor Sarma heads an office that brings together three existing offices (OpenCourseWare, the Office of Educational Innovation and Technology, and Academic Media Production Services) and a new office, focused on supporting the development of *MITx*, under an umbrella organization called the Office of Digital Learning.

Second, in his inaugural address, President Reif pledged a commitment to improve MIT's efforts around race, diversity, equity, and inclusion. To this end, in June 2013, he appointed Professor Edmund Bertschinger as the Institute's first Institute Community and Equity Officer. Professor Bertschinger's role centralizes MIT's diversity efforts among students, faculty, staff, and postdocs, and deepens the sense of inclusion based on MIT's shared values.

Finally, as MIT prepares to launch a major capital campaign, President Reif created a new *ad hoc* position of Chancellor for Academic Advancement, filled by former Chancellor Eric Grimson. The focus of the Chancellor for Academic Advancement is on connecting the Institute's fundraising aspirations to the needs and desires of MIT faculty and students. Chancellor Grimson serves as a central advisor to the President and meets with alumni and donors around the world.

### *Corporation*

In December 2013, for the first time in 15 years, the Executive Committee of the MIT Corporation conducted a comprehensive review of the Corporation's bylaws. The Executive Committee is charged with "responsibility for general administration and superintendence of all matters relating to the Corporation."<sup>13</sup> The body meets monthly during the academic year and exercises the primary governing function of the Corporation. The Executive Committee recommended the following changes to the bylaws of the Corporation:

1. Expand the scope of the Audit Committee, one of the standing committees of the Corporation, to include risk. The role of the newly-coined Risk and Audit Committee's

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<sup>13</sup> <http://web.mit.edu/corporation/bylaws/by14.html>



role would be to undertake responsibility with respect to the quality and integrity of MIT's financial statements, MIT's external and internal auditors, MIT's tax filings and compliance with law, regulation, and standards of ethical behavior, and risk management as stated in a charter adopted by the Committee following review by the Executive Committee.

2. Establish a Development Committee as one of the standing committees of the Corporation. As MIT prepares to embark upon a major capital campaign, it has become clear that the Corporation will need to play a key role in securing critical financial resources, both short and long-term.
3. Make several changes to the membership and leadership of the Executive Committee:
  - a. Add two additional members (bringing its total to 10 elected members serving staggered five-year terms), plus *ex officio* members.
  - b. Institute term limits (two five-year terms).
  - c. Install the Chair of the Corporation, rather than the President, as Chair of the Executive Committee. This change brings MIT's governance of its Executive Committee in line with the structure of its peers' boards.

The full Corporation unanimously approved these changes at its December 7, 2013 meeting.

### *Faculty*

With an eye towards engaging faculty more fully in issues of institutional importance, a new venue for discussion — the “faculty forum” — has emerged as a valuable setting for open discussion over the last five years. Since the first such forum to discuss MIT's global expansion was held in January 2011, senior leadership and the Faculty Chair have found this setting an effective way to share with faculty new challenges or opportunities facing the Institute and to collect feedback to help inform decisions. Topics have included digital education; Kendall Square development; graduate housing; and hacking, ethics, and community. For the most part, the Institute Faculty Meetings are devoted to conducting official faculty business. The faculty forums provide leadership with an opportunity to gather unfiltered, off-the-record input.

To illustrate the kinds of issues of particular interest to faculty governance, we share here two recent analyses conducted collaboratively by the standing committees of the faculty.

First, while the Office of Digital Learning leads *MITx* strategy, faculty governance has been intimately involved in defining the standards and policies necessary to guide discussions and decisions regarding the Institute's residential education and degree programs. As online education becomes rapidly ingrained in the residential learning model, the faculty committees continue to devote a great deal of time and energy to ensuring proper governance and oversight. In early 2013, with representation from the four faculty committees responsible for overseeing the Institute's curriculum, the Faculty Policy Committee, the Institute's senior faculty committee, charged an *ad hoc* subcommittee to examine issues related to the impact of *MITx* on course credit, Advanced Standing Exams, academic integrity, and contact hours. The recommendations of the subcommittee, with particular regard to credit and contact hours, are presented in this report's reflective essay. To ensure the ongoing evaluation of issues at the intersection of online learning and faculty governance, the subcommittee proposed the creation of a term-limited subcommittee of the standing faculty committees for periodic review of *MITx* questions. The standing committees of the faculty will take up this recommendation in the fall of 2014.

Second, since 1970, MIT's Independent Activities Period (IAP) has become one of the most vibrant, meaningful, and unique elements of the MIT experience. IAP is a special four-week term that runs from the first week of January until the end of the month. It was established to provide members of the MIT community with a unique opportunity to organize, sponsor, and participate in a wide variety of activities, including how-to sessions, forums, athletic endeavors, lecture series, films, tours, recitals, and contests at a pace that is not possible during the academic term. In 1993 a vote of the faculty allowed departments to offer required academic subjects during IAP, leading to a sharp increase in the number of academic exercises, some required, during the month. In response to the concern that IAP has become more akin to a third academic term, and less like the informal, flexible period it was intended to be, the Faculty Policy Committee charged an *ad hoc* subcommittee in fall 2011 to examine the current state of IAP in relation to its original ideals. It was the first comprehensive review of IAP in at least 20 years.

The subcommittee outlined a number of ways to foster IAP's growth but also to set clearer parameters to ensure that IAP retains the qualities that have made it so successful over the last forty years.<sup>14</sup> Central to the subcommittee's recommendations was a focus on ongoing assessment of required subjects offered during IAP. The subcommittee recommended that the Committee on Curricula undertake a regular periodic review of degree programs that include required IAP subjects to ensure that the subjects are appropriate for the unique pedagogical opportunities offered by IAP and are fulfilling the educational objectives of their respective programs. Such ongoing review should help to support IAP's continued success.

#### **4. The Academic Program**

Since the 2009 review, the faculty have approved three new undergraduate degrees: a Flexible SB in Aeronautics and Astronautics, an SB in Computer Science and Molecular Biology, and an SB in Engineering as recommended by the Department of Chemical Engineering. The faculty have also approved two new graduate degrees: a Master of Engineering in Computer Science and Molecular Biology degree, and a Master of Science in Management Research.

The process for reviewing and approving new degrees is iterative between the academic department and School, the standing committees of the faculty, and Academic Council before proposals are brought to the full faculty for a vote. In short, the review process for both new undergraduate and graduate degrees focuses on issues related to the curriculum, administrative infrastructure, policy, and governance and oversight.

The S- and E-Series forms contain data of basic measurements that MIT uses to monitor the size and success of its student body. The forms also provide information about various accrediting bodies to whom MIT presents data about the ongoing evaluation of its programs.

In compliance with Title IV, MIT has developed explicit criteria to ensure the consistent application of course credit. The credit hours for each subject indicate the total number of hours spent each week in class and laboratory, plus the estimated time that the average student spends each week in outside preparation. Each subject is listed with three credit numbers, showing in

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<sup>14</sup> <http://web.mit.edu/faculty/reports/pdf/iap.pdf>

sequence the units allotted to class time (lecture and/or recitation); laboratory, design or fieldwork; and preparation. Each unit represents about 14 hours of work per term. MIT has also developed explicit policies with regard to credit transfer. As is noted in the “Affirmation of Compliance with Federal Regulations Relating to Title IV” form at the conclusion of this report, policies and criteria related to course credit and credit transfer are posted on the website of the Office of the Registrar and in the *MIT Bulletin*.

## 5. Faculty

### *Faculty Satisfaction*

In January 2012 MIT conducted the first comprehensive quality of life survey of its faculty in four years. The survey captured faculty responses about a wide range of topics, including workload, climate, resources, and mentoring. In order to draw meaningful comparisons with its peers, MIT’s Office of Institutional Research administered the survey in coordination with a number of other members of the Association of American Universities.

In reviewing the data, two main themes emerged:

1. MIT faculty are very satisfied.
2. MIT faculty are working harder than ever and are deeply committed to their work.

Ninety-two percent of the faculty reported being “somewhat satisfied” to “very satisfied” with their positions at MIT; in comparison, only 81% of the faculty in 2008 expressed such a high level of satisfaction. If presented with the opportunity to “do it all over again” and join the MIT faculty knowing what they know now, 83% of the faculty would make the same decision.

Looking broadly across the MIT employee population, faculty expressed less satisfaction than other employee groups at integrating the needs of their work with those of their personal/family lives. However, the level of faculty satisfaction in this area increased significantly since the 2008 survey from 41% to 64%.

In two related datasets, underrepresented minority (URM) faculty report feeling as though they have a significantly stronger voice in the decision-making process than their non-URM peers, but URM faculty also report a need to work harder than their colleagues to be taken seriously. Peer institutions’ data do not reflect this same phenomenon.

Following the completion of the survey and the analysis of the results, the Office of Institutional Research presented department- and School-specific reports and trend analyses to the relevant Department Heads and School Deans. The data is also included in the materials provided to each department’s Visiting Committee. The inclusion of faculty survey themes and trends in regular departmental evaluation supports the ongoing commitment to continuous improvement and faculty success.

### *Diversity*

The issue of diversity in the faculty is one that continues to require great care and attention. In 2004 the faculty voted to approve a resolution outlining the Institute’s values and goals with

regard to attracting and developing URM faculty. To ensure accountability, the motion called on the Provost not only to provide ongoing guidance and direction to the departments and Schools, but to report on an annual basis at an Institute Faculty Meeting on process and outcomes. Each year since the resolution's acceptance, the Provost has presented a comprehensive report on hiring data from the previous year, trends in hiring URM faculty, and actions taken since the last report.

MIT's 2009 reaccreditation report described the Initiative on Faculty Race and Diversity, formed in 2007 to conduct a rigorous study of how race affects the recruitment, retention, professional development, and institutional experiences of URM faculty at MIT. In January 2010, the Initiative's final report<sup>15</sup> was released. As a leading institution in science and engineering, the report calls on MIT to take the lead in addressing the issue of diversity. The report's authors suggest that the low levels of representation from minority groups among the faculty indicate missed opportunities to gain and benefit from the top minds garnered from every aspect of American life. The report identified a perceived tension between the ideal of inclusion, which is central to MIT's mission, and the pursuit of excellence. One of the greatest tensions associated with achieving a diverse faculty is the idea that by being more inclusive, one sacrifices excellence or dilutes quality. As an institution that values meritocracy as one of its defining principles, this tension can be difficult to overcome.

In response to the report, the Provost asked the leaders within each School and department to use the findings and recommendations as a framework for directed efforts to enhance MIT's commitment to increasing the diversity of the faculty and to strengthening the climate of inclusion. The Provost stressed the importance of making this an intentional part of regular, strategic agendas at every level of the Institute. Specifically, each School Dean was tasked with defining a strategy and the mechanics of the makeup of search committees, broadening the candidate pool, educating committee members on diversity issues, and creating financial and other support with regard to these issues. Each School has also established a formal mentoring program for all junior faculty members. Academic Council, a body that consists of the Institute's senior leadership, continues to devote significant time and resources to discussing these issues across the Institute and to strengthening the diversity of the faculty as a whole. The appointment of MIT's first Institute and Community Equity Officer in June 2013 is intended to support MIT's efforts in this important area.

#### *Promotion and Tenure*

In June 2010 a Special Faculty Committee on Promotion and Tenure Processes submitted a report<sup>16</sup> that addresses a wide range of processes used in promotion and tenure decisions. The committee reviewed the hiring, mentoring, and promotion/tenure decision-making processes followed in different MIT departments and Schools, examined the Faculty Quality of Life Survey data relevant to these processes, and reviewed practices at peer institutions. It also reviewed the appeals mechanisms available to candidates who believe MIT processes have been violated in their case.

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<sup>15</sup> <http://web.mit.edu/faculty/reports/pdf/facultydiversity.pdf>

<sup>16</sup> <http://web.mit.edu/faculty/reports/pdf/promotionandtenure.pdf>

To promote consistency in messaging to new faculty hires, the committee recommended a number of steps that have been implemented across MIT's Schools and departments, including communicating promotion and tenure expectations orally and in writing when extending job offers to faculty candidates, and again once the faculty member is at MIT.

The committee also developed a document that aggregates best practices in mentoring junior faculty that has been shared across Schools and departments. Among those best practices are the following:

- Mentoring should begin at the point of hire with clarity about the responsibilities and expectations of both the mentor and the mentee.
- Departments might consider creating a mentoring committee (e.g., two to three mentors, one of whom is the principal mentor).
- The faculty member should be allowed to change mentors, in consultation with the Department Head.
- The mentor should have a voice in the promotion review process either as a member or a non-voting member.
- The Department Head has the responsibility for ensuring that there is good communication between the mentor and faculty member.
- Schools should recognize excellence in mentoring.
- The mentoring process should be highlighted at the New Faculty Orientation.
- The Department Head's letter to the School Council proposing promotion or tenure should include the name(s) of the mentor(s) as standard information.

Deans and Department Heads continue to monitor the efficacy of their units' promotion and tenure practices to ensure ongoing adherence to Institute standards.

## **6. Students**

### *Admissions*

MIT's undergraduate and graduate admissions processes differ significantly. While the undergraduate admissions process is overseen by a central Admissions Office, which falls under the purview of the Dean for Undergraduate Admissions, the graduate admissions process is handled locally within each department, with some coordination by the Office of the Dean for Graduate Education (ODGE).

Since 2009, the number of students applying for early admission has continued to rise. MIT admitted 612 students for the Class of 2018 under its early action program. This number represents a record low early acceptance rate of 9.0%, a decrease from the 9.9% early admittance rate for the Class of 2017. The early applicant pool has grown from slightly over 6,000 applications for an early spot in the Class of 2016 to 6,500 for the Class of 2017 to now almost 7,000 for the Class of 2018.

Of the 18,357 students who applied for admission to the undergraduate class of 2018, 1,447 were admitted, for an admission rate of 7.9%. More than a quarter of those admitted identify as

members of underrepresented minority groups, and 17% will be the first generation in their family to attend college.

This year, the Admissions Office introduced a new “maker portfolio” supplement as an optional part of the application. In addition to the music and art supplements, which are also optional, the application now provides a structured way for students to submit information on hands-on projects, such as coding a new computer program, rebuilding a car, or designing an entire costume for a play or performance. This new element introduces another opportunity for applicants to share qualities or interests that present themselves more fully.

During the 2012-13 academic year, 90% of MIT’s undergraduate students received financial aid, with 58% receiving an MIT scholarship of some type. The average MIT scholarship was \$33,697 (or 78% of tuition). The Institute provided a total of \$123.7 million in total undergraduate financial aid that year, \$87.1 million through MIT scholarships. MIT remains committed to need-blind admissions and to providing the aid necessary to support student enrollment and success.

For the 2014-15 academic year, MIT has instituted a new policy to reduce the financial burden on students whose families earn between \$100,000 and \$150,000 per year. Work by the Task Force on the Future of MIT Education highlighted the fact that these families experience a decline in support for tuition. Students from families whose income total is \$75,000 receive free tuition.

Graduate admissions underwent a comprehensive review in early 2011, as the Office of the Dean for Graduate Education (ODGE) assembled a Task Force on Improving Graduate Admissions Processes, followed by an *ad hoc* Committee on Graduate Admissions (CGA). As a result of the Task Force’s recommendations, the Institute has transitioned its graduate programs to an all-electronic admissions system. The CGA reviewed and oversaw the three-year transition of graduate admissions to a new platform, a process that included conducting surveys and discussions with the departments. This change has enabled graduate admissions to evolve from a fragmented structure with multiple providers to an all-electronic system with one recommended and supported application provider. Searches are possible in real time, and letters submitted by the same recommender on behalf of different applicants over the years can be reviewed for comparison. The new system has improved efficiency, reduced processing times and paper use, streamlined the review process, and improved applicant experience and recruitment competitiveness.

Moving forward, the ODGE has hired two staff members to support graduate admissions, one to support continued development and maintenance of the platform and another to serve as the Institute’s central point of contact and customer service representative for graduate and special student admissions. The latter role serves as the liaison between the platform development team, Information Systems and Technology, and departments/graduate programs; maintains the central admissions website; conducts and disseminates Institute-wide data analysis and surveys in collaboration with the Office of Institutional Research; and supports discussion on policies and procedures related to graduate admissions. The ODGE convenes meetings of a graduate admissions team on a regular basis, including the platform developers, staff from Information Systems and Technology, departmental representatives, and the Office of Institutional Research, to discuss topics related to graduate admissions systems, processes, procedures, and policies. The ODGE will sponsor an annual graduate admissions survey of all departments (following the work of the CGA) that will be utilized by the graduate admissions team in determining and prioritizing projects and activities.

With regard to the recruitment and retention of a diverse cohort of students, on an annual basis, the ODGE works with the Office of Institutional Research to formulate a comprehensive graduate admissions data briefing including detailed demographics disaggregated by program and School, race, gender, and ethnicity. This data briefing is disseminated to departments so that they can compare and monitor their progress and the effectiveness of their diversity efforts. The data briefing also includes data on yield, selectivity, and other metrics to monitor the success of their admissions cycle. Additionally, the ODGE and the Office of Institutional Research have provided individualized department data from the Integrated Post-Secondary Educational Data System on universities that are producing the largest numbers of underrepresented minority and female baccalaureates in their fields so that the departments can assess the pool and utilize this information for targeted recruitment.

### *Undergraduate Class Size*

Beginning in the late 1970's and continuing, with some fluctuation, until about 1996, MIT's undergraduate enrollment held at approximately 4,500 students. Beginning in 1996, and due to housing constraints, MIT decreased its undergraduate population to about 4,100. As the MIT campus has developed, creating increased capacity, MIT began a three-year process in 2011 to return its enrollment to 4,500. While the increase was driven largely by freshman admissions, during the first year of the planned increase, MIT admitted double the number of transfer students that it typically admits. The pressures that this expansion has created on the MIT infrastructure have turned out to be relatively insignificant and have, in fact, created opportunities for additional talented students to enrich life at MIT.

### *Diversity*

MIT took an active role in responding to the case of *Fisher v. University of Texas*, which reached the US Supreme Court. The case had the potential to adversely impact MIT's commitment to admitting a diverse student body and to fostering a campus of inclusion. The case concerned the affirmative action admissions policy of the University of Texas at Austin. Abigail Fisher, who was denied admission to the University, asked that the Court declare the University's race-conscious admissions unconstitutional. In August 2012, MIT filed an amicus brief with the Supreme Court in support of the use of race as a criterion in undergraduate admissions. MIT's decision to publically support the University of Texas sought to impress upon the Court not just the value, but the necessity of diversity in educational excellence. The Institute affirmed that diversity enriches the educational experience for all students, preparing them to be active, capable citizens of a changing world. Although a federal appeals court recently upheld the University of Texas at Austin's use of affirmative action in college admissions, the issue of diversity in relation to admissions policies will likely continue to be scrutinized. MIT's Admissions Office and Committee on the Undergraduate Admissions and Financial Aid will continue to monitor the Institute's policies and practices to ensure ongoing compliance.

The Office of the Dean for Graduate Education (ODGE) has taken great strides to increase the number of underrepresented and women students who apply to and attend MIT. The office administers a pool of first-year graduate fellowships aimed specifically at enhancing the diversity of the graduate population. It also administers the Ida M. Green Graduate Fellowships, which are dedicated to the recruitment of graduate women and include nine-month full fellowship support.

A key component of recruitment efforts is developing and supporting programs that contribute to a welcoming and supportive climate. ODGE sponsors events focused on improving the academic, personal, and professional success of women and underrepresented graduate students at MIT. Events such as the Power Lunch, the Graduate Women's Group monthly lunch, and the Graduate Women's Reading Group bring together students from across the institute to network, develop professionally, and to share information and ideas. Success is measured by consistent student participation (each year over 1,000 graduate women participate in these programs), expressed interest in upcoming events, the incidence of faculty members referring students to these valuable resources, and direct student feedback in the form of surveys and evaluations cards. The Graduate Women of Excellence event takes place approximately every three years, and is designed to celebrate accomplishments and inspire others. The event is well attended, and there has been strong anecdotal feedback about the information presented regarding both the celebrants' accomplishments and how they surmounted various challenges.

Path of Professorship is an annual professional development workshop for graduate and post-doctoral women who aspire to careers in the professoriate. Each year extensive feedback is collected via participant surveys, which is reviewed by the leadership team to shape the following year's program. Currently, more than one-third of former Path of Professorship participants have gone on to become faculty members, and a rising number of former participants also return as faculty panelists. The program received an invitation in 2014 to be featured in an National Science Foundation grant-funded book about such programs across the nation. The ODGE has also been a long-standing sponsor of Graduate Women at MIT (GW@MIT), which organizes an annual leadership and empowerment conference, as well as an extensive mentoring program. GW@MIT conducts feedback surveys at every conference. The ODGE also supports the Academy of Courageous Minority Engineers, a group devoted to scholarly development, which offers a regular lunch series that provides the opportunity for technical discussions and the presentation and sharing of research ideas. The ODGE sees the result of these efforts in ways that are less tangible, but clearly perceived. Students are eager to participate in the community through avenues such as helping to conduct interviews for open staff positions, becoming Graduate Community Fellows, and serving on selection panels for recognition programs. The ODGE can always find willing student partners to create positive change.

### *Undergraduate Advising and Mentorship*

Freshman advising at MIT has been a topic of discussion and increased scrutiny over the past decade. The number of faculty serving as freshman advisors decreased from a high of about 120 in 1996 to only 83 during the 2012-13 academic year. The 2011 Enrolled Student Survey found that, compared to students at peer institutions, MIT students are significantly less satisfied with the level of interaction they have with faculty. The same survey also revealed that MIT seniors are much less likely than students at peer institutions to know three or more faculty members who could write letters of recommendation.

During the 2011-12 and 2012-13 academic years, the Committee on the Undergraduate Program (CUP) focused its attention on the issue of waning faculty participation in freshman advising. The issue came to a head at the May 2013 Institute Faculty Meeting when the CUP, in conjunction with the Chair of the Faculty, Chancellor, and Dean for Undergraduate Education, offered a motion calling for the faculty to renew their commitment to mentorship with a goal of matching every freshman at MIT with a faculty advisor. The motion carried unanimously.



Between the time the motion passed in May and the time freshmen began arriving on campus in the fall of 2013, the number of faculty who volunteered to serve as freshman advisors grew to 142 (an increase of 42%) from the prior year. During the 2013-14 academic year, nearly 70% of the freshman class was advised by faculty, compared with just over 30% in 2012-13.

While the early returns of faculty serving as freshman advisors are promising, the challenge will be to sustain the faculty commitment and develop the infrastructure to ensure the continued success of the faculty motion. The motion has empowered the Dean to streamline the advising function, making it more practical and appealing to faculty, and allowing the Institute to engage greater numbers of faculty in this important role.

The students who are not advised by faculty are primarily those in other programs with a strong advising and mentorship core — the Residence-based Advising (RBA) Program, learning communities, and the Office of Minority Education (OME).

Mentorship remains an important component of OME's work in supporting students. Interphase, designed to help students transition to MIT and expose them to the rigor of the MIT curriculum with a specific focus on the first semester of the freshman year, spawned Interphase EDGE (Empowering Discovery – Gateway to Excellence) in the summer of 2012. Interphase EDGE not only helps students transition from high school to college, but teaches students pivotal concepts that will enhance their academic success at MIT and beyond. Each academic year, about 70 students participate in the two-year scholar enrichment program that includes a seven-week summer session and programming during the academic year to ease the transition to MIT and to build community among new students.

OME has implemented a robust administrative structure to ensure the success of Interphase EDGE and the program's ongoing evaluation. The primary success metrics for evaluating the program, which is overseen by two OME deans and one staff associate, center on academic performance and student satisfaction data (86% student satisfaction rating). Each semester (and annually), the office reviews academic performance data, including fifth-week flags, actions by the Committee on Academic Performance, grade point averages, and graduation rates. OME also administers mid-program and end-of-program student surveys for the program's summer component.

In addition, the MIT Teaching and Learning Laboratory has initiated a formal assessment of Interphase EDGE. The first phase of the assessment includes an evaluation of the enhanced curriculum on Communications and Writing and Physics from the summer component. The second phase includes a comprehensive assessment of the Interphase EDGE program. The preliminary data is promising, showing a substantial decline in fifth-week flag rates and an increase in overall recovery rates (students who pass courses in which they received a flag) for participants who are advised by Interphase EDGE staff. A summative evaluation of the overall impact of the program will be conducted when the first Interphase EDGE cohort graduates in 2016; this type of evaluation will be conducted every four to six years in order to assess trends and program efficacy.

### *Graduate Student Professional Development*

The MIT 2011 Enrolled Graduate Student Survey indicated that there is room for growth in many areas of professional development. Today's graduates are in need of an increasingly sophisticated skillset including, for example, oral and written communication, cross-disciplinary collaboration, the ability to work in diverse teams, global and cultural awareness, knowledge filtering and assessment, teaching, critical thinking, open-ended problem solving, leadership, project management, and contextual appreciation. To meet these needs, the Office of the Dean for Graduate Education (ODGE) has recently launched two new efforts.

In February 2012, ODGE created an electronic library and software platform, the Professional Development Portal or "PRO-DEPOT," which is intended to be a comprehensive and engaging online repository of MIT-sponsored personal and professional development video content. The platform is available to all MIT graduate students, including those who are not able to attend events physically due to scheduling constraints or capacity limitations.

In March 2012, ODGE assembled a Task Force on Graduate Student Professional Development (TFPRO) to consider various necessary skillsets, both discipline-specific and transferable, and to provide recommendations for formulating a coherent set of graduate co-curricular professional development offerings that will better prepare MIT's graduate students for employment trends. The Task Force's report, which was released in May 2013, identifies opportunities for engaging students more broadly and for systematizing professional development practices across departments. The recommendations continue to drive the Institute's approach to ensuring that MIT provides graduate students with the skills necessary to flourish after graduation.

### *Student Satisfaction and Support*

In early March 2013, the Chancellor invited all enrolled MIT students to participate in a quality of life survey, covering a range of topics including workload and activities, climate on campus, sources of stress, available resources, health and well-being, and personal demographics. Respondents reported being quite satisfied overall with life as a student at MIT (90% somewhat or very satisfied).

Nearly 82% of students said that they would choose to come to MIT if they could decide all over again. Just 3% said they would choose not to come to MIT. When asked to rate the quality of various experiences at MIT, both undergraduate and graduate students rated their academic experience higher than their student life experience. Undergraduate students tended to post higher ratings than graduate students in student life experience and personal development opportunities.

Students continue to report feelings of great stress as a result of MIT's rigorous academic program, an issue that MIT has faced for many years. When asked how often they felt overwhelmed by all they had to do during the current school year, a third said "often" and 21% said "very often." Undergraduate students tended to report feeling overwhelmed more often than graduate students. A quarter of undergraduate students responded to the question with "very often," compared to 19% of graduate students.

In an attempt to address student feelings of stress and isolation, in December 2012, the Office of the Chancellor and the Offices of the Deans for Undergraduate Education, Graduate Education,

and Student Life launched MIT Together, a campaign designed to create a greater sense of unity and support among the student community. The focal point of the campaign is a new website<sup>17</sup> that helps students to navigate MIT's broad network of support services. The site includes descriptions of specific resources ranging from Mental Health & Counseling to peer-to-peer services, student-created content about overcoming challenges, and dedicated pages on how to help someone in distress for concerned friends, parents, faculty, and staff.

The campaign maintains a ubiquitous presence on campus, through posters, door hangers, and ads on digital displays. The campaign is intended not just to direct students to support resources, but to remove some of the mystery and stigma that students report exists in asking for help.

### *SuperUROP*

Central to MIT's mission is to provide students with meaningful research opportunities to complement the lessons learned in the classroom. MIT's Undergraduate Research Opportunities Program (UROP), which was a bold experiment when it was launched in 1969, cultivates and supports research partnerships between MIT undergraduate students and faculty. It offers students the opportunity to work on cutting edge research by joining established research projects or pursuing their own interests. More than 80% of the Institute's undergraduates now participate in the program that allows them to spend a semester experiencing what it's like to work in a research laboratory.

In the fall of 2012, the Department of Electrical Engineering and Computer Science (EECS), by far MIT's largest department, launched a new SuperUROP program, in which students engage in a year-long research project and participate in a course titled "Preparation for Undergraduate Research." The course covers a range of topics, from selecting projects and research topics in EECS, to entrepreneurship and ethics in engineering. SuperUROP provides students with greater exposure to the rewards and complexities of scientific investigation. At the end of the academic year, students receive a certificate in advanced undergraduate research with a designated focus area.

SuperUROP is beginning its third year, with an entering class of over 110 students, backed by 16 participating companies and seven private donors. As EECS prepares for its first Visiting Committee review since the program's launch, the department has begun a process to analyze various data related to the program's efficacy. During each of the last two years, the department has asked student participants to rate their experience in SuperUROP. On a scale of one to seven, in 2013 and 2014 the class earned a rating of 5.9 and 5.7, respectively. With the input of the EECS Visiting Committee, the department will continue to evaluate and refine the program.

## **7. Library and Other Information Resources**

### *The Library*

In 2009, the Libraries adopted a new strategic plan, its Desired Future State, that articulated a vision of an agile, creative, and data-driven organization that:

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<sup>17</sup> <http://together.mit.edu>

- Ensures seamless discovery and access to scholarly information sources.
- Manages knowledge, with an emphasis on MIT-created content.
- Provides faculty, students, and staff with expert support and training to find, evaluate, manage, and use resources.
- Creates high-quality spaces for both reflective and collaborative work and study.
- Leads initiatives to inform and shape the future of libraries and scholarly research.

This plan recognized the need to re-align the Libraries' organization and staff to better manage content, and design and deliver information services based on the needs of a broadly networked interdisciplinary, international, and virtual community rather than on the legacy of a 50-year old geographical footprint. A new and significantly different organizational structure was put in place as of July 2010, based on functions within the Libraries rather than the legacy location of physical facilities. The benefits of the new organizational structure are numerous. Collections funds are better leveraged in support of multidisciplinary e-content packages. Inventory management maps more closely to current usage patterns, and scarce on-campus shelving capacity is assigned to those fields that rely most heavily on browsing and ready access to tangible materials. Online and physical services are considered holistically and synergistically, taking advantage of systematic data analysis and user experience tools. Economies of scale have been achieved across many collection management tasks, allowing some positions to be repurposed to provide more balanced support for the digital library infrastructure.

Recognizing the need to adjust priorities quickly to respond to a dynamic world, the Libraries engaged in a new strategic planning process during 2013 to ensure close alignment with the agenda of MIT's new administration under the leadership of President Reif. While remaining focused on the core academic support required by the MIT community — easy access to millions of scholarly resources, expertise in finding and using these resources, quality spaces for individual and group study and work, and the expertise to preserve and make available the knowledge that MIT generates — the new plan identified five key directions for focused efforts in the next three years:

- Advance digital scholarship and research.
- Expand investments in digital content management infrastructure and services.
- Participate actively in digital learning at MIT.
- Enhance the on-campus experience through transformed library services and spaces.
- Strengthen support for MIT's global engagement.

While these new strategic priorities will be vital to leading and inventing the next phase of library services in response to new demands, the challenge will continue to be balancing time and energy appropriately over the full spectrum of library services that provide value to the community.

The efforts devoted to planning and organizational rebalancing have enabled the Libraries to develop and improve services to support MIT's mission. In March 2009 the MIT faculty adopted a policy of open access for their scholarly articles. The Libraries were assigned the primary role of developing a mechanism to facilitate convenient article deposit for the faculty. The Libraries' Office of Scholarly Publishing, Copyright, and Licensing, working with many staff across the Libraries, developed such a process to support the policy. Over 10,000 articles have been added to the MIT Open Access Article Collection in DSpace@MIT.

A major effort in 2013 resulted in substantial improvements to the discovery and access of electronic resources online through the deployment of the new BartonPlus service, the MIT Libraries' implementation of the hosted EBSCO Discovery Service product. BartonPlus enables library users to search for both tangible collections and licensed electronic resources in a single discovery interface, providing a substantially better user experience for searching licensed e-resources compared to previous generation tools.

The Libraries have assisted the Office of Digital Learning and edX in negotiating publisher licenses, as well as in navigating other copyright issues related to the delivery of course content for MITx courses made available through edX. The Libraries also played a pivotal role in the establishment of the edX Libraries collaboration, a group of library professionals representing many of the institutions participating in edX. This has resulted in edX formalizing the creation of a Library Committee as one of the seven standing committees of the edX Consortium.

Due to the enormous growth of digital content, the Libraries have focused on improving infrastructure for digital content management and delivery. This effort has concentrated on developing a holistic, life cycle management approach to the Libraries' existing and prospective digital content, with the initiation of life cycle experiments on specific content types to inform solutions for all digital content types. Additionally, a Research Data Services Working Group has been established to assist faculty and researchers with the challenges associated with managing and sharing their research data.

The Libraries joined several Ivy Plus institutions in BorrowDirect, a collaborative program allowing the MIT community unmediated access to the tangible collections of peers such as Yale, Princeton, and Columbia. In addition, the Libraries joined the HathiTrust, providing desktop access to many millions of digitized collections worldwide. The Libraries also participated in the Digital Preservation Network (DPN), which was created to protect against catastrophic loss. The network ensures that the scholarly record is preserved for future generations by using a shared, national preservation ecosystem composed of several federated, replicating nodes containing redundant copies of all deposits to protect against catastrophic loss.

### *Information Systems and Technology*

In 2009 Information Systems and Technology (IS&T) implemented a three-year strategic plan for FY11-FY13 with an emphasis on customer focused services and ease and simplification of systems. In addition, The IT@MIT Task Force identified a number of issues for focus, one of which was to create clear processes for decision-making. To address these issues, the Provost and the Executive Vice President and Treasurer chartered a small, focused Information Technology Governance Committee (ITGC). The ITGC has been charged with the following responsibilities:

- Ensuring development and maintenance of the three-year strategic plan
- Ensuring the proper sharing of responsibility and setting the priorities for IS&T investments
- Ensuring proper sponsorship for IS&T projects, guiding, directing and approving the establishment and implementation of policies, guidelines and standards pertaining to the use of IT within MIT

- Identifying and charging subcommittees or working groups as appropriate to complete the committee charge and provide funding and review of progress as needed
- Advising the Executive Vice President and Treasurer and Provost on IT matters at MIT

To address customer-focused services, IS&T has implemented a new portal, Atlas, to replace the aging SAPweb and Employee Self-Service gateways, creating a single gateway, streamlining access to administrative functions, advancing the user experience, and better meeting community needs. Another interface supporting Facilities has been replaced with a simple and transparent system for requesting and tracking service requests. An interactive mapping application gives members of the community information and locations for events and services, and guides them to their destinations. Initiatives underway include installing the latest version of Quali COEUS, a system to manage the complexities of faculty research effort administration needs. In 2013, IS&T launched the free Drupal Cloud service, allowing faculty, staff and students to create their own custom websites on a common, hosted platform, integrated with many systems and mobile optimized by default. Over 700 websites have been built or migrated to Drupal Cloud since its introduction.

As part of MIT's IT security efforts, network traffic policies have been strengthened. By default, traffic originating from outside MIT's network (from non-MIT IP addresses) is blocked to reduce the potential for damage to MIT information systems. This has not impacted open services such as email and publicly accessible websites. Access to MIT administrative applications such as the Data Warehouse, SAP, and MITSIS (the MIT Student Information System) now require connecting from MIT's network on-campus (from MIT IP addresses) or by making use of MIT's virtual private network (VPN) service. MIT has implemented stronger password quality and expiration policies. Those engaged in research, teaching and learning activities have been given the option to opt out of the default network security policy through a self-service mechanism. Individuals whose work involves access to legally protected or otherwise sensitive information are advised to take additional precautions on devices used for confidential data access, such as using two-factor authentication and full-disk encryption.

IS&T continues to support wireless services, with 4,500 wireless access points and wired network services and over 4,000 end switches throughout the campus. IS&T has increased its connectivity to Fraternities, Sororities and Independent Living Groups and other buildings through the use of dark fiber.

Key student service offices partnered with the Education Systems team within IS&T to evolve the student information system to support a dynamic educational experience for students, faculty, and staff. This key phase delivered on five strategic priorities:

- Create efficiencies in business process by replacing paper with online self-service and workflow review. This will modernize and streamline business processes to meet community expectations.
- Enrich advising support through meaningful communications, curriculum planning tools, and context sensitive help. This will allow advisors to spend better-focused time discussing academic, personal, and career issues with students, and provide timely information to students so they are better able to steward their academic and financial records.
- Provide a seamless user experiences by creating a consistent, coherent, unified view

- between and among processes and to information.
- Improve technical stabilization by providing standard structure and components for new and replacement software. This approach will enable a foundation for system sustainability, develop roadmaps to incrementally replace obsolete system components to reduce technology risk and support sustainability, and provide ongoing operational support for Student Information Systems.
  - Fulfill mandated changes by responding appropriately to address government or faculty-approved changes.

The modernization plan resulted in several Institute-wide projects including online grade submission, online registration and add/drop, electronic transcript ordering and delivery, paperless admissions, online financial aid awards and NCAA academic eligibility compliance.

In 2014, the Vice President for IS&T assessed the state of IT@MIT and conducted an extensive listening tour to gather input from faculty, staff, and students representing research computing, student systems, digital learning, libraries, and administrative systems. He worked closely with members of the ITGC, and with each of the established IT advisory committees, to craft a 2020 vision for IT@MIT, along with a set of goals, priorities, and guiding principles. The vision has two complementary and mutually supporting elements: IT excellence through modernization, and a strategic focus on enabling members of the MIT community to innovate IT services in response to the diverse needs of their respective research, education, student life, and administrative functions. The guiding principles will shape MIT's future IT planning, linking the vision to strategy for best supporting the needs of faculty, students, and staff today and in the future.

The first phase of the transformation process has been completed. The ITGC approved the Vision, Goals, and Guiding Principles document in May 2014. The next phase of the transformation is underway: formulating the findings and developing the multiyear strategic plans for realizing the vision. The envisioned set of strategic plans and roadmaps will address technology, financial, governance, and communications strategies for achieving the 2020 Vision for IT@MIT. Additionally, IS&T, in partnership with community members, is engaging in several proof-of-concept projects to facilitate the transition to “platform-based” IT service models designed to better meet the needs of MIT's complex ecosystem of IT service providers and consumers.

## **8. Physical and Technological Resources**

In the section of this report that addresses areas identified for special emphasis, we describe MIT's efforts with regard to its long-standing deferred maintenance issues. Related to that process is reimagining MIT's connection to its community, in particular the Kendall Square and East Campus areas, which are central to the campus's revitalization. Kendall Square has been called the globe's leading innovation district. The area has a 200-year heritage of fostering the kinds of ideas that change the world. In reimagining the MIT campus and its place in Cambridge, Institute leadership identified an opportunity to strengthen MIT's ties to Kendall Square.

As Kendall Square has emerged as one of the most exciting and innovative hubs in the nation, MIT has developed plans to utilize its real estate holdings to transform the area into a livelier and

more distinctive neighborhood offering improved retail, dining, work, and entertainment experiences that will better connect the campus to the neighborhood.

In 2010, MIT began its efforts to consider new possibilities for its Kendall Square property, with broad discussions within the MIT and Cambridge communities. In August 2012, Provost Chris Kaiser charged a faculty Task Force on Community Engagement in 2030 Planning on Development of MIT-Owned Property in Kendall Square. The charge to the group was to provide advice regarding the development of MIT-owned property in Kendall Square, and to determine the most effective ways to engage the MIT community in the overall campus-planning process going forward. Two months later the Task Force released its report,<sup>18</sup> which details the faculty's support for MIT's plans to file a reasoning petition with the City of Cambridge, and advises the Provost about how MIT should proceed in order to ensure success in MIT's development plans for Kendall Square.

In addition to garnering the support of the faculty, through outreach and consensus-building efforts, the proposal that MIT ultimately submitted to the City of Cambridge also drew the support of the senior administration, the deans of MIT's five Schools, MIT's Graduate Student Council, the Kendall Square Association, the Central Square Business Association, the Cambridge Chamber of Commerce, a Better Cambridge Neighborhood Association, and the Governor of Massachusetts, Deval Patrick.

In April 2013, the Cambridge City Council voted to approve MIT's petition to transform the 26 acres of property it owns around Kendall Square. Based on the input of the faculty, the proposal includes increased housing, a plan for conceiving a new "gateway" between MIT's East Campus and the city, and the inclusion of a "community living room" for public cultural and educational programming. The petition also preserves MIT's existing rights to build 800,000 square feet of academic capacity. MIT will continue to be active in engaging all constituencies as details related to the development plan are refined and the project progresses.

In offering its support for the Institute's rezoning petition, the faculty task force called on the administration to commission a study to assess the housing needs for graduate students as part of the MIT 2030 process. In March 2013 the Provost and Chancellor established the Graduate Student Housing Working Group, whose charge was to:

- Evaluate the ways in which the graduate student housing needs are currently met, and identify strengths and weaknesses in MIT's current approach in the context of graduate student recruiting and satisfaction.
- Recommend ways by which the graduate student housing needs might be best served in the future in order to maintain competitiveness. Any recommendations that require new resources should be weighed against the need for other resources to support the graduate student population.

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[http://orgchart.mit.edu/sites/default/files/reports/20121012\\_Provost\\_2030CommEngageTFReport.pdf](http://orgchart.mit.edu/sites/default/files/reports/20121012_Provost_2030CommEngageTFReport.pdf)



In January 2014, the working group submitted its report<sup>19</sup> for public comment. The group focused its efforts on five areas: graduate students' attitudes toward their current housing situation; the Boston-area housing market; the utilization, adequacy, quality, and sustainability of the graduate housing inventory; future graduate enrollment; and graduate housing at peer institutions.

At a high level, the working group noted the importance of supporting the service, renewal, and operational aspects of graduate housing. As MIT undertakes capital planning on the east end of the campus and in Kendall Square, graduate students should be considered as a vital population that can contribute significantly to an outstanding and enhanced environment. MIT faces an opportunity in the next few years to greatly increase the value of the campus and to create a place worthy of its legacy, achievement, and ambition.

Among its findings, the working group reported that graduate students expressed high levels of satisfaction with the housing choices they have made. Housing is not a critical factor in their decision to attend MIT, but cost is a major concern. Graduate families and international students face special challenges in finding housing, and these groups express more desire to live on campus than single students do.

The group estimated unmet on-campus housing demand using two measures: the number of students who live off campus but would rather live on campus, and the durable size of the waitlist. These two measures revealed significant unmet demand for on-campus graduate housing.

In the Cambridge housing market, rents have been increasing steeply, condo conversions have been reducing the supply of affordable housing, and new housing construction consists mostly of luxury units. The group suggested that the 62% of MIT graduate students living off campus will likely be squeezed further by these trends, and noted that MIT cannot rely on the market to provide affordable housing as it has in the past.

Graduate students living on campus expressed high levels of satisfaction with their housing, although there is some dissatisfaction with deferred-maintenance and operational issues in three of the graduate residences. The Institute has already committed to a capital renewal plan that will ensure the continuance of existing housing resources. Including additional units in the renewal would be a way to meet graduate housing needs.

The group's survey of housing opportunities for graduate students at peer institutions revealed that MIT is a leader in supporting on-campus graduate housing.

Among its recommendations, the group encouraged MIT to build housing for 500–600 students, and suggested that these housing units be configured not in traditional dormitory-style facilities, but in buildings that can accommodate a variety of housing types, ranging from studios and multi-bedroom suites to apartments. Moreover, the group recommended that these housing units be capable of accommodating both married and unmarried students and families.

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<sup>19</sup> [http://orgchart.mit.edu/sites/default/files/reports/20140116\\_Provost\\_FinalGradHousing.pdf](http://orgchart.mit.edu/sites/default/files/reports/20140116_Provost_FinalGradHousing.pdf)

The working group recommended that, to facilitate capital renewal, MIT create 400 additional beds to meet swing-space needs over the course of the next decade and, at the end of that period, make that housing available to graduate students. A range of development options exist for this new housing in addition to traditional dormitory development channels. These include partnerships with developers, long-term leases on new housing, inclusion in already-planned capital renewal in graduate housing, and incorporation into nonresidential buildings on campus.

In response to the working group's recommendations, in July 2014, the Provost wrote to the MIT community to present a proposed parcel assembly that would include space for academic, commercial, and retail uses, as well as housing for graduate students. MIT has issued requests for proposals for design teams to create building concepts for this newly-imagined space. The review of these proposals will begin in the fall.

## 9. Financial Resources

Though not unique to MIT, the economic downturn of 2008, followed by a deep recession, severely reduced MIT's endowment and forced the Institute to identify both cost-saving measures and potential new revenue streams. As it does during times of crisis, Institute leadership called on the MIT community to work together to find solutions. An Institute-wide Planning Task Force was assembled, and various mechanisms were established to solicit campus-wide feedback. A preliminary report of the Task Force and a description of the process was included in the 2009 self-study.

In late 2009, the Task Force released its final report<sup>20</sup> detailing the suggestions of the Task Force's nine working groups. The suggestions were broken into five themes:

1. New Revenue Enhancement and Educational Opportunities for MIT
2. Framework for Accountability and Transparency
3. Gaining Efficiencies and Supporting Standards
4. Process Modernization (Digital MIT)
5. Modern Workforce Policies and Practices

In many ways, these themes have guided MIT's agenda over the last five years. For instance, among the recommendations included in the first theme was a proposal to increase the undergraduate enrollment and a proposal to pursue revenue generation opportunities through e-learning, both endeavors that have been pursued and are described elsewhere in this report.

The notion of a "Digital MIT," the focus of the fourth theme, has reshaped many of the Institute's administrative functions. While MIT is world-renowned for its leadership in technology and innovation, until recently, its processes for performing many of the day-to-day administrative functions were outdated and inefficient. Over the past five years, MIT has allocated funding to expedite the digitization of such functions as paystub delivery, W-2 delivery, travel booking and reporting, request for payment processing, establishing employee appointments, and onboarding new employees. The Institute remains committed to reducing administrative barriers through technology.

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<sup>20</sup> <http://web.mit.edu/instituteplanning/TaskForceFinalReport.pdf>

After several additional months of community engagement, the Provost, Chancellor, and Executive Vice President and Treasurer articulated a plan of action in a March 2010 letter<sup>21</sup> to the community. In April 2011, the Task Force Coordinating Team sent a final letter<sup>22</sup> to the community describing the status of the 200 ideas that were collected, 77% of which had been acted upon at that time, and identifying ideas in need of further analysis.

Since the downturn of 2008, MIT has continued to advance its mission and positive impact while further strengthening its overall financial position. In fiscal year 2013, the Institute's net assets increased by 10.4% to \$14,132.9 million. Key components of this increase included robust investment performance, a decrease in accrued benefit liabilities, and positive operating results. The value of MIT's investments surpassed \$13 billion due primarily to the Institute's endowment return of 11.1% for the fiscal year. Total operating revenues grew by 6.6% to \$3,186.6 million, and operating results were \$278.0 million.

Despite a year of strong financial performance demonstrated by increased revenues, managed expense growth, and improved operating results, we are reminded of the critical need to renew and modernize MIT's campus and infrastructure amidst a still uncertain economy. We also confront the continuing need to provide financial support for our students. Proactive steps taken to mitigate the effects of reduced federal funding have had a positive impact on financing the Institute's research enterprise. While MIT faculty will undoubtedly compete exceedingly well for available federal funds, continued diversification of research sponsorship will be paramount as the overall pool of federal resources diminishes over the near term. Despite this funding uncertainty, and the wind-down of the American Recovery and Reinvestment Act of 2009 (ARRA) research funding, the Institute generated \$1.6 billion in research revenues for fiscal year 2013, which is a 4.8% increase from the previous year.

While research, including at Lincoln Lab, and net tuition support more than half of MIT's revenue, the Institute experienced significant growth in other revenue categories as well, including increases in support from investments, gifts and bequests, and payments on unrestricted pledges. Support from donors, in the form of gifts and bequests, as well as payments on pledges for current use grew by \$50.4 million, or 24.4% in fiscal year 2013. The overall cash position of MIT reflects positive operating results and an active cash management strategy that takes into account liquidity management, economic conditions, and future needs.

The Institute moves forward with great optimism, and with the financial strength and momentum to support emerging opportunities. MIT remains vigilant in managing the financial uncertainties we continue to face, while also renewing our commitment to stewarding the Institute's resources and enabling the MIT mission.

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<sup>21</sup> <http://web.mit.edu/instituteplanning/letter7.html>

<sup>22</sup> <http://web.mit.edu/instituteplanning/letter8.html>

## 10. Public Disclosure

### *Web presence*

The information that MIT provides about itself continues to grow exponentially with an increased web presence. MIT prides itself on transparency in communication.

In March 2014, MIT News,<sup>23</sup> which serves as MIT's platform to share its story with the world, launched a completely redesigned site. In addition to being easier to manage, the new site has a mobile-friendly design that increases the prominence of campus news and more effectively integrates media information.

MIT's social media presence, essentially non-existent in 2009, has grown rapidly. In late 2011, MIT hired its first Social Media Strategist to guide departments, labs, and centers in incorporating new media into their communications plans. Similar positions with a local focus have emerged throughout the Institute over the last two-and-a-half years. In late 2012, MIT launched MIT Connect,<sup>24</sup> which aggregates MIT's social media presence into a hub that allows users to quickly and easily access information across MIT's web presence, both institutionally and locally.

In September 2013, the Office of the Chancellor and the Offices of the Deans for Undergraduate Education, Graduate Education, and Student Life launched a new Student Resources<sup>25</sup> site. The site provides a central gateway to everything students need to know about living and learning at MIT. In addition to providing information about student resources, the site also creates an online forum for the Chancellor and Deans to engage with students through letters and a "Students Are Asking..." feature.

### *Local and federal relations*

MIT has an institutional interest in working effectively with the local Boston/Cambridge communities and officials, and with national government entities. At a local and state level, the Office of Government and Community Relations (OGCR) fosters interaction and understanding between MIT and its neighbors. Through a broad range of activities, the OGCR is a communications link, a catalyst for action, and a resource for both MIT and the external community that is committed to promoting productive collaborations in all of its interactions.

The MIT Washington Office reports to the MIT President and works to provide a steady flow of information and ideas between MIT and key federal offices and agencies. In a climate of uncertainty around federal funding for higher education, the Washington Office plays a key role in promoting the value of basic research and scientific discovery as policy and funding decisions are made.

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<sup>23</sup> <http://newsoffice.mit.edu>

<sup>24</sup> <http://connect.mit.edu>

<sup>25</sup> <https://resources.mit.edu>

## 11. Integrity

### *Academic Integrity*

Academic integrity is at the core of MIT's mission. The Deans for Undergraduate and Graduate Education regularly stress the Institute's policies and expectations in communications with the student body. MIT has established training on the Responsible Conduct of Research (RCR) that covers topics including data acquisition and management, responsible authorship and allocation of credit, peer review, mentoring, conflicts of interest, and collaborative research. While graduate students funded by NSF and NIH grants and fellowships are required to take the training, the Dean for Graduate Education encourages all graduate students to complete the online course that MIT offers.

In the spring of 2012, the Dean for Undergraduate Education charged an Academic Integrity Working Group to update the Institute's Academic Integrity handbook to reflect current student practices and expectations. From that working group sprung a new website<sup>26</sup> devoted to academic integrity at MIT. The site provides an overview of the issue and offers direction for ensuring honesty and integrity.

### *Title IX*

Over the last few years, MIT has devoted a great deal of resources to responding to the shifting landscape of disciplinary cases, especially in light of new Title IX requirements. In the spring of 2011, Vice President Joe Biden and Secretary of Education Arne Duncan led a campaign to combat sexual assault, focusing on colleges and universities. On April 4, 2011, the Office of Civil Rights sent a "Dear Colleague Letter" to MIT (and other universities) on University Title IX Obligations to Prevent and Investigate Sexual Violence.

The "Dear Colleague Letter," coupled with the Biden/Duncan campaign and a spate of recent high-profile sexual misconduct incidents on university campuses, prompted MIT to revisit its policies and practices. The review generated a number of changes, including the creation of a new position, Title IX Investigator, and the establishment of a pool of trained advisors called Title IX Deputy Coordinators. These employee appointments reside in the Offices of the Deans for Student Life, Undergraduate Education, and Graduate Education; in each School; and in the Department of Athletics, Physical Education and Recreation. Other changes include:

- Training coordinators, advisors, and others who may respond to complaints
- Reviewing/revising policies and practices
- Educating the community about MIT's obligations and resources for assistance and support

The Office of the General Counsel created a new Title IX website<sup>27</sup> to serve as a central repository of information related to sexual misconduct and to increase the visibility of MIT's

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<sup>26</sup> <http://integrity.mit.edu>

<sup>27</sup> <http://sexualmisconduct.mit.edu>

obligations, policies, and resources. The site identifies resources on campus for dealing with sexual assault and Title IX concerns.

In February 2014, President Reif wrote to the community about the seriousness of sexual assault and charged Chancellor Cynthia Barnhart with assessing the nature and extent of the problem at MIT. Chancellor Barnhart spent much of the spring 2014 semester engaging the community in a dialogue about sexual assault and assessing MIT's programs aimed at preventing and responding to alleged assaults. She also administered a campus-wide survey to collect information about student attitudes, opinions, and experiences on this important issue including the campus climate.

In May 2014 Chancellor Barnhart reported to the community and noted five primary themes that emerged during this analysis:

- Students want clear answers about what behavior constitutes sexual assault.
- Students are eager for practical strategies to prevent sexual assault and change environments that encourage unhealthy and unsafe behavior.
- Students who have used MIT's support services in this area generally give the services high marks. However, most students are not clear about their rights and their options for advice and support.
- A significant barrier to progress is the complex social and psychological dynamics that discourage people from seeking help or reporting sexual assault or harassment.
- Students who experience sexual assault often turn for help to a friend or a faculty member they respect; MIT must help both students and faculty understand the best ways to respond.

The Office of the Chancellor has already instituted a number of practical changes:

- Before arriving on campus, all first-year undergraduate and graduate students will complete a new, expanded online training course that covers sexual harassment, assault, interpersonal violence and stalking, and the relevant campus policies, procedures and resources.
- During Orientation, all first-year undergraduates will attend an interactive program that explores questions around consent, communication, healthy sexuality and bystander intervention, an enhanced version of what they receive now.
- During new employee orientation, all new staff, post-docs, and faculty will complete an online training program as described above, but tailored for them.

These steps build on MIT's efforts in recent years to provide training to its students about sexual assault awareness and prevention. MIT is proud of the resources and programs currently in place, and will continue to analyze and make improvements to ensure the safest and most welcoming environment possible.

*Student expectations*

The *MIT Mind and Hand Book*<sup>28</sup> serves as a student's guide to the standards, guidelines, regulations, and procedures regarding general behavior and policies relating to undergraduate and graduate students. In compliance with Title IV, the manual presents a clear statement of student rights and responsibilities, including grievance procedures.

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<sup>28</sup> <http://studentlife.mit.edu/mindandhandbook>

## REFLECTIVE ESSAY

Since the 2009 reaccreditation process, MIT has continued to make strides in studying how its students learn with an eye towards promoting success, both while at MIT and beyond. With a transformation in higher education afoot, understanding the outcomes of student learning must be a priority. For MIT to maintain its level of excellence, and to build on that excellence through new educational tools, we must closely and consistently examine the impact of our pedagogy. The data that are now being collected to measure student learning are vast and extremely detailed. The key will be to identify the right questions to ensure effective analysis.

In this essay, we examine the different methods through which MIT measures student learning and success. We evaluate these qualities separately in undergraduate and graduate education, and describe some of the early work being done in assessing the impact of digital education on the residential experience.

### UNDERGRADUATE EDUCATION

#### *Undergraduate Alumni Survey*

One of the most important tools that MIT uses to understand the impact of an MIT education is the alumni survey. Though an indirect measure, assessing achievement after graduation can be an indication of the strengths (and weaknesses) of a student's experience.

Since 2005, MIT has conducted a comprehensive undergraduate alumni survey every four years. The most recent survey, administered in late March 2013, found that MIT graduates excel in a variety of fields. Those who wish to continue their studies at the graduate level do so with great success; those who enter the workforce are able to make an immediate and meaningful impact.

In the most recent survey, 75% of the undergraduate alumni indicated that they enrolled in a graduate or professional degree program after graduating from MIT. Seventy-one percent of alumni respondents indicated that MIT prepared them "very well" for their graduate or professional degree.

Eighty-five percent of alumni respondents are employed either full-time or part-time. Twenty-two percent reported that they have started a company; 14% reported that they are currently developing a start-up company. Eighty percent said that MIT prepared them "very well" or "more than adequately" for their current career. Eighty-six percent reported that they are "generally satisfied" or "very satisfied" with their careers thus far. Eighty-nine percent reported being "very satisfied" or "generally satisfied" with their lives now.

Ninety-two percent of respondents reported being "very satisfied" or "generally satisfied" with their undergraduate education at MIT. Between 85% and 90% of respondents "probably would" or "definitely would" encourage a current high school senior who resembles them when they were a high school senior to attend MIT. When asked how well MIT prepared them for various tasks, alumni felt that, overall, MIT best prepared them to think analytically, logically, and critically.

Following the completion 2013 survey, MIT's Office of Institutional Research conducted a trend analysis to examine changes in alumni success and satisfaction since the Institute began



conducting the undergraduate alumni survey in 2005. Some highlights:

- Significantly more respondents from the 2005 and 2013 administrations reported having enrolled in a graduate or professional degree program since graduating than from the 2009 administration. Approximately 75% of respondents from those two administrations of the survey reported graduate or professional school enrollment, compared to approximately 62% from the 2009 administration.
- More than 87% of respondents from both the 2009 and 2013 administrations of the survey reported that MIT prepared them “very well” or “more than adequately” for graduate or professional school. An additional 10% reported that MIT prepared them “adequately.”
- More than 75% of respondents from the 2009 and 2013 surveys reported that MIT prepared them “very well” or “more than adequately” for their current careers, with an additional 19% reporting that MIT prepared them “adequately.”
- The proportion of respondents who were either “very satisfied” or “generally satisfied” with their undergraduate education at MIT remained fairly constant at around 90% across all three survey years.
- Approximately 65% of respondents in 2009 would definitely encourage a current high school student to attend MIT. As noted above, that number increased by about 20% in the 2013 administration of the survey.
- Across a wide variety of categories, more respondents in 2013 than in 2009 reported that MIT prepared them “adequately” or better for life after college.

As each department prepares for its Visiting Committee review, the Office of Institutional Research provides committee members with department-specific data from the survey. The office also provides survey results and analysis to the MIT senior officers to use for strategic planning purposes.

### *ABET*

All of MIT’s School of Engineering undergraduate degree programs, except for those in Biological Engineering, seek accreditation by ABET every six years. In the summer of 2013, the MIT departments seeking accreditation submitted self-study reports to ABET, and in October 2013 a team of ABET Program Evaluators visited the MIT campus, toured labs and facilities, met with faculty, administrators, and students, and delivered a draft statement at the end of their visit.

In general, the ABET evaluation was very positive. The accreditors acknowledged the high quality of teaching at MIT and were particularly impressed by the MIT students they met. However, they suggested that MIT’s processes for continuous improvement of the curriculum should include expanded measures of direct assessment, and that these measures should be evaluated at the department level in a more systematic fashion.

In response to this recommendation, the School of Engineering is now working to create a system whereby granular, direct measures — student assignments and exams — will be collected for each identified departmental student outcome and combined with indirect measures (student survey results and student participation in certain extracurricular programs) to create department-level assessment reports. These reports will be created annually and delivered to the departments in order to help their departmental assessment efforts.

## *Grades*

There are many ways the Institute measures student learning in the disciplines. As might be expected, many faculty believe that grades are the best indicator of student performance, and evidence shows that the MIT faculty take their grading responsibilities very seriously. MIT faculty have long prided themselves as being resistant to the trend of grade inflation.

Section 2.60 of the *Rules and Regulations of the Faculty* describes the levels of subject competency that letter grades are expected to represent. In recent years, the practice of grading “on a curve” seems to have crept into some faculty members’ evaluations of their students. This practice, which is explicitly forbidden in the *Rules and Regulations of the Faculty*, can create uneasiness and uncertainty as students strive to meet the high academic standards that MIT faculty have set for them. In November 2012, the Chair of the MIT Faculty wrote to the faculty with a reminder that the grades assigned to a student’s work are not to be “rigidly related to any numerical scores or distribution function.”<sup>29</sup> The communication included a reminder of the clear statement of meaning that MIT has assigned to each letter grade, and was intended to maintain the integrity and consistency of assigning grades to students’ work.

## *Teaching and Learning Laboratory*

MIT’s Teaching and Learning Laboratory (TLL), formed in 1997, plays a crucial role in partnering with MIT faculty and other members of the community to strengthen pedagogy, curriculum, and educational technology. The collaborations and research TLL undertakes are designed to both strengthen the educational experience for students and impact national and international initiatives in STEM teaching and learning. Its focus has three dimensions:

- To contribute to the many educational innovations being developed at MIT
- To offer a certificate program aimed at doctoral students and postdocs, a for-credit course, and individual workshops in college-level teaching and learning
- To design and implement assessment studies, as well as conduct research in learning in higher education

Any MIT faculty member or instructor may enlist the aid of TLL on studies that help them investigate how the innovations they design impact student learning. TLL has become an invaluable resource in examining how our students learn and in promoting a wide range of pedagogies that meet the Institute’s educational goals.

Between 2009 and 2014, TLL conducted 25 assessment studies. These assessments range from analyzing the effectiveness of individual classes, to groups of subjects, to undergraduate and graduate programs, to massive open online courses (MOOCs). A recent TLL study on five MIT courses that have moved towards a blended model (that is, combining online lectures with increased hands-on activities during class time) is described later in this essay.

The assessment studies provide immediate and detailed feedback to faculty and Department

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<sup>29</sup> <http://web.mit.edu/faculty/governance/rules/2.60.html>

Heads. By collecting data about a subject's or program's strengths and weaknesses, the department is positioned to quickly adjust to meet students' needs. TLL's research is an important feedback mechanism to support ongoing improvement.

TLL itself is assessed on an ongoing basis as part of the Office of the Dean for Undergraduate Education (DUE). The lab undergoes a thorough evaluation as part of the DUE's biennial Visiting Committee process, described below.

### *Visiting Committees*

Since their establishment in 1875, Visiting Committees have influenced the course of education and research at MIT. Operating as advisory groups to the MIT Corporation, the committees provide appraisal, advice, and insight about each academic department and other activities of the Institute. Members help to maintain a close relationship between academic procedure and professional practice, while providing expert commentary on current and proposed departmental programs. Through interviews with the Visiting Committees, faculty and students participate in this facet of Institute governance. The Visiting Committees provide regular, substantive and highly valued program reviews.

Approximately 400 distinguished scientists, engineers, scholars, entrepreneurs, executives, and educators serve on the Institute's 30 Visiting Committees. Each committee is approved by the Corporation and typically includes five Corporation members, one of whom chairs the committee, appointed by the Chair of the MIT Corporation, six alumni nominated by the Association of Alumni and Alumnae's Committee on Nominations for the Corporation Visiting Committees, and six members nominated by the President of MIT.

Undergraduate and graduate education are discussed extensively throughout the visits, and students are invited to meet with committee members. The process typically provides valuable feedback that ultimately strengthens departmental programs. The background materials given to the committee chair include comparative data on selected questions from a number of student surveys. Individual departments often provide more in-depth analysis of these data during committee visits. Because each department has a biennial meeting with its Visiting Committee, the committee provides good follow-up on prior recommendations.

While the function of the Visiting Committees is defined in the Institute's bylaws, the senior officers and the Executive Committee consistently review the process by which departments are evaluated to ensure that this governance mechanism remains effective. In addition, the Office of the Secretary of the Corporation has implemented an evaluation process to gather committee members' immediate feedback. Towards the end of each Visiting Committee meeting, the committee chair polls committee members about the experience. With an eye towards continuous improvement, the data is compiled into a report that is shared with the Chair of the MIT Corporation, the Secretary and Associate Secretary of the MIT Corporation, and the appropriate Department Head.

### *Subject Evaluations*

An important part of assessing student learning involves understanding the strengths and weaknesses of the classes that comprise our students' academic experiences. In the spring of 2013, MIT's process for conducting and collecting subject evaluations completed its transition

from a paper-based, decentralized system to one conducted entirely online and managed in one office, the Office of Faculty Support (OFS). Since then, more than 1,000 subjects and 2,000 instructors have been evaluated each term.

The limitations of a paper-based subject evaluation system and the process of collecting teaching data made it difficult, if not impossible, to present timely and accurate feedback on the MIT educational experience. The new online process of collecting student feedback has improved the ease with which it is collected and the timeliness of evaluation reporting. The system makes it much easier to locate and study the feedback longitudinally, to analyze qualitative as well as quantitative data, and to see distribution patterns as well as averages. Evaluation reports are now available as soon as grades are submitted at the end of each term so that departmental administrators and instructors can review the data and plan improvements to subjects, staffing, and curricula while the classes are fresh in their minds.

OFS has established a Subject Evaluation Advisory Committee (SEAC), which includes faculty, graduate and undergraduate student representatives, and administrators, to provide counsel on policy and system improvements. The faculty members on SEAC, who represent MIT's five Schools, include social scientists with expertise in designing questionnaires and analyzing data. The committee has included both departmental and central administrators with experience in reviewing evaluation data, and a graduate student who worked professionally on surveys.

Some data from evaluations has already been incorporated into an online Faculty Professional Report. Originated in the School of Engineering, the report is now being adapted Institute-wide so that faculty can monitor and report on their professional activities more easily.

The online subject evaluation system was launched to report data and outcomes more effectively. It is helping to present a more complete picture of the state of education at MIT — including how students perceive their learning, what contributes to that learning, and what may hinder it.

## GRADUATE EDUCATION

### *Graduate Program Learning Objectives and Assessment Plans*

Beginning in the spring of 2013, the Office of the Dean for Graduate Education (ODGE) led a process that enabled each academic department and graduate program to develop, discuss, and review student learning goals and assessment methodologies. The Dean for Graduate Education, in consultation with the Director of the Office of Institutional Research, the Director of the Teaching and Learning Laboratory, and the Chair of the Committee on Graduate Programs, convened meetings with heads of all of the graduate programs to discuss the fundamentals and value of establishing program learning objectives and assessment plans. The group also examined and discussed current literature in this area. The graduate program heads were asked to include three components to their learning assessment plans as follows:

1. *Goals: How do you define a successful student?* Program heads were asked to consider what they felt students should know by the end of their degree programs including, for example, proficiencies, expectations, and aspirations.
2. *Data: How do you know if students meet your definition of success?* Program heads were asked to consider how they would know if students met their definition of success by determining

what systematic evidence (indirect and direct) they would gather or request from the Office of Institutional Research and analyze on an annual basis to understand if students were achieving their learning goals.

3. *Action: How do you use what you have learned?* Program heads were asked to create a closed feedback loop so that the findings would be used to make decisions about continuous improvement, facilitate determination of best practices, and assist with strategic planning.

The Dean for Graduate Education made clear to the departments and graduate programs that the learning objectives and assessment plans would reflect the many, distinctive disciplinary cultures and processes of MIT's departments, programs, and Schools. The Dean encouraged departments to utilize data already collected and provided them with examples of additional data that were available. Examples were provided in the form of indirect measures (e.g., survey data, exit interviews, course evaluations, time-to-degree data, awards, and honors) and direct measures (e.g., grades, qualifying examination performance data, thesis examination grades, and research presentations) that demonstrate strengths in measuring learning and that identify weaknesses. The Dean presented data collected through a graduate alumni survey (described in the next section of this report). She provided a summary of the most currently available types of data on doctoral outcomes in an article entitled "Doctoral Outcomes and Impact" in the *MIT Faculty Newsletter*.<sup>30</sup>

All departments and graduate programs submitted an initial draft of their learning assessment plans in October 2013. The Dean for Graduate Education, the Director of the Office of Institutional Research, the Director of the Teaching and Learning Laboratory, and the Chair of the Committee on Graduate Programs reviewed the learning assessment plan documents, distributed the drafts to all graduate programs with a summary document of highlights of best practices, and provided feedback to the programs on the drafts. Departments and graduate programs submitted final learning assessment plans in January 2014; the plans have been posted on a wiki for graduate programs to access.

The graduate programs found feedback on the results of the process to be extremely useful and positive. The learning goals that doctoral programs and research-based masters programs reported were consistent with NEASC Standard 4.26, in particular, the deep mastery of disciplinary specialized knowledge and the acquisition, organization, utilization, and dissemination of knowledge in their discipline. Many doctoral programs also cited the ability to generate original new knowledge (which is also articulated in the mission of MIT), to think critically, to synthesize disparate knowledge, to identify and pursue significant research topics, and to make significant contributions to the field by the publication of their research findings. For example, the PhD program of MIT's Department of Electrical Engineering and Computer Science cited its student learning goals as follows:

1. Conduct original research and publish in a peer-reviewed journal, and present their findings to a conference of their peers.
2. Demonstrate in-depth knowledge of one area of expertise.
3. Know and follow ethical guidelines for conducting research and disseminating knowledge.
4. Communicate technical contributions effectively both orally and in writing.

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<sup>30</sup> <http://web.mit.edu/fnl/volume/262/ortiz.html>

5. Learn to effectively teach undergraduates or graduate students.
6. Identify potential career options.

Similarly, professional masters programs (e.g., Masters of Business Administration, Masters in City Planning, and Masters in Architecture) were consistent with NEASC Standard 4.27 and involved the application or transmission of existing knowledge or the development of new applications of knowledge within their field. For example, MIT's Master of City Planning program cited its student learning goals as follows:

1. Demonstrate broad knowledge of the relevant theories, methods, and professional practices that are relevant to urban planning, social policy, and urban and regional development and governance.
2. Demonstrate in-depth knowledge of one area of expertise.
3. Demonstrate the capacity to work professionally with multi-disciplinary teams on problems that require creative problem formulation and spatial skills as well as good critical analysis skills.
4. Follow ethical guidelines for work in the field.
5. Write and speak effectively to professional and lay audiences about issues in the field.
6. Demonstrate a capacity for original, synthetic work through a thesis or professional report.

A number of programs also defined practical goals such as the ability to use basic software tools common in the profession and the ability to identify the costs of and mechanisms for executing research, as well as project evaluation. The program also identified several philosophical goals including an expectation that students understand the policy and conceptual level of a project and that they display knowledge of the academic and professional context of their field, keeping current on advances.

Graduate programs also almost universally displayed an emphasis on professional skills: many cited effective communication, both in written and oral forms, as critical. In the Department of Economics one of the learning goals is "to write and speak effectively to professional and lay audiences about issues in economics." The department has recently renewed its emphasis on improving the efficacy of students' written and oral communication by hiring a professional public speaking consultant to assist its graduate students, in particular those coming into the job market, with their communication skills.

Other professional expectations included the ability to work confidently, both independently and in teams, and to resolve conflicts. Many programs explicitly stated a demonstration of ethics as a key expectation. For example, the Department of Nuclear Science and Engineering organizes an Ethics Weekly Expert Guest Seminar during the academic year during which experts from the nuclear community are invited to give a weekly presentation to the department. The speakers address topics that touch on practical ethical issues that they face in the conduct of their work.

Teaching, whether at a formal university or in another setting, was also a key theme. For example, the Department of Mathematics carries out teaching training every semester before students are assigned as teaching assistants. The teacher training has three components:

1. Practice teaching: Prospective recitation instructors are paired with current recitation “mentors;” the prospective instructors then teach a class themselves, with performance evaluations completed by the mentor and students in the class.
2. Micro-teaching: The trainees attend a three-day micro-teaching workshop, with one day focusing on guidelines, pedagogy, and best classroom practices, and the other two on practice sessions where attendees are videotaped and critiqued.
3. Videotaping: During new recitation instructors’ first term teaching, the course lead or another faculty member records and reviews one of their classes. The reviewer then provides the instructor with a written evaluation.

In order to evaluate whether a student has met the definition of success, departments articulated the systematic evidence they collected. Many of these measures were direct, meaning that they were standardized or non-standardized objective measures demonstrating competency in specific areas. Broadly cited measures included coursework grades, qualifying examination performance data, thesis grades (including written and oral components), and research presentations. In addition, departments considered the existence of published work, whether or not a student had presented a paper at a major conference, and the successful completion of relevant training modules.

A variety of indirect measures are also used to both measure student learning, as well as in some cases to demonstrate strengths and to identify any weaknesses in the program’s curriculum and structure. The most broadly cited indirect measure was survey data, in particular student exit surveys, but also the new survey of graduate alumni. Other measures include participation and performance in teaching measured through course evaluations, time-to-degree data, the quality and impact of papers published or presented, and awards and honors. Some cited a town hall format that allowed them to collect feedback from students during the course of the academic year. In some departments, staff are in contact with employers and are able to collect feedback on how well-prepared a former student was for the work at hand.

MIT departments use this wealth of data in a variety of ways. Individual student data, in particular the direct measures listed above, are used to give feedback to the students, guiding their paths and indicating at times that improvement is needed. Most departments described the student advising system that exists, sometimes including multiple advisors as well as thesis committees and administrators and, in some cases, mentoring seminars or “Individual Development Plans” around graduate school and career goals. Some departments mandated certain meetings. This advising system is proactive, helping the students to do their best. In the event that improvement is needed, formal structures include letters from the advisor or thesis committee, as well as a “Dean’s letter” notification of probationary status setting forth clear academic expectations. In order to reward exceptional performance, some departments also give awards and prizes.

On the level of each program as a whole, departments routinely draw on indirect measures. Numerous departments review survey data every two years, prior to a Visiting Committee meeting. A summary of the survey highlights strengths and weaknesses and makes proposals for change. Visiting Committee feedback is also considered. For those departments that hold town halls as a subjective measure, the feedback has been the basis for refining such program aspects as first-year classes, and establishing or refining requirements.

As a result of the learning assessment process, numerous departments have become more deliberate about best practices and strategic planning. For example, the Department of Materials Science and Engineering (DMSE) drew on input from both faculty and the graduate student officers to propose a new model for continuous evaluation of student performance via multiple committee meetings. The Department of Architecture is planning a more formal and comprehensive approach to collect data on student publications. The Department of Urban Studies and Planning is preparing more and earlier feedback around a research assistantship program, as well as improved accounting for uneven faculty workload in supervising theses. In the professional development arena, the Engineering Systems Division has assigned designated advisors to oversee career development and job searches, and DMSE has proposed a new workshop on ethics, while the Microbiology Program may provide additional support for students in proposal writing.

In the fall of 2014, The Dean for Graduate Education, the Director of the Office of Institutional Research, the Director of the Teaching and Learning Laboratory, and the Chair of the Committee on Graduate Programs will reconvene the graduate program heads to discuss and document progress on continuous improvement based on the learning assessment plans.

#### *Graduate Alumni Survey*

During the fall semester of 2012, the Office of the Dean for Graduate Education sponsored a survey of graduate alumni whose degrees were awarded approximately five, 10, 15, 20, and 25 years prior. The purpose of the survey was to elucidate post-graduate trends in employment and career trajectories, entrepreneurship activities, professional activities and accomplishments, and the necessary knowledge and skillsets for various career paths.

The dataset provides a wealth of information. Of note, 94% of graduate alumni respondents were “generally satisfied” or “very satisfied” with their time as a graduate student at MIT.

Ninety-seven percent of doctoral alumni respondents reported that they are currently working, doing a postdoctorate, or in military service, with only 2% seeking employment. Though the doctoral degree has historically been considered as a main pathway to academia, 54% of doctoral alumni reported that their employer is non-academic: governmental (5.6%), industry (38.8%), not-for-profit (3.7%), other organization (1.6%), or self-employed (4.7%). Twenty-one percent of doctoral graduate respondents said that they have founded a company, and 41% indicated that they held at least one patent. The median annual income (without bonuses) of an MIT doctoral recipient was determined to be \$112,500.

Ninety-three percent of MIT’s graduate alumni are employed, with just 2% currently seeking employment (others are engaged in such activities as travel and caring for family). The average annual salary of graduate alumni was reported to be \$156,793; the median was \$137,500. Graduate alumni, overall, were most likely to report working in a private for-profit organization (54%), in a U.S. four-year college or university (13%), or to be self-employed (9%).



## DIGITAL LEARNING

### *Course Credit*

As digital learning becomes more fully ingrained in MIT's model of residential education, so too do questions about accurately assigning course credit units. As at all colleges and universities, MIT has relied on longstanding policies and practices to determine the credit units a student is able to earn by satisfactorily completing a class. Part of the equation in determining credit units has been in-class time spent interacting with an instructor or with one's peers. The clear delineation between in-class and out-of-class time is becoming increasingly murky. To grapple with the issue of class credit units for residential learners in an increasingly digital setting, the Faculty Policy Committee charged an *MITx* Subcommittee to identify criteria by which the Office of the Registrar and the Committee on Curricula might assess subjects that rely heavily on online technology to deliver content.

MIT currently uses a three-number scheme (3-2-7, for instance) to assign credit units for subjects, by which one credit unit is the equivalent of approximately 14 hours of work per term. The first number in the scheme represents the number of credit units assigned for lectures and recitation. The second number represents the number of credit units assigned to laboratory, design, or fieldwork. And the third number represents the number of credit units anticipated for outside preparation. The three numbers added together represent the total credit units for a subject (12 in the example above).

The *MITx* Subcommittee, which delivered a final report<sup>31</sup> in May 2014, recommends that MIT continue to use a three-number scheme to represent the different elements of a subject, but that the numbering system be updated to reflect the new element of online content delivery.

In the proposal submitted by the subcommittee, the first number will be refined to reflect "face-time," in which students are physically co-present with an instructor in a lecture, seminar, or recitation. Based on the working definition of a credit unit being equal to one hour per week, this number reflects weekly contact hours for full term subjects and a proportional calculation for half-term and IAP (Independent Activities Period) subjects. This number should clearly signify co-present, instructor-led class time.

The subcommittee recommended that the second number signify scheduled weekly hours of additional hands-on practice, involvement with materials (e.g., labs), and/or engagement with phenomena (e.g., film screenings) related to the subject matter studied and that require scheduled times and places for student presence.

The subcommittee recommended that the third number signify the homework, projects, reading, or writing students do outside of scheduled class time (class time understood as weekly hours designated by the first and second numbers). It is expected that there is variation in the activities signified by the third number, which could include problem sets, writing a paper, reading, rehearsing, or working with materials online. As a best practice, the subcommittee suggested that faculty include a sentence in the subject description detailing the components of the third credit unit designation, such as the use of online materials, and provide means to track such use among

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<sup>31</sup> <http://web.mit.edu/faculty/reports/pdf/MITx2014.pdf>

subjects and over time.

The subcommittee expressed some concern that the numbering system should reflect actual practice. Faculty submitting new or modified subject proposals to the Committee on Curricula and the Committee on Graduate Programs for consideration should include a brief, clear explanation of activities that will make up each of the three numbers, with quantification where appropriate.

The changes to the numbering system are more in the spirit of refinements. While the subcommittee considered the option of adding a fourth number to the current system to signify expected weekly hours of online activity, it chose means that would be far less burdensome for instructors, departments, and faculty review committees to administer and permit more facile integration of online materials into the curriculum in diverse and multiple ways.

### *Assessment*

As *MITx* content becomes further ingrained in the residential learning experience, a “blended” model of learning is emerging in which lecture material is accessed online, freeing up classroom and laboratory time for meaningful hands-on activities. One of the greatest challenges of digital learning will be studying the ways in which students learn in this new blended environment.

During the spring 2013 semester, researchers in the Teaching and Learning Lab conducted a study of five residential MIT courses offered in a blended fashion during that semester. The research questions underlying the analysis were:

1. What is the experience of the course instructional staff and students involved in the residential blended learning class?
2. How do students use blended class resources, including but not limited to online homework problems, discussion boards and in-person discussions, lab videos, resource papers, and screencasts?
3. How do students use online resources in content-related collaboration?
4. What were instructional staff and students’ perceptions of the flipped classroom (if utilized)?

Among the highlights were the following:

- In one course, the instructors felt that grading student participation in class was more informative than evaluating their posts on the online discussion board, so they abandoned assigning grades to residential students’ involvement in the discussion forum.
- In another course, the instructors changed the number of attempts allowed for online lecture questions after receiving feedback from students about their difficulty with application of lecture concepts when responding to the questions.
- Several instructors changed the type of online homework problems assigned to students; several weeks into the semester, they began to assign more conceptually based problems to residential students rather than the more numeric-type problems found in the edX course. These changes required flexibility by course instructional staff and students, producing some disaffection toward the online courses, while at the

same time increasing cohesion between instructors and students as they determined more palatable approaches.

- In the flipped classroom, information regarding student understanding of the pre-class content serves as an important diagnostic tool for faculty. In order to correct students' misconceptions or tailor in-class activities and problem-solving exercises toward concepts that are difficult for students, faculty need to have timely and user-friendly access to student performance on pre-class assignments.

The study raises a number of questions and reflects the complexity of evaluating learning in this new environment. As our instructors and staff gain more experience in teaching in a blended setting, so too will our understanding of effective pedagogical methods.

## PLANS

The process begun by the release of the report of the Task Force on the Future of MIT Education will drive much of MIT's work over the next five years and well into the future. Any actions that result from the Task Force's final report will impact each of the 11 standards addressed herein. From students to faculty to physical and technological infrastructure to governance, the outcomes of the Task Force will shape MIT for generations to come. In that regard, the questions that MIT faces in 2014 are more foundational than those addressed in the 2009 report. By the time MIT undergoes its next formal reaccreditation cycle in 2019, many of the questions raised here will have clearer answers, providing a blueprint for inventing MIT's future.

The role of online learning, in particular, will continue to undergo significant analysis. If MIT does indeed launch an Initiative on Educational Innovation, as the report's authors propose, it will foster an environment of experimentation and constant evaluation. Both in reaching a global audience of learners and in adapting the residential learning experience, the early steps MIT has taken to harness the potential of online and blended learning will become more ingrained in MIT's educational model in 2019. The Task Force reported on a tension that exists between, on the one hand, a desire among some to preserve many of the qualities that define an MIT education, and on the other, a push to make grand, sweeping changes to MIT's very core. A great challenge over the next five years will be striking the right balance between both ideals, maintaining MIT's excellence in teaching and research while, at the same time, adapting to meet current challenges in a rapidly shifting climate.

MIT's campus and surrounding areas will also undergo significant change. As funds are raised and plans become clearer, many of the most serious maintenance issues facing our campus will be addressed, and several new buildings will be built. MIT's gateway idea for Kendall Square is a bold proposal that would blur the lines between MIT and Cambridge and make the Institute more accessible to those in the surrounding communities. Securing funding and the zoning approvals necessary to make the changes envisioned as part of the Kendall Square project is complex and challenging, and will remain an institutional priority.

One of MIT's most ambitious physical projects, the demolition of Building 12 to make room for the construction of a new facility devoted to nanoscience and nanotechnology at the center of MIT's campus has just begun. Due to be completed in 2019, the building will support the research activities of 2,000 members of the MIT community in fields including energy, health, life sciences, quantum sciences, electronics, and manufacturing. While the disruption to the MIT campus over the next five years will be significant, the new structure's potential to redefine the frontiers of research, exploration, education, and innovation is profound.

Finally, over the past year, MIT has been preparing to embark on a major capital campaign. While the details remain a work in progress, the aspirations that MIT leadership has set for the campaign are potentially transformative. For those who wish to change the world for the better, MIT contends that there is no better investment than the work of our faculty, students, and researchers. Preparing for the campaign's launch will require an enormous effort on behalf of our entire community. By the time of MIT's assessment in 2019, the campaign will be well underway.