

MIT Faculty Newsletter

<http://web.mit.edu/fnl>

in this issue in lieu of an editorial position, we have dedicated that space to reprinting both the open letter to President Reif concerning the State of New Jersey subpoena regarding Tidbit, and President Reif's e-mail response to the MIT community (Pages 3 and 4); we also offer our regular features From The Faculty Chair (Page 6) and Beyond the Classroom (Page 14).



MIT Corporation Chairman John Reed

An Interview with MIT Corporation Chairman John Reed

THE FOLLOWING INTERVIEW by the Faculty Newsletter (FNL) of MIT Corporation Chairman John Reed (JR) was held on January 15, 2014.

FNL: *What are the primary issues with which the Corporation is concerned?*

JR: There are two big issues that we've been engaged with, and I think engaged is the right word. First are finances. I think we now have a plan that will get us out to 2030. It's a plan that imagines we'll get the finances on a more stable basis, and will deal with the financial needs and maintenance issues we have.

The other thing is MITx, which we all see as opening all sorts of opportunities, but bringing with it change. Everybody always worries about change. I think the Corporation is representative of the broader community but they are older than the current students. They all value, and maybe even put on a pedestal, their MIT education.

FNL: *So they're loyal alumni.*

JR: Yes, they're loyal alums and they're here because they greatly value the Institute. And so, when you talk about changing it in such a dramatic way, they're very engaged. And you will hear voices representing everything from the revolutionary who sees this as just absolutely changing everything, and welcomes that, to those who say, uhh, I wonder.

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Editorial Items to Consider

Reports

A VARIETY OF IMPORTANT reports were released as this issue was going to press. These include the draft report from the Graduate Student Housing Working Group; the preliminary report of the Institute-Wide Task Force on the Future of MIT Education; the Town Gown Report to the City of Cambridge; and President Reif's letter supporting the students behind Tidbit. We hope to address at least some of these in the next issue of the *Faculty Newsletter*. In addition, this issue includes an in depth interview with Chair of the MIT Corporation John Reed, a report from Faculty Chair Steve Hall on the December faculty meeting consideration of a motion to establish a Campus Planning Committee as a standing committee of the faculty, and an obituary of former MIT President Charles M. Vest.

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Faculty interested in commenting on the reports, interview, or articles are welcome to submit a letter or article to the FNL.

Editorial Board Election

The *Faculty Newsletter* is directed by an Editorial Board whose members are directly elected by the faculty. The next election will be later this spring. We encourage readers to

nominate colleagues who they believe will be effective advocates for the active role of the faculty in the academic life and governance of MIT. (Send nominations to fnl@mit.edu with a paragraph supporting the nomination.) The current Editorial Board will choose a subset as candidates for open Board seats. In putting forth candidates, we try to ensure that the Board has appropriate balance in terms of the various Schools of the Institute, in terms of gender and diversity, and that we have members

with expertise or concern covering those issues that the faculty consider important.

Open Letter

In place of our regular editorial, we are publishing the open letter from Professor Hal Abelson, graduate student Nathan Matias, and Principle Research Scientist Ethan Zuckerman, supporting academic freedom, together with President Reif's proposal that responds to the letter. ■

Editorial Subcommittee

Open Letter to President Reif Regarding Tidbit

Dear President Reif,

WE ARE WRITING YOU as MIT faculty and graduate students whose research creates new technologies, and who teach, advise, and encourage innovative creativity among our undergraduates. We have devoted our careers to training young people to imagine, create, and disseminate projects that expand the possibilities of technology. That mission is currently under serious risk, and we believe that the MIT administration is not working to mitigate that risk.

As you might be aware, four MIT undergraduates, including EECS sophomore Jeremy Rubin, are facing legal challenges in the state of New Jersey for a project they created as part of a programming competition. Rubin and his colleagues had a novel idea: what if websites could replace ads as source of revenue, and instead borrow power from readers' computers to mine bitcoins, the popular new cryptocurrency? The students submitted a prototype, called Tidbit, to an international programming competition in November. Tidbit was only a non-working proof of concept and was not fully capable of mining bitcoins, but the idea was compelling enough to win a prize as the competition's most innovative project.

When Tidbit was featured for its creative innovation, it caught the attention of New Jersey's attorney general, who subpoenaed Rubin in December for Tidbit's source code and demanded formal responses to questions about Tidbit's workings and motivations. The state of New Jersey recently secured a million dollar settlement from a gambling website that hijacked users' computers and made them mine for bitcoins, and New Jersey may have been concerned that Tidbit used a similar technique.

Whatever New Jersey's thinking, this subpoena represents a serious, overly extreme response to an undergraduate project. The wording leaves open the possibility of prosecution under New Jersey's cyber-crime laws, which could result in lengthy legal battles, prohibitive fines and might well destroy the nascent careers of these innovative MIT students.

When the four students approached the Office of the General Counsel upon receiving the subpoena, they were told that the OGC could not help because this was not an official Institute matter. When MIT students face legal difficulties, the Institute's policy is to refer students to external resources, since our General Counsel's Office does not provide legal advice or representation to any MIT com-

munity members in connection with personal legal issues. One of the OGC lawyers offered to give unofficial advice and suggested that they reach out to the Electronic Frontier Foundation (EFF) and Harvard's Berkman Center. The EFF is now representing the students.

We disagree with the OGC's position. This is an Institute matter. Students are being threatened with legal action for doing exactly what we encourage them to do: explore and create innovative new technologies, consistent with our educational and research missions.

These MIT undergraduates demonstrated the kind of innovation we fully support and aspire to, both for our students and ourselves. Although the programming competition was not hosted by MIT, we routinely encourage our students to submit work to conferences, journals, and competitions run by organizations outside of MIT. Tidbit is also typical of the kind of project that students might create in response to a class assignment. Furthermore, we ourselves routinely submit our research for verification and recognition by third parties. The award for best innovation at this competition, which was not limited to undergraduates, would have been an honor for any of us.

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Open Letter to President Reif
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As faculty and graduate students, we see this subpoena as an affront to our academic freedom and consider it to have a chilling effect on MIT teaching and research. Technology research advances in part because we and our students publish classwork and project ideas online. New Jersey's subpoena challenges our ability to share our work. If New Jersey is successful with this subpoena, it could motivate other legal challenges of technology ideas that any of us describes in public. If Rubin and his fellow MIT undergraduates experience serious legal consequences for describing their ideas in public, and if MIT declines to support them, how can we ever responsibly continue to advise our students to disseminate their work in public? Furthermore, since Tidbit is an innovation that could have been pro-

duced by faculty or graduate students in the course of our own research, we consider this subpoena to have a chilling effect on our own work.

We are writing a group letter to the judge who is evaluating the New Jersey subpoena, speaking on behalf of a cross-section of MIT faculty and graduate students. In that letter, we will explain what we have said to you, expressing the affront to our academic freedom that this subpoena represents and urging the judge to drop the matter. Although we hope the judge will take our letter into consideration, it is a weak defense of our academic freedom compared to an official response by MIT.

We strongly urge you to consider Rubin v. New Jersey to be an official MIT matter. We urge that MIT should be active in trying to resolve this case. We request that

MIT contact the New Jersey Attorney General and advocate that the subpoena be withdrawn. We urge you to express that Rubin and his colleagues were engaging in creative innovation that is a fundamental part of the MIT student experience, that MIT as an institution directly views this as an affront to its academic freedom, and that MIT faculty and students are chilled by this action. Rubin's hearing is likely to be scheduled on the 3rd of March, so we urge you to act swiftly.

We appreciate your support for teaching, research, and innovation at MIT and look forward to your response.

The undersigned,

Hal Abelson
Nathan Matias
Ethan Zuckerman

E-mail From President Reif Regarding Tidbit

To the members of the MIT community:

I AM WRITING TO ADDRESS a problem that a group of MIT students currently face but that concerns all of us, because it highlights issues central to sustaining the creative culture of MIT.

The students in question are the creators of Tidbit, a proof-of-concept code for a novel Bitcoin-harvesting strategy. After Tidbit won the "most innovative" award in a recent hackathon, the State Attorney General of New Jersey demanded that the students turn over a sweeping set of documents, code and information – a surprising and difficult turn of events for the Tidbit team.

I am grateful to all those who have written to me to express their concern about this situation, and I want to make it clear that the students who created Tidbit have the full and enthusiastic support of MIT. Chancellor Cindy Barnhart and Provost Marty Schmidt met with the students yesterday. They and General Counsel Greg Morgan also spoke with the Electronic Frontier Foundation (EFF), which is providing to the students, pro bono, the independent legal representation that they need. We will remain in close coordination with the students and the EFF to offer assistance in the legal proceedings.

Beyond this specific case, I believe we should provide our student inventors and

entrepreneurs with a resource for independent legal advice, singularly devoted to their interests and rights. I have asked the Provost, Chancellor and General Counsel to develop and submit to me a specific proposal for creating such a resource, which will add an essential new strength to MIT's innovation ecosystem.

When the MIT community works together, we spot problems, analyze them and solve them. Let's solve this one together.

Sincerely,
L. Rafael Reif

Teaching this spring? You should know . . .

the faculty regulates examinations and assignments for all subjects.

View the complete regulations at: web.mit.edu/faculty/teaching/termregs.html.
Select requirements are provided below for reference.

Contact Faculty Chair Steven Hall at x3-0869 or srhall@mit.edu for questions or exceptions.

No required classes, examinations, oral presentations, exercises, or assignments of any kind may be scheduled after the last regularly scheduled class in a subject, except for final examinations scheduled through the Schedules Office.

Undergraduate Subjects

By the end of the **first week** of classes, faculty must provide:

- a clear and complete description of the required work, including the number and kinds of assignments
- the approximate schedule of tests and due dates for major projects
- an indication of whether or not there will be a final examination, and
- the grading criteria and procedures to be used

By the end of the **third week**, faculty must provide a precise schedule of tests and major assignments.

Tests, required reviews, and other academic exercises outside scheduled class times shall not be held on Monday evenings. In addition, when held outside scheduled class times, tests must:

- not exceed two hours in length
- begin no earlier than 7:30 PM when held in the evening, and
- be scheduled through the Schedules Office

In all undergraduate subjects, there shall be no tests after Friday, May 9, 2014. Unit tests may be scheduled during the final examination period.

Graduate Subjects

By the end of the **third week**, faculty must provide:

- a clear and complete description of the required work, including the number and kinds of assignments
- the schedule of tests and due dates for major projects
- an indication of whether or not there will be a final examination, and
- the grading criteria and procedures to be used

For each graduate subject with a final examination, no other test may be given and no assignment may fall due after Friday, May 9, 2014. For each subject without a final examination, at most, either one in-class test may be given, or one assignment, term paper, or oral presentation may fall due between May 9 and the end of the last regularly scheduled class in the subject.

Collaboration Policy and Expectations for Academic Conduct

Due to varying faculty attitudes towards collaboration and diverse cultural values and priorities regarding academic honesty, students are often confused about expectations regarding permissible academic conduct. It is important to clarify, in writing, expectations regarding collaboration and academic conduct at the beginning of each semester. This could include a reference to the MIT Academic Integrity Handbook at: integrity.mit.edu.

From The Faculty Chair

The Role of Faculty Governance in Campus Planning

Steven R. Hall

AT NOVEMBER'S FACULTY MEETING, Professor Jonathan King introduced a motion to establish a new faculty standing committee. As proposed, the Campus Planning Committee would consist of six faculty, two students, and three representatives of the administration. The charge to the committee was amended at the December faculty meeting, to the following:

“The Committee shall keep itself informed of plans relating to the future of the MIT built environment, including its physical campus and all MIT-affiliated off-campus structures, and shall be concerned with the relationship of construction projects and space planning to the activities of the Faculty, students and staff and the future academic and community needs of the Institute. The responsibilities of the Committee include representing Faculty and broader MIT Community interests and perspectives in the development of the campus and its surrounding properties and other MIT affiliated properties, including mechanisms of stewardship and oversight. The Committee shall insure that major construction and renovation projects are discussed and assessed by the Faculty.”

The motion was submitted by 10 faculty (N. Choucri, J. Jackson, J. King, H. E. Lee, D. H. Marks, R. Perry, N. Rabbat, F. Solomon, R. Summons, S. Teller) concerned about the impact of economic development in the Kendall area, scarcity of available land for campus buildings, and increases in real estate costs in Cambridge, which they argue has a detrimental impact on faculty, staff, and students.

The motion generated considerable interest, with more than 50 faculty in attendance at the December meeting. There was a spirited debate on the merits. Many of those who opposed the motion

seemed to be in favor of the general idea of a campus planning committee, but argued that the motion had not been carefully vetted, and that a number of important questions concerning the role, composition, and charge to the committee had not been answered. Prof. Bob Jaffe moved to refer the matter to the Faculty Policy Committee (FPC) for additional study. After a friendly amendment that the charge to the FPC include a requirement to report back to the faculty at the April meeting, the motion to refer was approved by the faculty.

The Process

Other than the requirement that we report back in April, there was little specific direction to the Faculty Policy Committee. I expect that the FPC will look at the proposal broadly. There are a spectrum of possible recommendations: (1) The FPC might recommend that the proposal be approved. If so, the FPC may propose an amended resolution to address concerns raised at the faculty meeting. (2) The FPC might conclude that the faculty should not adopt the proposal; if so, it would certainly provide its reasons. (3) The FPC might recommend some other structure, such as a presidentially-appointed or joint committee, as more appropriate. Whatever its conclusion, the guiding principle is that we will endeavor to produce a recommendation that best serves the interests of the faculty and the Institute.

We have used IAP to lay the groundwork for FPC deliberations this spring. To move expeditiously, I'm working with Faculty Governance Administrator Lynsey Fitzpatrick to meet with stakeholders and domain experts, in order to better understand the challenges of involving faculty in campus planning, and to better define the questions we will con-

sider in our deliberations. We believe that the offices of the Provost, Executive Vice President and Treasurer, Campus Planning and Design, and Government and Community Relations, as well as members of the Task Force on Community Engagement in 2030 Planning, the Graduate Student Housing Working Group, and the MIT Building Committee will have valuable experience and perspectives. The Faculty Policy Committee will draw on their feedback when it begins deliberations in February.

There are important questions for us to answer. I think it's uncontroversial that faculty should have a voice in defining the future of the campus; the difficulty is designing a framework to do so effectively. If FPC believes a faculty committee is the right approach, among the questions that we will need to address are:

Who would be on the committee? Planning decisions made by MIT affect current faculty, students, and staff, as well as future generations. In addition, planning decisions can have significant impacts on MIT's financial well-being. All members of the community have a stake in the stewardship of the MIT campus and its resources. How can we effectively represent the interests of the members of our community?

For example, a question that arose in debate on the campus planning proposal is whether there was enough (or too much) student representation included. At MIT, we sometimes include students as full voting members of committees, but not uniformly. Not surprisingly, we include more students on committees that directly impact student affairs (as on the Committee on Discipline), and fewer on committees with less relevance (as on the Committee on Outside Professional Activities). What is the right number in this case?

Faculty standing committees often have non-faculty members as *ex officio* members, designated either to provide expertise for the committee, or to represent the administration. Depending on the role, *ex officio* members may be voting or nonvoting. For example, the Committee on Academic Performance includes (among others) the heads of Student Support Services and Disability Support Services as *ex officio*, nonvoting members, who can provide information to the committee about both specific cases and broader policies and practices. On the other hand, a committee such as the Committee on the Undergraduate Program includes three voting *ex officio* members who are either members of the administration or their designates. This shared governance reflects responsibility for the undergraduate program shared by the faculty and the administration. What is the right composition for a campus planning committee? Especially regarding the question of administration membership, the question requires careful deliberation.

What would be the charge to the committee? While there seems to be a consensus that faculty should have a voice in planning, few argue that faculty should make planning decisions. As such, the committee would necessarily be an advisory or consultative body. For committees that make policy or administrative decisions, the charge is usually straightforward – it defines the scope of the committee’s decision-making powers, and sometimes defines how those decisions should be made. (A good example is the Committee on Discipline.) For advisory committees without policy making powers, the charge can be much more difficult to define. We should think about what types of issues we imagine coming before the committee, and how those issues might be brought.

How would the committee fit with existing bodies and processes? Are there clear interfaces? In the case of a campus planning committee, one can imagine several very different roles for the committee. It might

advocate for faculty views on the future of the campus. It might serve as an advisory committee to the administration. It might be called on to provide a faculty perspective with architects and planners as they develop the plan for individual projects or larger developments, such as the East Campus gateway.

While all that is required to stand up a new committee is a vote of the faculty, standing up an *effective* committee requires careful vetting of these and other questions. We need to consider what results can reasonably be expected and ensure that the committee is set up to achieve those outcomes. Planning is a complex, iterative, sometimes time-sensitive exercise with many different inputs. In order for a faculty committee to add value, we need to understand where and how it could contribute.

Lessons for Faculty Governance

In my September *Faculty Newsletter* column, I discussed opportunities to strengthen our governance structure to make participation in faculty governance in general and faculty meetings in particular more meaningful, and asked whether we might consider governance structures other than our town-meeting form of governance. I noted that some schools have experimented with online voting, with voting open for a short time (say, a day or two) following meetings. The November and December faculty meetings hold some important lessons on this issue and others related to faculty governance.

First, although on average faculty attendance is lower than desired, and often lower than that required for a quorum, issues of broad impact can still prompt debate. At the December meeting, where a vote on the campus planning motion was scheduled, we saw the highest turnout yet this year. My sense was that both sides of the argument were well represented in the discussion. At least in this instance, there’s evidence that important issues, about which people may disagree, will bring out faculty to participate, which I think is a positive sign for our current system. Of course, there is still the

problem of achieving a quorum for non-controversial but equally important motions.

Second, the events of the December faculty meeting show the benefit of public debate around potentially controversial issues. My sense is that some faculty came to the meeting expecting to vote in favor of the motion, but through the course of the discussion, decided that the motion wasn’t yet ready for a vote. Likewise, many of the faculty who came to the meeting expecting to vote against the motion were persuaded that the idea of a Campus Planning Committee has enough merit to warrant further consideration. In the end, the faculty voted unanimously to refer the issue to the Faculty Policy Committee. It’s remarkable that very few (and perhaps none) of the faculty voted in the way they had expected before the meeting began.

Third, whether or not the faculty chooses to establish a Campus Planning Committee, the events around this motion underscore the importance of faculty committees in our governance structure. One reason often cited for low attendance is that nothing of importance happens at the faculty meetings, that agenda business isn’t controversial. I would argue that this is a feature of our system, not a bug. Most motions brought to the faculty are developed first in one or more faculty standing committees, which carefully vet them and consult with appropriate stakeholders. If faculty committees do their jobs well, most motions will be noncontroversial when voted on by the faculty.

Finally, groups who bring proposals to faculty standing committees are often frustrated by the process, sometimes justifiably so. It’s time consuming, and may involve several rounds of iterations as each committee with jurisdiction considers the proposal. But the committee vetting process ultimately benefits many proposals, and can help groups prepare motions that are more likely to succeed once they reach the faculty meeting. ■

Steven R. Hall is a Professor in the Department of Aeronautics and Astronautics and Faculty Chair (srhall@mit.edu).

Interview with John Reed

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So I think [MIT President] Rafael [Reif] and the administration probably find that useful. We did have Corporation members participate on the task force that just made its report [Institute-wide Task Force on the Future of MIT Education]. And it will be brought up at the March Corporation meeting. We did discuss it at the last Executive Committee meeting, but it's a discussion – there aren't any actions. You asked in your written questions about the economics of MITx.

FNL: We've heard a variety of ways different departments are dealing with the financial question. One department head had a private pot of cash and said, all right, I'll just pay for those people developing the courses.

JR: We have funded it, and are continuing to fund it. Obviously students who were admitted here, paid tuition to be here, and make use of MITx – you're not going to charge them extra for that. But, to the extent that we're broadcasting it globally, we all understand that this might create a new source of revenue. But no one knows quite how to do that yet.

There are all sorts of ideas floating around. You could try to charge students, you could try to charge employers who might be very happy to have lists of students in their geography who happen to have completed a series of MITx courses. There is some Executive Education potential. In other words, there are companies who have asked us to create courses for them, and one could imagine charging for that kind of thing.

Because you know, let's face it, if the aerospace industry all of a sudden asked Course 16 if they could put together a series of things to refresh their engineers, they would be quite prepared to pay for it. And by the way, for companies, it would be cheap as dirt, because if you had to physically send somebody here, the

company would not only have to continue paying them, they would have to provide for their housing, and they would also lose their productivity at the home office.

When I was in the private sector, we used to send people to Sloan [School of Management] for the Executive Education. It was wildly expensive, because you had to pay the person's salary, you had to move him and his family and find housing and so forth and so on, and

You know, the kids pay something in the area of half of the cost of their education – the graduate students pay even less – and so the idea that all of a sudden MITx should be a profit center, where everything else we do is a loss center, doesn't make any sense.

you lost his work at the office. So, you know, it was an expensive deal. But it was worthwhile, because you were able to retool people at a point in their career where that retooling could be very useful.

So, there are all sorts of opportunities, and we understand that. And undoubtedly, over the next five or 10 years, we'll experiment with different models. On the other hand, there's nothing we do here at the Institute that earns a return.

You know, the kids pay something in the area of half of the cost of their education – the graduate students pay even less – and so the idea that all of a sudden MITx should be a profit center, where everything else we do is a loss center, doesn't make any sense. We're in the business of educating people, not making profits. We should look for revenue where revenue opportunities exist, but we don't refuse to let somebody attend MIT because they can't pay the tuition; we provide them with student aid that allows them to come, and that's deeply embedded in the values of the Institute. And we're not going to treat MITx any differently.

FNL: Well that's a very important point.

JR: There are different potential financial models, and I think the faculty has clearly indicated that they don't want a Coursera model. I don't think that would fit with MIT. The Corporation and the Executive Committee understand and embrace that. If we were a profit-making institution, we'd close our doors. That's not what we're here for. I mean, we're here to educate and to let research move the frontiers of our knowledge.

FNL: Related to that, it seems that there would need to be some fundamental change in responsibilities for faculty, because we've seen that an enormous amount of work and time goes into creating these online courses, so faculty teaching loads would have to be altered, etc. Do you anticipate that new faculty may be hired or an increased budget within departments to compensate for the time needed to work on MITx?

JR: You know, that's all part of the administration's problem, this is not something we would get into at the Executive Committee or in the Corporation.

The answer is obviously we're going to have to provide the resources, time as well as money, to create these MITx initiatives. The real question is, how frequently are you going to update these things? Because it's just like core curriculum – some courses are updated pretty routinely. But I doubt that 18.01 is much different today than it was when I was here.

And you know, 8.01, 8.02, some of the core courses probably haven't been updated in a long time. And I would imagine that that would be true of MITx as well, where some of the courses will remain the same but others will be constantly updated.

FNL: *Is there part of the Corporation that's specifically concerned with MITx or edX?*

JR: No, we don't organize ourselves that way. We have no Corporation committees, with the exception of participating on the Visiting Committees. A typical Visiting Committee has 15 members; five are Corporation members, five are alums, and five are academics.

There is a Visiting Committee on undergraduate education, which undoubtedly will go deeply into MITx. We have a Visiting Committee on student life, and to the extent that some of this education begins to work its way into the dormitories through the Internet, it will attract the attention of that committee.

And so, we will have Visiting Committees, but we do not subdivide the Corporation itself. We could, if there was something wildly important, we could create a special committee to look into it, but we haven't to this point.

And mind you, this is something that Rafael is really heading and he is very inclusive. He creates these large task forces to do the work, and then he shares it with the whole community. And so my guess is that this is going to be an endeavor that captures all voices.

Also, some of the alums are very jealous of their MIT degree. If you leave here and become an academic that's one thing – you went to MIT, but people are still going to look at the papers you publish, and the letters you get from colleagues, to establish your reputation.

But there are a lot of people who go into the private sector when they graduate, say they went to MIT, are treated differently because they are thought to be a little brighter, or a little more analytical, or what have you. So you can be sure that the alums who are very much part of the Corporation care very much about the brand, if you will. They're not going to want to see it eroded.

Another thing is most of us believe that there's something very special about the MIT culture, sort of like the Marines. I'm not a Marine, but I'm told that the Marines sort of feel that there's something that pulls them all together. And I think the Corporation is quite sensitive of the need to maintain that unique MIT culture.

But there's probably a limit to our scale that would be defined by our culture. You know, if the undergraduate population were five times larger than it is now, would we in fact still be MIT?

FNL: *It's been pointed out that through digital education technology we're likely to discover thousands and thousands of incredibly talented people that we had no way of knowing existed. So the question is, if we're finding these people, should we expand the residential population, now that we have a new mechanism for discovering academically worthy candidates? Has the discussion in the Corporation gotten that far?*

JR: It hasn't gotten that far, but we have invited people who we found through MITx to come to the campus, and I believe there are two people here now who were invited in that way. We don't lack for qualified applicants, as you know. The question is scale and scope. The scope I think is a separate issue, that's an intellectual issue of what fields do you cover, and what fields don't you, but the scale issue is an interesting one.

And MITx might allow us to fiddle around with the scale issue. We all know that we turn down probably two candidates for every one that we accept, all of whom would be quite qualified. And if we open the door for international applicants totally, which as you know, we do not on the undergraduate level, most people believe that there are a fair number of international applicants who would be fully qualified, and could be added to the community.

FNL: *Is there pressure for that?*

JR: No, but there is discussion of it always. I think pressure is the wrong word. There is a fundamental issue here – we want to educate everybody if we can. On the other hand, we are an American institution, and we do enjoy a tax benefit that the American system gives us. And so, it's a little hard to totally ignore the fact that

we're 501(c)(3), and that permits us tax benefits that come from the American people.

So there is some sense that we should be constrained a little bit, in terms of internationals. Being need-blind, which we are, and which we hold to be very important, if we open the doors to the whole world it raises an important financial issue. Taking round numbers, it costs roughly \$150 million a year out of discretionary funds for student support. That's the equivalent of \$3 billion from the endowment. And so we're substantially supporting free admission, so to speak.

Still MITx is going to open the door. But there's probably a limit to our scale that would be defined by our culture. You know, if the undergraduate population were five times larger than it is now, would we in fact still be MIT? I think we're going to run out of scale for cultural reasons, sooner than we will for applicant reasons. And so I don't personally see MITx as a way of expanding the applicant pool, although there could be some outliers who are clearly different and worth grabbing.

But the point is, there are, within the group that we accept, a set of people who just seem to be unusually capable. Maybe MITx could expand that pool. And you'll

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find some people who are just spectacularly interesting, but I don't think that's a driving force. That's just a byproduct.

FNL: So part of the issue is protecting the MIT name. And the most commonly held idea is if you passed the class you'd get a certificate, which I believe would hold a lot of weight. If you had two equal candidates for a position, and one had a certificate from MIT...

JR: Well, that's the discussion, and I think the faculty is as concerned as the trustees. I don't think there are any differences between us.

FNL: Before we leave the international sphere, we had a question about MIT's international collaborations, such as the Skolkovo Institute in Russia, the Singapore-MIT Alliance for Research and Technology, and others.

JR: I think Rafael wrote a piece for you on the rules of engagement associated with our international activity. And here is a case where, as we lose people who are engaged internationally, we do replace them. We create a spot, so that we're not short people here in Cambridge to teach, because somebody happens to be in Singapore, for example. As well there are explicit attempts to make sure we're not exporting talent.

This started before I was chairman. It's really this whole issue of globalization. It takes on many, many different aspects. One part of it is that many emerging countries are back where we were in 1861, and they have a need for the "MITs" in the same way that the United States did in 1861.

The knowledge and training are going to be essential to the evolution of these countries. Take Brazil, for example. It has a pretty decent aviation industry competitor in the form of Embraer, and I'm told

that the intellectual origins of that activity stem from a working relationship that MIT had with a technical institute in Sao Paulo. I'm not positive that that's true, but you could go over to Course 16 and ask and they'll tell you about it.

FNL: I always wondered where they got the expertise!

JR: But the point is, there are many countries around the world for whom the role of an MIT is just as important as it was in

It's really this whole issue of globalization. It takes on many, many different aspects. One part of it is that many emerging countries are back where we were in 1861, and they have a need for the "MITs" in the same way that the United States did in 1861.

our industrialization period. So we get a lot of requests for a variety of technological and intellectual assistance.

The other side of the coin is there are a lot of highly competent academics around the world. That's really just fairly recent. The post-World War II period was truly unique in this area for America. The United States was unusually favored in the sense that we hadn't been damaged, we probably had been strengthened by the war, while the rest of the world was pretty well devastated.

And during that period of time, not surprisingly, many academics chose to pursue their careers in the United States. And if you look at the faculty of all the major research universities in the country, they're populated by a large percentage of people who were born elsewhere, but who emigrated to the U.S, because this is where intellectual activities took place.

That's no longer true. You can be a serious academic in Europe today and find opportunities to pursue your professional life that are just as good as those you might find in the United States. And that will become increasingly more true, for example, even in China.

And so while MIT depends tremendously on having an exceptionally able faculty, we can't count on having everybody in the world wanting to come to Cambridge 02139 to spend their life. And so, maybe institutionalizing collaborations in places that have pockets of talent makes some sense.

If you go to any private sector company and ask where they locate their research, they'll say we go where the talent is. And the reason we have a lot of research labs in

the pharmaceutical business being built around this campus is the talent is here, and they want to be here to do their research, and to recruit the people who will be the researchers, and so forth and so on.

So there are packets of talent around the world. If you're writing software, for example, I'm told that you might consider going to St. Petersburg, because there's a big pool of highly trained and apparently very competent people in that domain. And so there is some tendency, if MIT wants to continue to attract the best and the brightest faculty, to expand our collaborations to pockets of talent that would not necessarily have come here. There are a lot of forces that move us in that direction.

Unlike many American schools, MIT has made no effort to take our undergraduate education overseas. We're not like NYU, for example, which has created a campus overseas and then allows their students to study there. We do have MISTI [MIT Science and Technology Initiatives] which gives our students an opportunity to get some international flavor. Obviously we want our students to be aware that there is a world outside of the United States.

FNL: *And they've done a nice job. But are there any plans for new international collaborations?*

JR: To the best of my knowledge, there are no big new initiatives being proposed. Although neither the Executive Committee nor the Corporation would be the initiator. The administration comes to us and says we would like to do XYZ, and are you guys OK with it? It's very much an administration-driven effort.

As for Skolkovo, I believe it came out of an approach from the Russians, who were trying to see if we could replicate the sort of environment that exists here. And by the way, it involves industrial companies as well as academic institutions. It's sort of an enclave. And I think it's struggling a little bit, but that's not surprising. I think the first 10 or 15 years of MIT were not smooth and easy, either.

FNL: *One of the issues that has been of concern to a pretty good set of faculty is the plan to build commercial office buildings in the East Campus. We believe that came as quite a surprise to most faculty. And it's not clear to us how open the discussion has been. Certainly it's been very controlled inside MIT, but prior to it becoming common knowledge was it under discussion in Corporation, or approved, or what?*

JR: I think it's been well discussed at the Corporation level. I've been on the MITIMCo [MIT Investment Management Company] board on and off for many years. When I became chairman, I became a member of the board again, *ex officio*.

MIT has always been an acquirer of real estate in Cambridge. We have always had a clear delineation of the sort of space that could be useful for academic purposes, and could be part of the campus. Then there's other space in Cambridge that only would have a distant value to us.

MITIMCo only has dealt with this second category of space. In other words, the space that MITIMCo owns is part of our

portfolio, and is developed for financial reasons, not for academic reasons. Those properties are acquisitions that were made that are outside of the envelope that was identified as being for short- or medium-term academic purposes.

The whole development of Tech Square is probably the biggest such example. It's not far from campus, but it never was seen to be a natural sort of expansion of academic space. And we pay taxes on the commercial space; it doesn't get the benefit of being an academic enterprise.

And you know, the City of Cambridge is of a mixed mind. They love us and they hate us. They'd miss us horribly if we weren't here. But on the other hand, they'd much prefer we built low-cost housing and gave up everything else.

Kendall Square was never seen as a place for academic expansion. Yet nearby we built the new Sloan School building because that was academic space.

Now if we had looked at it from a financial point of view, we should have built the Sloan building on the West Campus, because their current location would be economically valuable. But it always was in the academic envelope; it never was part of MITIMCo. And therefore it was developed academically.

So what's happened here, is we now have MITIMCo developing things that actually touch the campus. And the faculty responded by saying, whoa, what's going on here? There are a number of faculty who live in Cambridge, and hence participate in the discussion at the Cambridge level. But it's been quite open. We've had academic committees looking at this and they're even redoing the design. I think there are four new design proposals, and all of this has been reported to the Corporation. No one has ever asked the Corporation to make a decision as to what should or shouldn't be academic – we're not in any position to do that.

FNL: *But the East Campus is indeed part of the campus. If you build commercial office buildings within the 501(c)(3) campus, that's not a trivial change.*

JR: True, but the land that they're talking about developing was held by MITIMCo, not for academic purposes. Now you could change your mind and say, let's move this parcel into Pool C, which is where they would hold land for academic purposes, and take it out of MITIMCo.

When you do that, you have to make sure that you take it out of MITIMCo at full value, because if MITIMCo has something that's worth \$100 million, you can't transfer it to MIT for \$50 million, because that's basically taking money from the endowment.

And you know, the City of Cambridge is of a mixed mind. They love us and they hate us. They'd miss us horribly if we weren't here. But on the other hand, they'd much prefer we built low-cost housing and gave up everything else.

And I'm sure that Cambridge knows exactly how much land we own, because they have the records. But I doubt that they know what our needs are. For example, there's a big lab that's going up right here on Mass. Ave., I believe it's Novartis, and we gave them a 40-year lease, but then it reverts to us, with the building and everything else. And that's simply because the administration decided that we're not going to use that land for 40 years, but you know it may not be bad to have it back again, at that time.

continued on next page

Interview with John Reed
continued from preceding page

100 Memorial Drive is going to come back to us very shortly. And that's going to be interesting, because 100 Memorial Drive is right on the East Campus. I don't personally know whether it's in MITIMCo or Pool C. I would guess Pool C. And I'm sure that will open up a lively debate with the City.

FNL: One of the things about the Faculty Newsletter is that our editorial board is the only committee of the Institute that's elected entirely by the faculty with no administration oversight. It's not like all the other committees that are joint administration/faculty committees. So, we have a little more independence.

And people come to us when they have issues where they'd be unable or uncomfortable going through more regular channels – a department chair, a dean, etc.

JR: So you act kind of as a conduit.

FNL: Exactly. We don't have any specific authority, but we'll suggest writing an article or a letter, or perhaps raise the issue anonymously in an editorial. This happens particularly with concerns by junior faculty, postdocs, and graduate students – those who feel at risk by being too public.

So one thing that we know very, very clearly, is that there's been quite a high level of angst among graduate students for many years about the problem of housing. And the grad students feel that their views are not given serious attention.

JR: They have certainly caught the administration's attention. A report on the subject has just been released. Let me tell you my point of view on this question of graduate student housing. But note it's my point of view. The administration will decide what to do.

I was a grad student here and I did live off campus. I also left graduate school with a level of debt that was equal to my starting salary. One hundred percent of my starting salary. So, I understand that you could be poor and may have to live off campus.

But most of the issue is economic. We subsidize dorms, in round numbers, \$10-12,000 per year/per bed. The question is very simple. We have limited resources, we

But most of the issue is economic. We subsidize dorms, in round numbers, \$10-12,000 per year/per bed. The question is very simple. We have limited resources, we have a budget, and we currently are spending about \$150 million a year from the budget, not from endowed funds, to support students. . . . So if you go to the faculty and ask do you want to house another thousand students, hundred students, you choose a number, but the money is going to come out of our discretionary funds, and do you want to have flexibility in the budget or do you want to have student housing, that's the economic question.

have a budget, and we currently are spending about \$150 million a year from the budget, not from endowed funds, to support students.

The bulk, by the way, being grad students. Grad students are more expensive. We also have more endowed funds for undergraduate support, and much less for grad support. But anyway, so you know, \$10,000 a student.

So if you go to the faculty and ask do you want to house another thousand students, hundred students, you choose a number, but the money is going to come out of our discretionary funds, and do you want to have flexibility in the budget or do you want to have student housing, that's the economic question.

There's also a social issue which says by the time you're a grad student, should you be old enough to go out and find an apartment to live in and live like the rest of America lives? Or are we going to say, since you're a student, which we all assign value to, we'll protect you from the realities of life? So, that's a social question. And you know, depending on one's age, you'll get different points of view.

FNL: Well, I respectfully say that that's a social question from your point of view.

JR: Yes.

FNL: But from someone who runs a research lab and competes nationally for research funds, and has to publish or perish, when you have graduate students who spend two hours a day commuting, it's not a social issue. It's a fundamental inefficiency.

JR: It is an inefficiency, but most of the world wastes that time going to and from work. So there are choices you have to make. Now, I'm not making that argument, but there are two arguments. One is pure money. The other is social/cultural.

From the financial viewpoint, we have to recognize that we're not going to get more

money in the endowment because we decide to build dorms. So, we're talking about how we allocate our resources. Do you want to hit the budget, our discretionary funds? You tell me how many graduate beds you want to build. A thousand? I mean, there are at least a thousand students who claim they'd rather live on campus.

And you know, it's \$10-12,000 per bed/per year that won't be available for other uses. No one can say MIT's hoarding money, that we have money and we're failing to use it. I mean, we have two-and-a-half billion dollars of deferred maintenance. And you know, there are people who say we're failing to get new, young professors because of the current condition of our buildings.

FNL: What else would you use that money for?

JR: What's the marginal use of the money?

FNL: For many of us, the graduate students are the most valuable resource that MIT offers the nation. Graduate students and postdocs. So, I can understand that they're expensive, but it's not clear to me there's a better way of investing \$12,000.

JR: Well, that's the question, if you believe that, but then what are we going to take it from? We have a constrained budget. The thing we've chosen not to do, presumably because it's the least important, is maintenance. And so, we have \$2.4 billion in deferred maintenance. And we have buildings that are in pretty crummy shape, and we get complaints that you can't attract young faculty because of the condition of our labs and things of that sort. What we've done is we've failed to maintain the campus, and I think we've reached the point where we now think it's having an impact on our ability to attract students and faculty, and therefore we're trying to rectify it.

We are going to rebuild the freshman chemistry lab after 50 years of not having done so. We're going to build a nano facility, because we have a lot of people whose research requires more clean space than we currently have available. These are the things that we'd have to push back on if we wanted to subsidize graduate student living conditions.

It might be cheaper for us to pay the grad students more money because the cost of renting places that are closer to campus probably is cheaper than the cost to us to build new space. Probably. But the point is you could simply up the stipend \$5,000 a year and maybe the grad students would feel better. I don't know.

Obviously we could say that we're going to provide 100% space for everybody who's admitted as a student here, and it's simply a cost issue.

But the point is, everything we do here loses money.

FNL: What about the overhead on research funds? What fraction of that is the total operating cost?

JR: It's been \$127 million as I recall and we treat that as revenue for research, we don't treat it as an offset. In other words, research doesn't cover its costs, either. In our estimate, research dollars cover about 80% of the cost.

FNL: So expanding the research endeavor doesn't solve the problem.

JR: It would if we were private sector research. So, take the Energy Initiative, for example. That is significantly funded by the private sector, and they'll pay us greater overhead. We charge them differently.

FNL: Right, gotcha.

JR: But, you know, I don't blame the government. They're a monopoly funder and

so they can exercise monopoly power, and the taxpayers are on their back about the budget. And so, the last thing they want to be accused of is being overly generous with NIH grants and so forth. And they've gotten pretty tight.

There was a period of time when things were different. We even have a dorm that was built, I think, by the Department of Defense and given to us. There was a time when money flowed much more easily. But it doesn't now. And there was an article that appeared in the Newsletter about graduate student dorms, in which there was a throwaway sentence that we have the money in the endowment, but that was just an uninformed comment.

We have \$11 billion in the endowment, but we also have to fund the shortfall between expenses and revenue. And saying we have the money in the endowment is just wrong. You know, what we need in the endowment is approximately four to five billion more than we have. If we had an additional four to five billion, instead of 11 billion, say 15 billion, then the earnings on the endowment would allow us to catch up with the deferred maintenance, give us needed flexibility, and certainly look at new living space. But we're not there.

So as far as graduate student housing goes, there it is. If you were an economist only, and you didn't care, you'd increase their stipend and not build the dorms. The administration will balance all those issues and decide. We will see.

FNL: Well thank you. And thank you for your time today.

JR: It was good to see you, as always. You should always feel welcomed. ■

Beyond the Classroom Build to Win

Steven B. Leeb

FOR ALMOST 20 YEARS I have had the good fortune of teaching a freshman seminar. I learned about this program from faculty who worked with Doc Edgerton, who taught freshman seminars even at the height of his considerable technical and industrial success, when he had no shortage of demands on his time. This is a wondrous program that consumes only minimal temporal and material resources. For the past several years, I have taught a seminar called “Physics of Energy” collaboratively with Professors James Kirtley, Les Norford, and Marc Baldo.

This specific seminar program arose several years ago from support for project-based learning activities spearheaded by Professors Silbey, Redwine, and Henderson, support for which I remain very grateful. In the seminar sessions, we meet with a combined group of freshmen, typically for two hours each week on a Tuesday afternoon. And we build. We work with the freshmen to apply concepts from the GIRs to construct practical systems like stereo speakers, amplifiers, electric go-carts, heat recovery engines, generators, motors, combustion boilers, and magnetic coil launchers. We read about energy and economics and climate change, and we meet for dinner to discuss the serious and the silly. The freshmen define a short energy project of their own conception, and present results at the end of the term, usually with stellar creativity, passion, and sophistication.

Freshman seminars are important to me not only because they provide an opportunity to enjoy the company of stu-

dents and colleagues as fellow learners, but also because the seminars have served as a laboratory for trying out new demonstrations and hands-on activities that have impacted every other class I have taught

The enduring value of residential education is the opportunity to learn actively from the serendipity that surrounds gatherings of engaged minds, wherever these gatherings occur. As teachers, we affirm our character and return value to our students and society when we participate actively in sharing our thought processes as designers, and when we share our communal sense that good technology exists to enhance human abilities and experiences without directly taking away from someone else.

here. For me, these seminars have affirmed the connection of mind and hand in teaching. The program has improved all of my teaching activities. I hope and believe that it has connected freshmen to seeing value and delight in new ideas, to begin the process of lifelong learning, and given them the courage to stand flat-footed in front of technical challenges they face and build to win.

In an address to the American Physical Society in 1938, MIT President Karl Compton observed that:

“...modern science has developed to give mankind, for the first time in the history of the human race, a way of securing a more abundant life which does not simply consist in taking away from someone else...”

This is an observation that I hope is in the hearts of the youngest members of our community here at MIT. Professor Compton’s words highlight the great privilege of, and place a heavy burden on,

teaching here. I was asked to contribute this essay for the *Newsletter* series of articles titled “Beyond the Classroom,” which is a delightful oxymoron for stimulating a conversation about teaching at MIT. Here, the classroom is everywhere. The enduring value of residential education is the opportunity to learn actively from the serendipity that surrounds gatherings of engaged minds, wherever these gatherings occur. As teachers, we affirm our character and return value to our students and society when we participate actively in sharing our thought processes as designers, and when we share our communal sense that good technology exists to enhance human abilities and experiences without directly taking away from someone else.

The twentieth century saw marked changes in instruction for technical

undergraduates. That period saw a laudable and transformative focus on science in education; a celebration of the invention and adaptation of modern computing in many forms; and an appreciation for the critical importance of social context, economy, and grace in the application of technology. The clarity that motivated these changes came at the great price exacted by the conflicts of the last century. A new challenge, managing and delighting in complexity, faces technical students today, and the potential stakes have never been higher. A balanced educational experience, one that combines a good appreciation of exciting, “information age” methods with context and the essential ability to understand and manipulate the physical world, enables a student to design real systems of value.

Our goal as educators is to inspire students.

As we experience the frisson of new electronic media and the contemplation of entirely new business models and delivery techniques for education, the distinction between training and education becomes critical. Professor Flowers has written eloquently in this regard in these pages. Educators at a technical institution are fundamentally in the business of building confidence. Students gain confidence and a joy in lifelong learning by successfully tackling problems that demand craft, creativity, open-ended thinking, hypothesis generation, and the ability to modularize, organize, and “debug.” The strongest learning experiences are often associated with a surprise, and these are arguably most often found at the bench. By bench, I mean any place where craft is practiced: a piano keyboard, a computer keyboard, a podium, a soldering stand, a machine shop, a hood, anywhere.

Recent reports of the death of the conventional lecture have been greatly exaggerated. The 1800s stereotype of the face-to-face lecture to transfer and transcribe a conceptual textbook from the mind of the lecturer to the pages of the student is clearly archaic. However,

sharing between a skilled craftsman and apprentice learners is not archaic, and the face-to-face lecture can be more important today, and more economically effective, than ever. I had the pleasure of completing an award nomination recently for a colleague outside of my home departments who has transformed intro-

Recent reports of the death of the conventional lecture have been greatly exaggerated. The 1800s stereotype of the face-to-face lecture to transfer and transcribe a conceptual textbook from the mind of the lecturer to the pages of the student is clearly archaic. However, sharing between a skilled craftsman and apprentice learners is not archaic, and the face-to-face lecture can be more important today, and more economically effective, than ever.

ductory teaching by presenting lectures filled with live, interactive demonstrations. The student comments I collected speak for themselves. Some examples:

• “When [the lecturer] poured the water out, it crystallized as it was poured and formed an amazing iceberg structure. A year later, I still remember how remarkable the phase transition was, and more importantly, I can easily describe what super cooling is because I remember the concepts from the experiment.”

• “Not only are students genuinely excited by the demos, but they also ground complex concepts like the chemical potential and miscibility gaps with something tangible that students can touch...”

• “I’m almost certain that when [eating] a piece of pizza, [the lecturer] appreciates the variance in heat capacity between the cheese and the crust.”

There will come a tipping point, possibly sooner than we think, when the nature of education will change in a very fundamental way. In the next three decades we

are likely to see machines that exceed the computational capabilities of the mind, and which are capable of emulating thought processes. We may eventually merge machine and mind, and true distance education may become technically possible and economically desirable. In the meantime, we work with the same

brains, with the same limitations and marvels that have served us for thousands of years.

For now, any education innovation must be a fervent stimulus of engagement. No technical material was ever created or put to great use by someone who was bored. MOOCs, MOOLs, “flipped” classrooms, electronic books – all are hopefully signs of energetic educational exploration and a wonderful desire to enthuse and engage students and enhance impact. I hope, as we explore these new tools, that we make fair comparisons to the tried-and-true methods that exemplify the first rate in our learning community. I hope that we recognize that new teaching methods need not automatically conflict or compete with current successes. I hope that we support an environment that encourages our faculty to create the demonstrations, buy the needed laboratory facilities, and spend the extra minutes with our students. I hope that we do not crown a new king by starving the current one. ■

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Former MIT President Charles M. Vest Dies at 72

Steve Bradt, MIT News Office



FORMER MIT PRESIDENT Charles M. Vest – a tireless advocate for research and science, and a passionate supporter of diversity and openness – died last night of pancreatic cancer at his home in the Washington area. He was 72.

As MIT’s 15th president, serving from 1990 to 2004, Vest led the Institute through a period of striking change and growth. A mechanical engineer by training, Vest was president of the National Academy of Engineering from 2007 until earlier this year.

During Vest’s presidency – the third-longest in the Institute’s 152-year history – MIT renewed its commitment to education and research through major innovations in both areas; developed strong ties with academic, government, and industry partners around the world; broadened the diversity of its people and programs; and

transformed its campus with dramatic new buildings. MIT’s endowment nearly quadrupled during Vest’s tenure, growing from \$1.4 billion to \$5.1 billion.

“Through its own work, and especially through the lives and works of its graduates, a great university can strive to make the world well,” Vest wrote in 2004. “The knowledge we generate, the things we come to understand, and the devices we build can improve health, economies, security and the quality of life. MIT must continue to be optimistic in its vision of why we are here and what we can do.”

An era of multifaceted growth

Consistent with Vest’s optimistic interest in the expansion of knowledge, MIT’s research enterprise grew substantially during his tenure. Vest spearheaded expansions into fields including brain and cognitive sciences (with the establishment of the McGovern Institute for Brain Research and the Picower Center for Learning and Memory); nanotechnology (with the creation of the Institute for Soldier Nanotechnologies); genomic medicine (with the founding of the Broad Institute); biological engineering; engineering systems; and new media, among others.

“Personally and professionally, Chuck Vest set an exceptional standard of intellectual clarity, moral courage, and generosity of spirit,” MIT President L. Rafael Reif says. “And there was no better example of his vision and values than the creation of MIT OpenCourseWare – the simple, elegant, unprecedented idea that MIT should make all of its course materials available online to anyone in the world,

free. Thanks to Chuck’s leadership, OCW has become a source of outstanding content for 150 million global learners, the model for the global OpenCourseWare movement, and the foundation and inspiration for everything we are striving to achieve with edX and MITx.”

In 1999, Vest charged a faculty committee with considering how to use the Internet in pursuit of MIT’s mission. That committee, led by Professor Dick K. P. Yue, made a revolutionary proposal: the online publication of teaching materials for MIT courses, free and available to learners worldwide. By November 2007, OpenCourseWare had completed the initial publication of virtually the entire curriculum, more than 1,800 courses in 33 academic disciplines. MIT’s move would catalyze similarly bold efforts by universities around the world to democratize access to education.

“Chuck Vest was a staunch supporter and champion of MIT OpenCourseWare literally from day one. OCW would not have been possible without his singular vision, courage, and leadership,” says Yue, the Philip J. Solondz Professor of Engineering and Professor of Mechanical and Ocean Engineering.

Vest fostered MIT’s international engagement through large-scale ventures, often undertaken in conjunction with other institutions. These included the birth of the Singapore-MIT Alliance, intended to promote global engineering education and research using synchronous distance-teaching technologies.

Closer to home, Vest undertook a major examination of student life and

learning. His tenure as president was defined by campus innovations such as the introduction of cellular and molecular biology as a core requirement for all undergraduates; the establishment of the MacVicar Faculty Fellows Program to recognize and reward excellence in teaching; the creation of a five-year combined Bachelor/Master of Engineering program; a restructured housing policy including a common first-year experience; and the construction of three new student residences, all designed to enhance interaction among students and faculty, and a state-of-the-art sports and fitness center.

Vest's strong belief that MIT could best address certain educational and research challenges in partnership with others took the form of collaborations with industry that he helped foster. "Industrial issues have become intellectually challenging and exciting ... and we need each other as never before," he wrote in 1993.

A scientist on the national stage

On assuming the MIT presidency – an occasion he later described as “a call to national service” – Vest set out to rebuild public understanding of and support for higher education and research. He became a regular presence in Washington, championing research, science, and innovative partnerships among universities, government, and industry. Vest logged more than 100 visits to the nation's capital, personally conferring with some 250 federal officials during his time as MIT's president.

“Chuck came to lead MIT at a difficult time for American higher education,” says Paul Gray, who preceded Vest as MIT's president. “In 1990, many in Washington had come to feel that the nation's universities had not acted as wise stewards of their federal funding. He made frequent trips to Washington as an ambassador not only for MIT, but indeed, for academia as a whole – and he did so supremely well.”

Vest served on the President's Council of Advisors on Science and Technology and chaired the Task Force on the Future of Science Programs at the Department of Energy. At the request of President Bill

Clinton, he chaired the Committee on the Redesign of the International Space Station, which revitalized the space station at a time when its future was in question.

“Chuck Vest was both a product and a champion of this nation's powerful scientific and engineering community,” Clinton says. “He served with distinction as an ambassador and spokesman for science in Washington, advocating tirelessly for the essential role of research in our economic growth and national security.”

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“Chuck Vest's irrepressible good humor and easy laughter mixed effortlessly with his earnest, persistent pursuit of the right path in all things,” says Susan Hockfield, who succeeded Vest as MIT's president. “He took up with passion the role of MIT's president as national spokesperson for higher education and research policy. MIT affords an especially clear view of the dependence of the American innovation economy on federal investments in education and research, and President Vest expanded the Institute's engagement in federal policy-making, becoming a consistent, trusted voice of the research university in Washington, earning the gratitude of college and university presidents across the nation. Later, as president of the National Academy of Engineering, he continued his role as advocate-in-chief of sound policies for education and research. At MIT and beyond, he will be terribly missed, because his advocacy success was inseparable from his personal warmth.”

“Chuck Vest was, above all, an extraordinary human being: Not only was he perhaps the most respected figure in higher education, he was a man of

extraordinary decency, integrity, and grace,” says Lawrence S. Bacow, who served as MIT's chancellor under Vest before being named president of Tufts University in 2001. “His principled courage stood him, and MIT, in good stead on countless occasions when the going got tough, and he was a good friend and extraordinary mentor to so many of us. I will miss him terribly.”

After the terrorist attacks of Sept. 11, 2001, Vest became a national spokesper-

son on the importance of higher education and research to the nation's well-being. As research universities grappled with the balance between security and openness, Vest argued directly, and passionately, in favor of the latter. “Knowledge creation thrives in openness and suffers in isolation,” he wrote in 2002.

In 2004, Vest was appointed by President George W. Bush to serve on the bipartisan Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction. The commission ultimately concluded that in reporting the presence of nuclear, chemical, and biological weapons of mass destruction prior to the U.S. invasion of Iraq in 2003, U.S. intelligence agencies were “dead wrong” and their collected information “worthless or misleading.” In 2006, Vest was awarded the National Medal of Technology by President Bush “for his visionary leadership in advancing America's technological workforce and capacity for innovation through revitalizing the national partnership among academia, government, and industry.”

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Charles M. Vest Dies at 72
Bradt, from preceding page

A champion of diversity

Vest's deft handling of one of his presidency's greatest challenges – a public examination of MIT's troubled history on issues relating to gender equity – ultimately proved a high point of his tenure, reinforcing the Institute's status as a beacon of meritocracy.

In 1998, Vest forthrightly acknowledged serious gender-equity problems cited by senior women faculty in the School of Science; he then supported corrective measures to address longstanding imbalances. A stunningly candid and publicly released report detailing gender inequity at MIT – and Vest's subsequent leadership on the issue – stimulated examination of gender equality at universities across the country.

"I have always believed that contemporary gender discrimination within universities is part reality and part perception," Vest wrote in a much-cited preface to the MIT report on gender equity, "but I now understand that reality is by far the greater part of the balance."

Vest's leadership team, and those of MIT's five schools, reflected Vest's personal commitment to diversity and inclusion. Under Vest, MIT appointed its first female department head in the School of Science; its first two minority department heads in the School of Engineering; its first five female vice presidents; and the first African-American chancellor

Throughout his presidency, Vest also strived to bolster the diversity of MIT's student body and its faculty. Underrepresented minorities grew from 14 percent to 20 percent of the undergraduate population, and from 3 percent to 5 percent of the graduate student body. The number of women grew from 34 percent to 42 percent of undergraduates; when Vest stepped down as president, women outnumbered men in 10 undergraduate majors. The proportion of women graduate students increased from 20 percent to 29 percent during his tenure.

Vest was a staunch advocate of need-based financial aid. In 1992, MIT went to trial to fight the Justice Department's contention that antitrust statutes were violated when top universities, including MIT, shared information about applicants' financial need. A lengthy court battle ultimately established the "MIT Standards of Conduct," enabling colleges committed to need-based aid to exchange certain data, and also led to legislation permitting colleges to adopt a common methodology for measuring need.

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A campus reimaged

Vest's presidency reinvigorated MIT's campus, bringing new construction whose square footage exceeded the scope of MIT's original 1916 campus in Cambridge. Indeed, as Vest left office, one-quarter of the Institute's square footage had been constructed during his term. His tenure also produced some of MIT's most celebrated buildings: Vest championed engagement with world-class architects to design facilities such as the Ray and Maria Stata Center; Simmons Hall, an undergraduate residence; the Albert and Barrie Zesiger Sports and Fitness Center; Building 46, which houses the McGovern Institute for Brain Research and the Picower Institute for Learning and Memory; and the Media Arts and Sciences building.

"I believe that the buildings at this extraordinary university should be as diverse, forward-thinking and audacious as the community they serve," Vest said. "They should stand as a metaphor for the ingenuity at work inside them."

Beyond the construction of new facilities along Vassar Street, MIT's revitalization of Vassar Street itself – with new trees, lighting, bicycle lanes, and paving – breathed new life into what had for decades been a grim and rundown area of Cambridge.

A career immersed in engineering

Charles Marsteller Vest was born Sept. 9, 1941, in Morgantown, W.Va.; 49 years later, in his inaugural address at MIT, he recalled his upbringing in "a warm family in a small town in West Virginia." Vest

earned a BS in mechanical engineering from West Virginia University in 1963, and MS and PhD degrees in mechanical engineering from the University of Michigan in 1964 and 1967, respectively.

Vest joined the Michigan faculty as an assistant professor in 1968, teaching courses on heat transfer, thermodynamics, and fluid mechanics, and conducting research in heat transfer and engineering applications of laser optics and holography. He and his students developed techniques for making quantitative measurements of various properties and motions from holographic interferograms, especially the measurement of three-dimensional temperature and density fields using computer tomography. He became an associate professor at Michigan in 1972 and a full professor in 1977.

In 1981 Vest's career turned toward academic administration when he became Michigan's associate dean of engineering. He was named dean of engineering in 1986, and served as Michigan's

provost and vice president for academic affairs from 1989 until he became MIT's president on Oct. 15, 1990.

"Serving as president of a major research university is not a sandbox ambition for any child – I remain frankly astonished at the road that led me here," Vest wrote upon stepping down as president in 2004. "But looking back at that road – the bends and dips, the forks and unintended shortcuts – I'm struck by how little one can predict at the journey's outset and by how much of life comes down to how one handles the points where the roads cross. I am also overwhelmed with the sense of how much I

owe to the insight, imagination, inspiration and judgment of the many, many gifted people I have been lucky enough to work with at MIT."

Vest is survived by his wife, Rebecca; daughter and son-in-law, Kemper Vest Gay and John Gay; son and daughter-in-law, John and Christina Vest; and grandchildren Mary and Robert Gay and Ameri and Charles Vest.

The Vest family has asked that gifts in Vest's memory be made to the Charles M. Vest Presidential Fellowship Fund at MIT or to the Charles M. Vest President's Opportunity Fund at the National Academy of Engineering. A memorial

service is being planned at MIT in March; details to follow. Two additional memorial services are planned: at 1 p.m. on Saturday, Jan. 25, at the First Presbyterian Church, 1432 Washtenaw Ave., Ann Arbor, Mich., with a reception to follow in the Pendleton Room of the Michigan Union, along with a short program of remembrance by University of Michigan colleagues; and at the National Academy of Sciences in Washington on Thursday, Feb. 20. ■

Steve Bradt is Director of News in the MIT News Office (sbradt@mit.edu). This article was reprinted with permission of *MIT News* (web.mit.edu/newsoffice/).

letters

The Continued Need for Nuclear Power Plants

To *The Faculty Newsletter*:

THE SUGGESTION BY Prof. Emeritus Ernst Frankel in the November/December issue of the *Faculty Newsletter* regarding nuclear energy ["There is No More Need for Nuclear Power Plants in the USA"] could not be any more wrong. If we did not have nuclear power, we would have had to invent it in order to supply the future generations with an assured supply of energy without increasing the danger from global warming or making the electric grid highly unreliable. A review of the record of operating power plants in the U.S. would have informed him that the plants have been the electricity source with the highest reliability over the years. For example, the average capacity factor of nuclear plants in 2012 was about 85%, compared to only 55% for coal or gas with combined power cycle plants, 51% for hydro, 30% for wind, and 27% for solar.

The nuclear plants have to undergo periodic inspections to assure the integrity of operations. Their effluents of radioactivity have been kept at lower than the prescribed limits by a considerable margin. The U.S. plants have had to install measures to counter the loss of all means of electricity to power emergency pumps and valves, well before Fukushima. Objective assessment of the amount of radioactivity that Fukushima leaked to the atmosphere would have led him to conclude that under the worst of conditions, the health effects to the surrounding population is well below dangerous levels. One should not rely on the headlines of ill-informed media outlets to judge the level of danger involved in industrial activity. Not a single death, even among the plant workers, resulted from radiation associated with the damaging event to three reactors in Fukushima. Just by comparison, the tsunami that crippled the three reactors killed nearly 20,000 people

in the affected coastal area.

The reference to recent reports on long-term effects of radioactivity is baffling to me. If anything, several studies of the health effects of low levels of radiation around nuclear facilities, among the residents of high altitude locations such as Denver, and even among airline pilots who get much higher doses than the average citizen, all cannot detect any increase of diseases that might be caused by radiation.

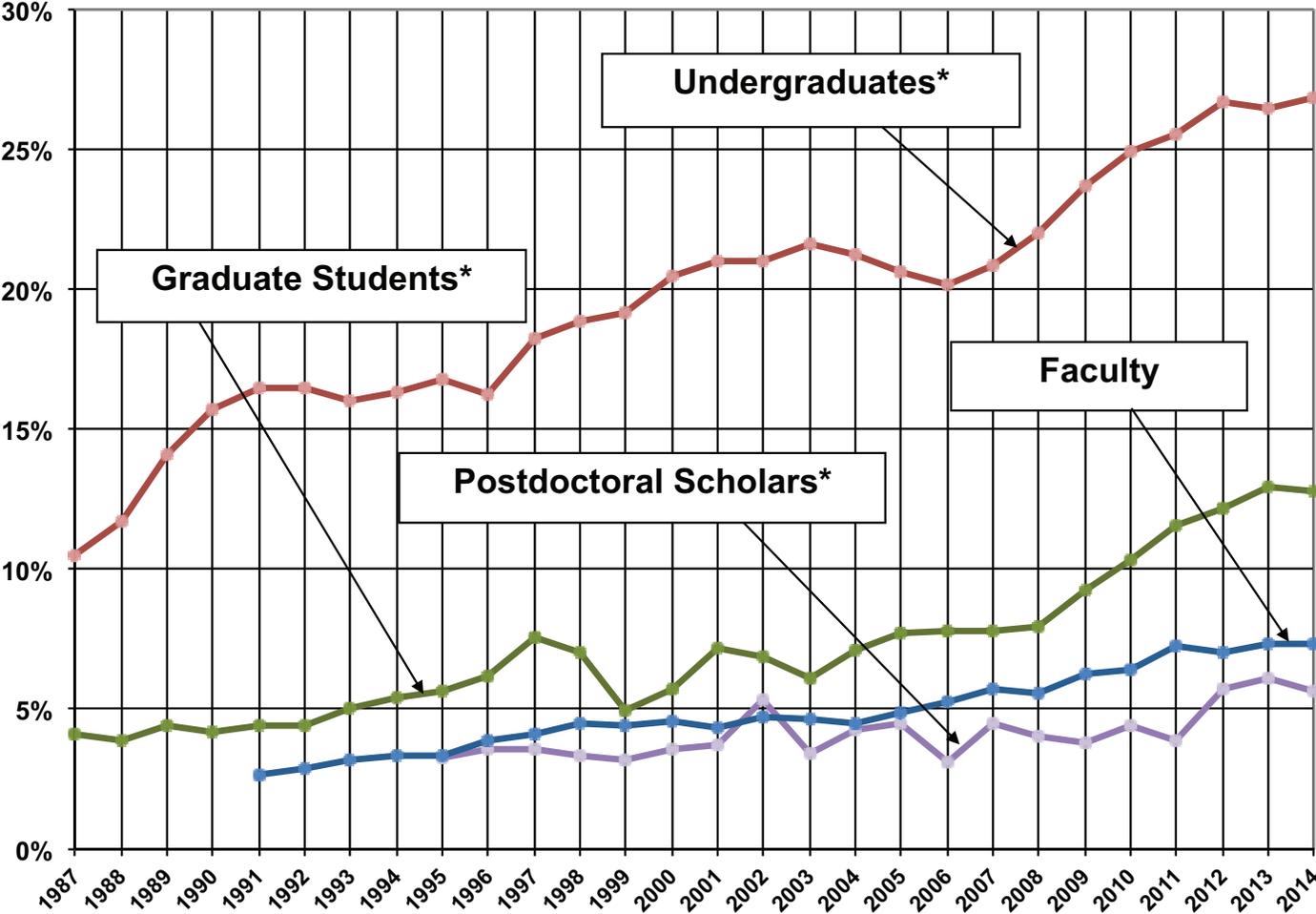
I, for one, would not want to have a much higher reliance on natural gas among our electricity supply. Such a source cannot be stored near the plants, and make our electricity supply highly vulnerable to natural disasters and terrorist actions much less daring than the sort that Professor Frankel is worried about.

Mujid Kazimi

Professor, Department of Nuclear Science and Engineering

M.I.T. Numbers

Underrepresented Minority Faculty and Students at MIT



*Includes only domestic students (i.e., U.S. citizens and permanent residents).

Source: Office of the Provost/Institutional Research