

# MIT Faculty Newsletter

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

**in this issue** we explore the role of faculty governance at the Institute in our Editorial (below) and From The Faculty Chair (page 6); offer "Introducing Sandbox" (page 9); and take a hard look at the construction plans for MIT's East Campus (page 14).



Volpe National Transportation Systems Center

## Constraints on Civilian R&D Budgets From Excessive Pentagon Spending

Jonathan King, Frederick P. Salvucci,  
Aron Bernstein

**IN DECEMBER 2015, CONGRESS** adopted its Omnibus Budget Bill, appropriating \$1.15 trillion for federal spending in the coming budget year. We can take some comfort that the R&D budget increased by 5%. The National Institutes of Health (NIH) budget was increased \$2 billion to \$32 billion, while NASA's science budget received a 6.6% increase to \$5.6 billion, and the National Oceanic and Atmospheric Administration (NOAA) budget increased 4.4% to \$5.77 billion.

In a statement released December 17, 2015, the AAAS (American Association for the Advancement of Science) "applauded the high priority that Congress placed on reinvesting in our nation's innovation system." However, a few sentences later, they stated: "As has been well documented, the United States

continued on page 11

## Is This Really Who We Are?

Sally Haslanger

### **I AM NOT WRITING TO CRITICIZE**

MIT's decision not to divest from fossil fuel. I disagree with it, but that is not my point. I am also impressed by many elements of "A Plan for Action on Climate Change" (henceforth "the Plan"). I have no doubt whatsoever that the plan is an important part of what MIT can offer and demonstrates a sincere and deeply held commitment to address climate change. I am concerned, however, with some of the reasoning about the significance of divestment and the decision not to create an Ethics Advisory Council. Ethics and social meaning are topics that fall squarely in the humanities, arts, and interpretive social sciences. Might it be worth considering what MIT's experts in these areas have to offer?

Recent discussions of the Fossil Free movement at MIT have revealed, yet

continued on page 4

Editorial

## Improving Faculty Governance for Changing Times

### **IN THIS ISSUE, FACULTY CHAIR**

Prof. Krishna Rajagopal describes in detail the role of the Standing Committees of the Faculty in ensuring a smooth governance process for the Institute, and also refers to a prior column by previous Faculty Chair Tom Kochan (see page 6). Many close observers of MIT have noted its unusual governance, lacking a faculty association or faculty senate, so that no faculty not serving on standing committees are delegated responsibility for governance, and all committees are in essence joint committees of the faculty and the administration.

The health of MIT as an institution depends on the contributions of all of its sectors: students, faculty, staff, and administration. The *Faculty Newsletter*, since its inception, has attended to the singularly important role of the faculty in ensuring

continued on page 3

# contents

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	<b>01</b>	<b>Constraints on Civilian R&amp;D Budgets From Excessive Pentagon Spending</b> Jonathan King, Frederick P. Salvucci, Aron Bernstein
	<b>01</b>	<b>Is This Really Who We Are?</b> Sally Haslanger
Editorial	<b>01</b>	<b>Improving Faculty Governance For Changing Times</b>
From The Faculty Chair	<b>06</b>	<b>The Roles of the Standing Committees of the Faculty in the Governance of MIT</b> Krishna Rajagopal
	<b>09</b>	<b>Introducing Sandbox</b> Ian A. Waitz
	<b>14</b>	<b>A Critical Look at the Plan for MIT's East Campus</b> O. R. Simha
	<b>17</b>	<b>Our Faculty Agenda</b> Rafael L. Bras
M.I.T. Numbers	<b>20</b>	<b>MIT Campus Research Expenditures</b>

---

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**Improving Faculty Governance**

continued from page 1

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the quality of both the educational and research functions of the Institute, its deepest social missions. Thus we continue to be sensitive to the question of whether faculty concerns, experiences, and views remain central in MIT governance.

MIT's academic governance is built on the assumption that parts done well will produce a good whole. Joint faculty/administration committees are indeed effective for dealing with routine issues that don't challenge the organizational culture of the Institute. However, the standing committees sometimes become more occupied with rejecting undesirable change, than seeking productive change. Krishna carefully points out how they improve proposals, but the system is not structured to encourage innovation and/or ensure that our overall strategy is appropriate.

When deeper issues arise, the committee mechanism has often proved inadequate for ensuring the full range of faculty discussion, debate, accountability, and action. For example, over the past few years, a number of issues arose that needed broader consideration than was provided by the committee system; two of these are a) the decision to use the East Campus for commercial real estate development, rather than fill the deep need of graduate students for affordable on-campus housing; and b) the recent "Open Letter to President Reif" signed by 83 faculty, calling on MIT to divest from its investments in fossil fuel firms. Other earlier examples include the inequity between male and female faculty, the slow rate of recruitment of minority faculty, and the dissolution of the Department of Applied Biological Sciences, (which gave rise to the FNL).

In fact, in both of those two recent cases, numerous faculty who were not then serving on standing committees had serious interest in the resolution of the

issues; however, substantial debate was relegated to special forums where the faculty had no power to move a resolution, censor a position, or take any other form of effective action. As noted by Prof. Kochan, in these situations further committees tend to be constituted which may or may not provide truly democratic input. They generally are appointed, as the faculty – with no organizational or parliamentary structure – has no mechanism to ensure that its full range of views are represented in such bodies.

From this point of view, it is worthwhile to read the views of a previous Faculty Chair, Rafael Bras, reprinted within, whose assessment of the committee system was much more ambiguous. Bras was more sharply aware of the failures of the committee system – failure to ensure equity between male and female faculty, failure to ensure that the diversity of the Institute faculty and student bodies was growing as fast as was needed.

The existing form of the faculty meetings where few attend, and those that do attend have no delegated authority, is one of the weakest forms of democratic governance, and is eschewed by institutions who have faculty senates or associations, as well as by most towns, cities, and states. To quote Prof. Bras: "I do feel that the faculty at large is not participating in the decision process to the extent that it should. I also believe that the governance system works because of a long tradition of inspired and quality leadership, but could become unstable in times of financial and other stress, when difficult decisions need to be made. To make the analogy to New England towns: Is it time to move from a town meeting of the whole to a representative town meeting where the responsibility to represent the opinion of the faculty resides in a significant subset of the faculty?"

The academy is hardly trusted more than our political system. Does our existing governance system encourage the changes needed to remain a leading insti-

tution? Digital media, intelligent systems, brain science, nanotechnology, biotechnology, etc., are all changing much more rapidly than our education programs. Students face very different career choices and constraints. What part of our governance system is encouraging change rather than selectively resisting changes? Our colleagues are up to their ears with research and teaching. Unless they are charged with overseeing the Institute as a whole, they are not likely to do so. Thus the argument for true delegation and representation.

**Some Modest Proposals**

The Institute would be served better by a governance system in which faculty members were elected to a governing body by their peers (by department, for instance) to represent them, thus ensuring that the faculty meetings provided a representative governance function. An alternative would be to enlarge the Faculty Policy Committee and have its members nominated and elected from academic units. (This would also solve the embarrassing problem of faculty meetings, which repeatedly come close to failing to reach a quorum.) An additional reform would be for primary responsibilities of the Chair of the Faculty to include actually chairing the faculty meetings, and ensuring that the views of faculty were expressed and heard. The faculty as a group – who bring in much of the total income of the Institute – should also have their own modest budget to support initiatives that might not be valued by the administration. (For example, we know from letters to the *Newsletter* that Research Associates and junior faculty often have serious housing problems, but this issue has never been seriously studied or addressed at MIT.)

Please see page 17 for the complete text of Prof. Bras' comments from 2004. ■

Editorial Subcommittee

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**Is This Really Who We Are?**

Haslanger, from page 1

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again, how MIT's emphasis on natural science and engineering is as much a weakness as a strength. There is no doubt that MIT's research in science and engineering is second to none and that the Institute is a home for remarkable scientists and engineers who are deeply committed to making a positive difference in the world. But there are also world-class researchers, scholars, and artists in other Schools at MIT who create knowledge, and the value of this knowledge is as important for improving the world as anything else that MIT produces. So the refrain that accompanies the gesture towards science and engineering, "This is MIT. This is who we are." is not only disrespectful to the rest of us, but awkwardly calls attention to a blindspot at the core of the Institute that prevents it from being all it could be.

There is a broad temptation, both in popular culture and in certain academic contexts (expressed, for example, in the faculty forum on "the Plan"), to think that ethics and "meaning" are purely subjective matters and can only ever be a matter of opinion. People have different values, live by different moral codes, and find different things or actions meaningful. These differences, it is assumed, are no more resolvable than differences in taste. You like chocolate? I like vanilla. If you tell me that I shouldn't like vanilla, you are simply imposing your values on me. You drive a Prius? I drive a Hummer. If you tell me I shouldn't drive a Hummer, you are only insisting I live by your values, perhaps implying that I'm not a good person. You don't know me. Your "political correctness" does not appeal to me. Live and let live.

I've described the temptation in somewhat crude terms, but I've done so to invite questions about moral knowledge and social critique. Just as chemistry and physics, as forms of disciplined thought, purport to offer training in scientific thinking, philosophy, as a form of disciplined thought, purports to offer training in moral thinking. Is philosophy's aspira-

tion pointless? Is systematic and justified moral critique impossible? Of course not. Although we still have a long way to go, efforts over the past 50 years to articulate and defend civil rights have resulted in an expansion of moral knowledge that has fueled moral progress. This knowledge grew out of both systematic moral think-

ing and activist movements. And this is just one example.

Moral critique takes many forms. Looking back as far as Socrates, we can see that good critics are adept at revealing inconsistencies in moral thought. These inconsistencies can arise among our beliefs or when there is a conflict between what we say and what we do; the latter are pragmatic contradictions. Such contradictions between principles and practices are typically the focus of social movements. Moral critique also highlights forms of value that are occluded or diminished by current practices. For example, within markets, things are valued as commodities. But not everything should be treated as a commodity; e.g., it would be a mistake to treat one's child as a commodity. More generally, one should never treat another person as a commodity; persons are entitled to a kind of respect that is at odds with using them as a mere means. There are ethical limits to the market. This is moral knowledge.

As in any rational endeavor, there will be disagreements about the kinds and sources of value, and which principles should be kept and which rejected in the face of a contradiction. Moral inquiry is fallible. But all inquiry is fallible. Progress is not linear. Nevertheless, philosophical inquiry is guided by norms and standards for argumentation that have developed over thousands of years. To dismiss this is to deprive ourselves of a resource as

important to human progress as the scientific method.

Philosophy cannot succeed in social critique on its own because uncovering the inconsistencies in our commitments requires an interpretation of social life. History, anthropology, literary criticism, and the arts, among others (including

So the refrain that accompanies the gesture towards science and engineering, "This is MIT. This is who we are." is not only disrespectful to the rest of us, but awkwardly calls attention to a blindspot at the core of the Institute that prevents it from being all it could be.

sociology and law, which are not well-represented at MIT) offer training in reading social meaning, interpreting social practices, and exploring new meanings. Human beings are not machines; how we act depends on how we represent things to ourselves. But representation is tricky. The same thing can be represented in different ways, with very different implications for our attitude towards it and our action. Some of these representations are individual and idiosyncratic, but the tools that enable us to coordinate – such as a shared language and shared cultural practices – also create shared meanings. Pink means girl and blue means boy. These meanings are not up to you or me. If I dress my boy in pink, that has social meaning, and social consequences, whether I intended them or not. Symbolism is not a trivial thing.

Consider another often discussed example of social meaning: Dueling was a stupid practice. Aristocratic men regularly killed each other over tiny slights. Efforts were made to end the practice. Laws forbidding it were passed. They made no difference; dueling continued at the same rate. Eventually those pressing to stop dueling recognized the significance of honor to the practice: Duels defend a man's honor, and nothing, even the law, was more important than a gentleman's honor. At the time, a gentleman's honor also obligated him to serve in public office. So the movement passed a law saying that no one who had fought in a

duel could hold public office. Soon after, the practice of dueling ended. Why? The new law shifted the social meaning of dueling. The risk of the duel was no longer worth it, for even if one survived, one's honor would be tarnished. Tarnished honor would result in reduced social power and credibility.

Because social meaning is *social*, actions can have a meaning beyond, even in direct opposition to, what we intend. As a result, pragmatic contradictions – those conflicts that occur between what we say and what we do – may not be a sign of hypocrisy. And what we do may have multiple meanings that depend on context. So to determine the best course of action, we cannot simply introspect the sincerity of our intentions and the depth of our commitment to certain values. We must be attentive to the sources of our values, their consistency, and the meaning of the available courses of action. Of course, consequences also matter, but in the social domain, consequences cannot be wholly separated from the social meaning of our choice, for how others respond to us will depend on their interpretation of what we have done.

Let us return to Fossil Free MIT, the recommendations from the Climate Change Conversation Committee, and “the Plan.” First, both those in favor and those opposed to divestment seem to agree that MIT's divesting would have social meaning. How do we determine the social meaning of divestment?

One of the main arguments against divestment in “The Plan” offers an interpretation of what MIT's divesting would mean: “Given its intent to stigmatize, divestment is contrary to the strategy of working with industry that is at the core of MIT's culture of real-world problem solving” (page 3). And, “In our judgment, the deliberate public act of divestment would entangle MIT in a movement whose core tactic is large-scale public shaming” (page 16). These are bold claims about the intentions behind the divestment effort: stigmatizing and shaming. They are also demonstrably at odds with explicit statements by many involved in divestment

work. But more importantly, even if some activists have such intentions, they do not establish the social meaning of divestment, because intentions do not create social meaning. I, personally, think these claims both about the intentions and the social meaning are mistaken. But I am not going to argue that here. MIT is rightly concerned with credibility, standing, even a modern-day form of academic honor. However, the social meaning of divestment cannot be simply *intuited*. It is a proper subject of inquiry, inquiry that requires expertise in fields of research that MIT systematically devalues. There is knowledge to be had about social meaning, knowledge that is produced by our very own faculty, some of whom work on social movements. Were they consulted? And might we also ask, whose interpretation of the meaning matters, and why?

Second, “the Plan” does not include discussion of the proposed Ethics Advisory Council; in fact, it doesn't include the term “ethics,” “ethical,” or “transparency” at all. What does this say?

The proposal to divest from fossil fuels is supported by several distinct arguments. The one central to my concern here is ethical. Put simply, there is a moral imperative to do all we can to prevent the immense suffering, conflict, and injustice that is easily predictable given the current rate of climate change. Divestment is required to fulfill this moral imperative. The Climate Change Conversation Committee Report proposed that an Ethics Advisory Council would be an important part of the plan to fulfill MIT's mandate. “MIT has been faced in the past, and will continue to be faced with complex ethical decisions regarding its investments, but it lacks a transparent, community supported means of making such decisions.” Even if one rejects the claim that ongoing investment in fossil fuel is unethical, the argument in favor of an Ethics Advisory Council rests on the value of transparency and community oversight. However, “the Plan” does not discuss this proposal. In the faculty forum there were two arguments offered against it: (a) this proposal was controversial and

provoked cries of “political correctness,” and (b) MITIMCo (MIT Investment Management Company) is already subject to oversight by the Advisory Committee on Shareholder Responsibility.

I hope that my earlier discussion of the value of moral reasoning and the possibility of moral knowledge makes it clear that those who cry “Political correctness!” are misguided about the nature of moral argument and critique. Assuming that members of an Ethics Advisory Council would include those who have a background in normative inquiry – just as a Science Advisory Committee would include experts in science – there is no reason to think that such a council would just be driven by current political winds. To think otherwise is a sign of disrespect for ethics and related interpretive sciences as areas of inquiry. Moreover, it should be obvious why the current Advisory Committee on Shareholder Responsibility does not adequately address the concern that MIT lacks a “transparent, community-supported means of making [investment] decisions.” It is neither transparent nor community-supported. Should we conclude that the Institute doesn't value transparency and community support for oversight of its investments? This is what “the Plan” clearly conveys, even if its authors didn't intend this. For after all, meaning is not just a matter of intention.

Who are our peer institutions? There may be no peer in science and engineering. But is this all we are aiming for? Every institution usually considered a peer – Stanford, Harvard, Oxford, etc. – has the equivalent of an Ethics Advisory Council. Shouldn't we respect the knowledge and expertise of our whole community – as our peers clearly do – and draw on our collective insight to make morally sound decisions? We certainly aren't coming close to that. Refusing to establish such a Council is a public repudiation of moral reasoning and is of a piece with the distorted affirmation of science and engineering, “This is MIT.” ■

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From The Faculty Chair

## The Roles of the Standing Committees of the Faculty in the Governance of MIT

Krishna Rajagopal

**IN THE MAY/JUNE 2011 ISSUE** of the *Faculty Newsletter*, then Chair of the Faculty Prof. Thomas Kochan wrote a wonderful column entitled “Faculty Governance @ MIT: Strengths and Future Challenges” ([web.mit.edu/fnl/volume/235/kochan.html](http://web.mit.edu/fnl/volume/235/kochan.html)). I remember the column well from when it appeared, reread it when I was asked to stand for election to my current position, and just reread it again. Prof. Kochan’s article remains as good a description of faculty governance at MIT as any I have read.

In this column I would like to pick one aspect from Prof. Kochan’s column, namely the role of the Standing Committees of the Faculty, expand upon his description and provide some recent illustrative examples of the role these committees play in the governance of MIT. As Prof. Kochan wrote, the 11 Standing Committees of the Faculty are the heart of faculty governance. Approximately 100 faculty members (10 percent) participate in any given year on one or more of these committees or on two focused awards committees. The faculty are joined on the committees by undergraduate and graduate students who bring key perspectives and by administration representatives and professional staff, who provide both perspective and institutional memory for the faculty and students who rotate on and off committees. The Standing Committees of the Faculty oversee a broad spectrum of what MIT does, and is. It is within these committees that the governance referred to in the phrase “faculty governance” happens.

The complete charges to each of the committees are to be found here

([web.mit.edu/faculty/governance/rules/1.70.html](http://web.mit.edu/faculty/governance/rules/1.70.html)). My aim is to illustrate their roles in the governance of MIT in sum; I will not come close to providing a full description of the work of any one of them.

Perhaps the committees whose responsibilities are easiest to understand are the two that make dozens of executive decisions each year: the Committee on Discipline (CoD) and the Committee on Academic Performance (CAP). Every year, the CoD considers cases of alleged misconduct by students or student organizations, and takes appropriate action in the name of the Faculty. In so doing, it plays a key role in implementing the values of the MIT community and defining its standards of conduct. Every year, the CAP reviews the academic performance of all of our undergraduates and takes appropriate actions in the name of the Faculty, including sometimes requiring students to spend time away from MIT. These decisions provide an operational definition of MIT’s minimum academic standards, a responsibility of the CAP. Every year, the CAP also reviews and approves applications for readmission to MIT from students who have spent time away. Because the CAP hears regularly from them, it also plays an important informal stewardship role for the many professionals who are deeply committed to supporting our students in so many ways.

Both the CoD and the CAP also play key policy-making roles. This year, the CoD is implementing new processes for how complaints of student sexual misconduct are handled, processes that it developed following the recommendations

made last year by an Institute Task Force chaired by Prof. Munther Dahleh, the former chair of the CoD. Also this year, the CAP, together with the Dean for Undergraduate Education, is in the midst of a soup-to-nuts review of the processes via which medical withdrawals occur and readmission decisions are made. By making the difficult decisions that the Faculty has delegated to them, as well as through their varied policy and stewardship functions, the CoD and the CAP play key roles in the fabric of academic and nonacademic life at MIT.

Every year, the faculty and students on the Committee on Undergraduate Admissions and Financial Aid (CUAFA) serve as the eyes and the voice of the Faculty as MIT formulates policies related to undergraduate admissions, enrollment, tuition and fees, and financial aid. This fall, CUAFA made a public statement ([mitadmissions.org/pages/cuafa-diversity-statement](http://mitadmissions.org/pages/cuafa-diversity-statement)) that it developed over the past year on the “Role of Diversity in MIT’s Educational Mission.” Quoting its last sentence, “It is through [the] experience of the richness and diversity of interests, strengths, viewpoints and concerns of their fellow students that our students become open-minded intellectuals and innovators, primed to pursue the MIT mission of the betterment of humankind.” This public statement of MIT’s goals in forming our student body and its commitment to our students is particularly important given the current state of the national conversation on this topic.

There are three committees that, among them, provide broad oversight on

how we educate our students: the Committee on Graduate Programs (CGP), the Committee on the Undergraduate Program (CUP), and the Committee on Curricula (CoC). These committees help faculty members and departments to innovate in what we offer our students via reviewing, improving, and approving new curricula, including new subjects, new or revamped minors, majors and graduate degrees, and related educational policies. Just in the present academic year, the relevant committees have approved new majors in Business Analytics, Finance, and Management and a new Master's degree in Business Analytics from MIT Sloan, a new pathway via which a professional student may attain our Supply Chain Management (SCM) Master's degree, as well as two flagship educational initiatives from our new Institute for Data, Systems and Society: a doctoral program in Social and Engineering Systems and an undergraduate minor in Statistics and Data Science that includes a new and innovative interdisciplinary capstone subject, the vision for which evolved to some degree in response to committee feedback.

In fact, in the case of each of these degree programs, the processes of consultation and discussion with the relevant committee or committees resulted in substantive improvements to the final product, which is to say improvements in how we will be educating future students. This comes about because of the breadth of experience and perspective that the committees provide. A committee that includes faculty from all five Schools, several students with differing perspectives, and professional staff who have seen the successful launch of many previous innovations will inevitably add value, finding ways in which a proposed new program can best be aligned with respect to existing curricula and can be strengthened, no matter how carefully and thoughtfully it has been conceived and developed by those with the relevant disciplinary expertise and experience. Through the work of these committees,

lessons learned from the experience of individual departments and Schools over time inform and improve subsequent innovations across MIT. Authors of new educational activities and initiatives regularly comment on the value of discussion with, and review by, the CGP, CUP and CoC.

In the case of new majors or new graduate programs, after committee approval, the final proposals are reviewed by the Faculty Policy Committee (FPC) and voted on at an Institute Faculty Meeting on the third Wednesday of some month. In other cases also, for example as new minors or substantial revisions to programs or policies are under consideration, the committees often seek advice from each other, from the FPC, or from the faculty officers (all of whom serve on the FPC). The chairs of all the Standing Committees meet twice annually, the professional staff of the committees meet monthly, the chair of the CUP meets weekly with the faculty officers during the semester, and the chairs of the CoC, the CGP, and other Standing Committees consult regularly with each other and with me. There are often instances where the experience or perspective of one committee can help another.

To give a recent example, when the CGP received the proposal for the new configuration of the SCM professional Master's degree, in which a cohort of students will be admitted only after taking a suite of online subjects and an Advanced Standing Exam, the CGP chair and I decided together that, although as always the approval of a substantial modification to an existing graduate program rests with the CGP, it would be of considerable value to hear as many faculty perspectives as possible. This proposal to modify the SCM program was therefore reviewed by the FPC as well as by the CGP and was presented for discussion at an Institute Faculty Meeting, the minutes of which can be found here: (<https://web.mit.edu/dept/libdata/libdepts/d/archives/facmin/151118/Enclosure%20A%2011-18-15.pdf>).

The FPC was warmly supportive of trying this approach to blending online and residential education in the particular context of a professional Master's degree, and saw the proposal as moving MIT to the forefront at a time when professional Master's programs and the needs of their students are changing. Furthermore, both the CGP and the FPC saw it as particularly important that this pilot program, still in the early stage of its development, be evaluated so that all of us can learn from the experience of developing, launching, and running it. The CGP will review the modified SCM program again before it is launched, likely in fall 2016, in order to provide further feedback. And, upon the request of the CGP, after the first two cohorts of students admitted via the new pathway have graduated, the CGP, the FPC, and the Dean of Engineering will review key elements: the effectiveness of the new program; how well its new admissions criteria serve to bring to MIT the best students – including students who would not have been admitted previously; the quality of the teaching; and the initial success of its graduates. MIT is well positioned to learn a lot from this pilot program via the reviews envisioned. Through the future work of the Standing Committees of the Faculty, the lessons learned will inform MIT's future educational innovations – and, in so doing, will improve the education that we offer to our future professional Master's students.

Sometimes, although the evidence indicates that this is quite infrequent, a Standing Committee of the Faculty can outlive its role. Earlier this year, the Faculty decided to disband the Committee on Outside Professional Activities (COPA) while charging the Faculty Policy Committee with the key component of its former responsibilities. When COPA was formed many years ago, a large part of its *raison d'être* was that it was the forum where a faculty member could go for advice when she or he was concerned about whether some outside profes-

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### Roles of the Standing Committees

Rajagopal, from preceding page

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sional activity would constitute a conflict of interest. However, it has been more than 15 years since COPA last received any request to consider a question like this. Policies and practices have evolved in recent decades, in part in response to external changes. Individual faculty members now discuss such questions with the heads of their department, lab or center, or with the Office of Sponsored Programs (OSP). For years, then, faculty members have had no need to discuss potential conflicts with COPA.

Consequently, in recent years COPA met infrequently, on average less than once per year over the most recent six years. And yet, one component of COPA's charge remains at least as important a goal of the Faculty today as ever: speaking loosely, COPA was charged with being the eyes and voice of the Faculty as new kinds of potential conflicts of interest arise and as MIT's policies evolve. However, as COPA no longer had individual cases to consider and met so infrequently, it has for more than a decade been questioning whether its charge justifies the existence of a standing committee. The recent incarnation of this discussion was initiated last year by Prof. Steve Hall, then Chair of the Faculty, and Prof. Sheila Widnall, then chair of COPA, and reached its conclusion this fall with a decision by the Faculty to charge the FPC with being its eyes and voice on questions related to conflict of interest and to disband COPA. The FPC can exercise its new responsibilities via its biannual meetings with the Provost and via adding regular meetings with the Director of OSP and the Assistant Provost, as well as by forming a targeted ad hoc subcommittee if and when a need arises. Once COPA itself, then the FPC, and then the Faculty reached the conclusion that adding to the role of the FPC in this way would be a more effective way of meeting the needs of the Faculty than a separate standing committee, the decision to disband COPA was unanimous.

This brings us to the FPC, which I chair in my capacity as the Chair of the Faculty. Prof. Kochan described its role in his column and I have already given some examples of its work from the present academic year. The FPC coordinates the work of the other committees as needed, reviews any resolutions and proposed changes to the *Rules and Regulations of the Faculty* before they are brought to an Institute Faculty Meeting for a vote, and meets regularly with the President, the Provost, other members of the administration as topics of interest arise, and the Chair of the Corporation. The FPC can take up any agenda item of concern or interest that is not better handled by one of the other Standing Committees and, in so doing, serves as a strategic committee, as Prof. Kochan described. When an issue arises that the FPC wants to delve into more deeply than it can as a whole, it forms an ad hoc subcommittee. For example, this year the FPC has formed a subcommittee (chaired by Prof. John Fernandez, with membership drawn from the CAP, CoC, CUP, and CGP, as well as from the FPC itself) that is currently looking at sub-term-length subjects. Over the past few years, many professors, instructors, and departments have been exploring the educational flexibility and pedagogical value of subjects whose duration is less than a whole semester. Individual faculty and students, as well as the CAP, CoC, CUP, and CGP, have posed various intersecting questions about best practices and policies. The subcommittee is collecting data, including from students via surveys and focus groups and from faculty via interviews, with the goal of understanding the scope and motivations of sub-term subjects as well as their intended and potential growth, and their impacts on students, faculty, and the curriculum. The subcommittee is aiming to report by late this spring.

There are three Standing Committees of the Faculty that I will defer discussing to a future occasion. The Committee on Campus Planning is our newest standing committee, having been created only last

year; it will report on its activities for the first time later this spring. The best time for a discussion of the Committee on Student Life will be after it has begun working with our future Vice President for Student Life. And, the best time for a discussion of the Committee on the Library System will be after the Task Force on the Future of Libraries has completed its work.

Last but not least, the Committee on Nominations (CoN) nominates faculty members for election as members of the Standing Committees, or as officers of the Faculty.

The examples that I have given constitute only a fraction of the myriad ways in which our committees have served MIT, its faculty and its students, just during the current academic year. The committees make key executive decisions; in varied ways and in different domains they are the eyes and the voice of the Faculty; and, by synthesizing experience and perspectives across Schools and over time, they improve the ways in which we all innovate as we develop new educational opportunities for our students. I hope that next year when you get the email from your School Dean asking you which of these committees you would be interested in serving on, you volunteer. Rotating onto one of these committees is one of the best ways to play a part in the governance of MIT. It requires a commitment of time and effort, but you will see your service play a part in shaping our Institute. If you have further questions about the roles of each of our standing committees and, in particular, about how your own interests and passions might best be deployed in the service of our collective governance through joining one of them, please don't hesitate to be in touch. I also welcome hearing from you regarding issues or opportunities that you feel should be addressed by one of these standing committees. ■

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## Introducing Sandbox

Ian A. Waitz

**STARTING THIS SEMESTER, A NEW** educational program will be available to all 11,000 of MIT's students. Called the Sandbox Innovation Fund Program ("Sandbox" for short), the program will provide meaningful seed funding of up to \$25,000 for student-initiated ideas, mentoring from within MIT and from a broad network of committed partners, and tailored educational experiences. The objective of Sandbox is to help students to develop the knowledge, skills, and attitudes to be successful innovators and entrepreneurs. *It is about developing people, not ideas.* However, the learning will be in the context of advancing innovative ideas or projects of the students' own creation – ones that serve important needs in the world.

### Origins

The students and alumni from the five MIT Schools represent an incredible force for innovation in the world. This is well reflected in our history and recounted in multiple studies, including one by Professors Ed Roberts and Fiona Murray, and their student, Daniel Kim that was released in December. MIT's legacy is amazing, but even more exciting, and more important, is what our students and alumni will do in the future, and how we as faculty can better prepare them to do it.

As faculty we take on multiple roles to support our students: we teach, we mentor, we encourage, we collaborate, we support, we provide resources and opportunities, we connect students with others, and we hope occasionally to be a source of inspiration or the spark for a new idea. And sometimes we know enough to just get out of

the way and let our students do remarkable things on their own – where they are often a source of inspiration for us.

Keeping pace with student needs and expectations has always been challenging at MIT. These days, one key area of change – both within and beyond MIT – is the nature, pace, and process of innovation. We live in a world with the Internet of Things, autonomous vehicles, a biotech revolution, engineering at the nanoscale, and an explosion of data and information. These advances present unprecedented opportunities for our students. Likewise, the world increasingly needs MIT's unique brand of deep scientific and technological innovation to address grand challenges in areas such as health, energy, environment, poverty, and education. It is important to think about how we can better prepare our students for the world they're going to land in when they leave MIT.

### Responding to a need

A significant number of our students are on a path to becoming innovators and entrepreneurs while at MIT, and some are headed that way even before they get here. For example, over 1,000 students participated in the MIT \$100K competition last year. Many more are involved in UROP, SuperUROP, club activities, dorm room projects, D-Lab, and other efforts to make and create things.

Large company or small, for-profit or non-profit, academia, industry, government, or entrepreneur – the ability to identify a need, create and communicate an innovative solution, and build a team that produces a positive impact are things

we ought to better prepare our students to do, especially as the data indicate they are doing it already.

Further, Institute-wide efforts to consider innovation and the future of education contain ample evidence of these changes in our students and those that are occurring more broadly in the world. These very thoughtful reports also offer many exciting ideas and plans for improving what we do at MIT to better enable our students to have an impact. The new Sandbox program has emerged from these and other discussions.

We have heard from our students that they want more opportunities, resources, and spaces to pursue innovative student-initiated ideas. They would like more integrated curricular programming around entrepreneurship. (The growth of the excellent programs at the Martin Trust Center for MIT Entrepreneurship, StartMIT, and a proposal for a new minor in entrepreneurship and innovation are also responses to this need.) Our students would like help navigating the rich ecosystem within MIT as well as the network outside MIT.

As faculty we want to ensure students have appropriate educational foundations, effective independent mentoring (especially when they are interacting with people who may have a financial interest in their ideas), and guidance on conflicts of interest that increasingly involve other students, faculty, or non-MIT entities. We would also like to help them achieve an appropriate meta-curricular balance (e.g., not adding three new things to their plate

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## Introducing Sandbox

Waitz, from preceding page

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if they are struggling in freshman physics). Finally, we would like to ensure that external partners in our educational enterprise interact with our students in a way that is consistent with our mission, culture, values, and policies. Putting education and community-building first, Sandbox was designed, and will operate, with all of these considerations in mind.

## How Sandbox works

Engaging with Sandbox will be easy for students.

1. **Submission.** Students (individually or in teams) will have the opportunity to submit short proposals three times per year to secure funding (ranging from \$1,000 to \$25,000) and receive programmatic resources and mentoring.

2. **Evaluation.** Students seeking amounts greater than \$1,000 will present their proposal to the Sandbox Funding Board (more details below).

3. **Education.** Accepted proposals will be accompanied by expected milestones and/or co-curricular requirements that are tailored to the needs of the individual student or team. These will be fulfilled largely by connecting the students with existing programming and resources across MIT.

4. **Mentorship.** All participants will be matched with mentors leveraging the alumni and non-alumni networks in the area. Advanced teams will be able to take advantage of existing strong mentorship programs, such as the MIT Venture Mentoring Service (VMS).

5. **Partners.** The education and mentoring will be significantly augmented by an impressive team of participants on the Funding Board. They represent individuals and organizations from around the world and span the range of pathways through which our students and alumni may have an impact: foundations, large companies, small companies, individual entrepreneurs, investors, and government laboratories. They will provide guidance and feedback to the students and make

recommendations to the Sandbox Executive Director on which projects to fund and at what level.

6. **Sustainability.** In order to help sustain the fund, students will be encouraged, but not required, to make a non-binding personal pledge to “pay it forward” if their idea eventually results in creating a successful start-up that goes on to produce significant gains for its founders.

Sandbox is integrative by design, not a standalone endeavor. Led by the School of Engineering in close partnership with the MIT Innovation Initiative, Sandbox will work collaboratively with existing campus programs and resources to empower and educate student innovators and entrepreneurs: StartMIT, Martin Trust Center for MIT Entrepreneurship, Bernard M. Gordon MIT Engineering Leadership Program, Technology and Licensing Office, i-Teams, Alumni Association, Venture Mentoring Service, MIT \$100K Competition, capstone design subjects, GEL, and others. It will be overseen by an MIT governing board that includes the Chancellor, the Provost, the Dean of Engineering, the Dean of the Sloan School of Management, the President of the Graduate Student Council, and the President of the Undergraduate Association or their designates.

## What's new and different about Sandbox?

MIT has one of the most powerful and expansive innovation networks in the world. We are fortunate to have so many programs and resources, but that also means when we launch a new program we have to be concrete about what sets it apart. In the case of Sandbox, it is not one feature, but a collection of characteristics. It is:

- about developing people, not ideas, but in the context of an authentic learning experience driven by advancing an innovative idea which a student or student team is passionate about;
- not a competition or a fellowship, and it does not pick winners. It is about offering educational experiences to as many

students as possible, and failure is recognized as an important part of the learning experience;

- not solely about start-ups. It is about innovation writ broadly – through new or existing organizations, for-profit or non-profit. It is designed to reflect the breadth of pathways through which our students and alumni will have an impact on the world;

- time-flexible. A student could start as a freshman, and finish as a senior (or as a doctoral student);

- a connector (e.g., students with ideas looking for team members with different strengths from across the Institute, companies with hard problems looking for talented students with creative new ideas);

- a source for meaningful seed funding;
- a vehicle through which we will enforce a code of conduct among participants and partners; and

- a way to gain insight into potential conflicts of interest and a mechanism to manage them.

Like the Undergraduate Practice Opportunities Program, Sandbox is made possible through a partnership with people and organizations who are committed to its educational objectives and are willing to support it with time, mentoring, and funding. Our partners bring a wealth of knowledge and a network of connections and opportunities that we could not hope to replicate solely with MIT personnel.

## How you can help

We have sufficient financial contributions to provide more than \$2 million per year for innovative student-initiated projects. In short, we have the gearing to do something big. We have lots of ideas and visions and plans, but we are also inventing as we go. We need your help and feedback.

In particular...

- please share this opportunity with your students. You can find more information at [sandbox.mit.edu](http://sandbox.mit.edu); and

- if there are aspects that are unclear or don't seem to make sense, please let us

know. One of the benefits of a new program is that we have a lot of flexibility to change and improve it. You can provide feedback to Ian Waitz (Faculty Director) and Dr. Jinane Abounadi (Executive Director).

Ultimately, we would like Sandbox to become, like UROP, a hallmark of MIT's singular educational experience. It will

exemplify our collaborative spirit, our emphasis on learning by doing, our desire to tackle hard problems with new ideas, and the importance of partnering within and beyond MIT. It will respond to what students have told us we can do to help them go further. We want students to become future entrepreneurs and innovators who are grounded but bullish about

taking on grand challenges. We want students to feel they can make an impact from day one of their MIT career. But most of all, we want them to become people who use knowledge and innovation to make the world a better place. ■

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### Civilian R&D Budgets

King et al., from page 1

has fallen behind other nations in the priority it places on R&D, recently ranking 10th among developed nations in R&D investment compared to the size of its economy." U.S. non-defense R&D has decreased from approximately 0.9% in the 1960s to 0.34% today. [Jeffrey Sachs, *The Boston Globe*, February 4, 2016.]

Though the negotiations over the budget were widely reported – mostly devoted to the issue of riders that might or might not be appended to the budget (such as defunding Planned Parenthood) – news accounts were generally silent on the most profound aspect, the overall budget priorities. In fact, more than \$600 billion, about 55% of the total Congressional discretionary budget – our tax dollars – was appropriated for Pentagon spending and weapons procurement, including DOE (Department of Energy) nuclear weapons, and the Overseas Contingency Operations Account.

R&D funds are the engine driving scientific and engineering research and higher education in our research universities and medical schools. They provide on the order of \$460 million to MIT's operating budget, about 66% of the total (see M.I.T. Numbers, back page) financing our research equipment, materials and supplies, publications, research assistants,

postdoctoral fellows, and general operating overhead. Given their long term importance, projecting necessary investments in R&D, technological innovation, and higher education, requires carefully assessing the balance between our military and civilian expenditures. We offer examples below indicating that this balance has shifted too far to the military side. We would have a healthier society, stronger economy, and a less dangerous international policy if we reduced the 55% of our discretionary budget going to the Pentagon, in part by spending less on nuclear weapons, and increasing spending on civilian needs and programs.

Despite this year's increases in the R&D budget, we are still underinvesting in civilian research. Following are just three examples of some of the many critical investments needed for national health, for public transit, and for dealing with climate change.

### Biomedical Research on Neurodegenerative Diseases

The \$32 billion for biomedical research financed by the National Institutes of Health in universities and hospitals across the country will be about 3% of the federal budget under the control of the Congress. At this time, neurodegenerative disease affecting the brain (including Alzheimer's disease, Parkinson's, and Huntington's) afflicts more than 4.5 million Americans. By 2050, the numbers for Alzheimer's alone are expected to

triple to 13.2 million. These long-lasting afflictions cause a great emotional and economic cost to the families and to the nation as a whole. The Alzheimer's Association projects that caring for patients with Alzheimer's will cost all payers – Medicare, Medicaid, individuals, private insurance, and HMOs – \$20 trillion over the next 40 years.

As a result of prior NIH research investments, the mechanisms of diseases such as Alzheimer's, Parkinson's, and Huntington's are reasonably well understood. The key proteins have been identified, as have many steps in the development of pathology. Thus the time is ripe for the development of effective anti-Alzheimer's drugs, with many pharmaceutical firms pursuing vigorous programs. However, development of effective therapies requires human trials testing for improvement in cognition and behavior, and looking closely for side effects, particularly in higher brain functions. These trials are enormously expensive.

Given the known and increasing cost to the nation as the population continues to age, the rational approach would be an all-out effort – like the moon landing program in the 1960s – by sharply increasing the federal R&D budget for neurodegenerative diseases. Senator Elizabeth Warren has called for supplementing the NIH budget with fees from

continued on next page

**Civilian R&D Budgets**

King et al., from preceding page

the pharmaceutical industry, but this is only a small step in the needed direction. In his State of the Union address, President Obama called for new efforts toward cancer therapies. Subsequent reports indicated a sum of ~\$1 billion, a step in the right direction but hardly a “moonshot.”

What our nation needs is on the order of a 10x increase in neurodegenerative R&D to \$10 billion a year. This would still leave the total NIH R&D budget at only 4% of the total. Yet a majority of the members of Congress claim that the nation can’t afford such expenditures. Nonetheless, they voted some \$30 billion for upgrading nuclear weapons capacity, both unnecessary and destabilizing, and counter to the Nuclear Non-Proliferation Treaty that the U.S. ratified 40 years ago.

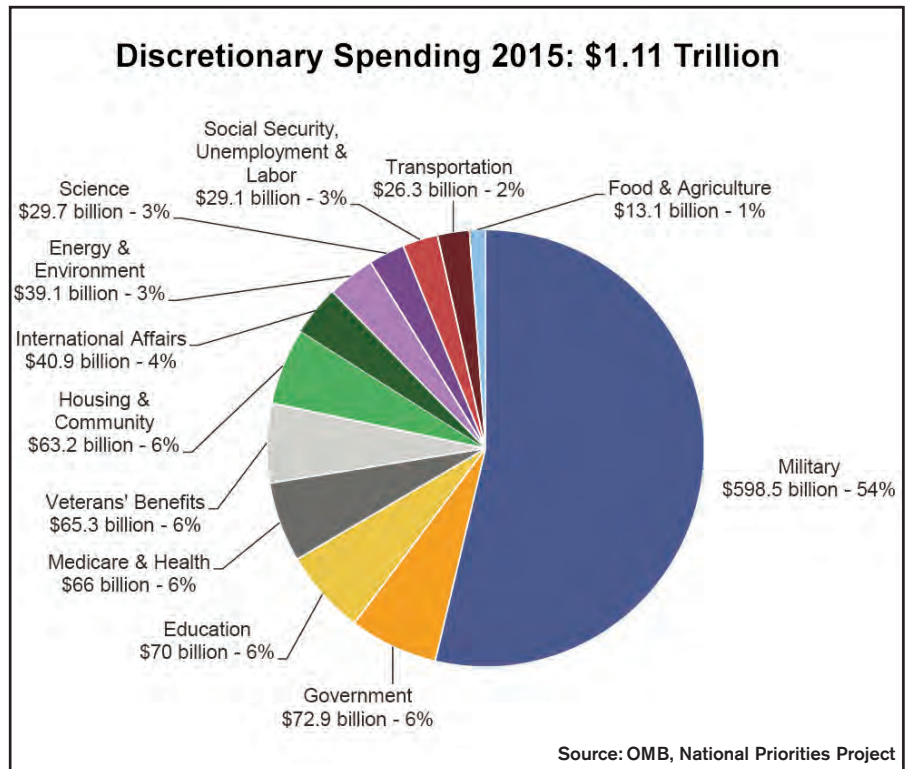
**Public Transportation**

On May 12 last year, an Amtrak train derailed outside Philadelphia, in part because of the failure to install Positive Velocity Control (PVC) signals. The next day, a Senate committee supported a further reduction in Amtrak investment. The sums under discussion were in the \$1-2 billion range. Subsequently, the Republicans in the House passed a transportation bill reducing Amtrak funding by \$250 million below the President’s \$2.45 billion request. Delays and equipment failures on the Massachusetts MBTA, and on New Jersey Transit, stranded or delayed tens of thousands of rail passengers, causing serious personal inconvenience and cost, as well as overall damage to the economy. The derailment represents failure to upgrade track bed, rail cars, and signals, and failure to install PVC technology throughout the route. According to Amtrak, the New Jersey Transit delays “. . . stem from long-term under-investment in the Northeast Corridor.” New York and New Jersey have recently agreed on the need to upgrade

the rail corridor, including the building of two new tunnels under the Hudson River, but the source of the funding is unclear.

From a broader perspective, these failures reflect the almost insignificant investment by the Department of Trans-

of train travel for hundreds of thousands of Americans, we can afford to spend billions of dollars each year increasing the accuracy of our nuclear missiles. The Draper Lab in Cambridge received \$2.7 billion in DOE contracts to increase the



portation in R&D on sensors, signal systems, and telecommunications needed, not only to bring both passenger and freight trains up to the already obsolete twentieth-century standard, but to prepare for higher speed, more efficient passenger travel that will be needed later in this century if the U.S. economy is to continue to grow.

After many years of stopgap single-year funding, Congress passed the Fixing America’s Surface Transportation (FAST) Act. This act authorizes a total of \$305 billion over the next five years, with \$10 billion spread over five years for passenger rail improvements. These sums are totally inadequate to the need, and are dwarfed by European and Asian investment in rapid and energy-efficient rail transit.

Though the nation apparently can’t afford to improve the safety and efficiency

accuracy of nuclear missiles. Given warheads that will obliterate every living creature within miles of the explosion, increasing accuracy from 600 meters to 300 meters is deeply absurd and a terrible waste of national resources. Meanwhile, the Department of Transportation Volpe National Research Center two blocks away is sufficiently strapped for funds that they are negotiating to sell some of their land to a commercial developer in exchange for building renovations.

**Sustainable Energy**

Committees of the National Academy of Sciences, the United Nations, and many professional organizations agree that the Earth’s climate is heating up, putting many sectors of human society at increased risk from multiple factors: rising sea levels increasing weather

extremes – both storms and droughts – and changing fresh water hydrology and availability. There have been many calls for intensified R&D into sustainable energy, and many states have established incentive programs. But real progress requires large-scale scientific and energy efforts. Yet the Department of Energy budget for research development and demonstration remains under \$5 billion, no higher than it was five years ago. In fact, the DOE spends far more on nuclear weapons maintenance and upgrades than they do on sustainable energy research. Similarly, the NOAA budget provides only \$58 million for climate research instead of the requested \$89 million, and \$10 million for ocean acidification research rather than the requested increase to \$30 million. Although Congress routinely separates spending bills into civilian and military categories, the only way that ~\$600 billion for military spending can be appropriated is to limit civilian programs, as has been done over the past decade, or to increase taxes (which has become politically taboo). The Congressional Budget Office projects the cost of U.S. nuclear forces for the decade 2015-2024 at \$348 billion. A significant fraction of that cost is in replacement of our land- and sea-based intercontinental missiles, a cost which will increase in the following decade.

### Excessive Nuclear Weapons Spending

One arm of our current nuclear weapons triad is the U.S. fleet of 14 nuclear powered and nuclear-armed submarines, the world's largest. Each submarine carries multiple warhead missiles, representing a several orders of magnitude greater destructive power than the bombs dropped on Hiroshima and Nagasaki. In addition to the blast, heat, and radiation damage, launching and detonation of the Trident missiles from a single nuclear weapons submarine – either by accident or intent – could be sufficient to induce a “nuclear winter” leading to worldwide famine, resulting in the deaths of tens of millions of people. The current Pentagon proposal, a quarter-of-a-century after the

collapse of the Soviet Union, proposes buying eight new nuclear weapon submarines at \$12 billion each.

Sadly, the President's State of the Union address included no mention of the need to reduce our nuclear weapons stockpile, retreating from his earlier 2009 call in Prague to rid the world of nuclear weapons.

These projected expenses are a classic example of “less would be more”; they are not only economically counterproductive, but ironically they also decrease our national security. Steady improvements in the accuracy of our ballistic missiles increases Russian fear of our first-strike capabilities (no matter how implausibly we view this as a possibility) and coupled with their less robust early warning system, could possibly lead to an accidental launch which would start a nuclear war. The probability of this “doomsday scenario” is low, but not zero, as massive failures of complex technical systems have occurred – e.g., Challenger, Fukushima. Indeed, twice false attacks have been indicated on Russian early warning systems, a response having been averted only by the heroism of individual officers who were on duty.

Our systematic nuclear weapons and delivery system improvements feed the dangerous international competition for the modernization of nuclear weapons in Russia and China, making it more difficult to negotiate arms control agreements. They play into other countries' notions of the importance of nuclear weapons (e.g., India, Pakistan, North Korea), which is very dangerous for international stability. We note sadly that despite our having almost a thousand nuclear weapons on hair trigger alert and capable of pinpoint accuracy, this has not prevented North Korea from proceeding with their nuclear weapons program. The path to security is nuclear reductions, not increases.

Our reliance on nuclear weapons helps to undermine the Nuclear Non-Proliferation Treaty (NPT) that is a cornerstone of our security, as exemplified by the recent intense negotiations with Iran.

The NPT depends on an agreement that the countries that forgo nuclear weapons are entitled to develop nuclear power and expect the nuclear powers to disarm (NPT Article 6) although the time scale is not defined. The failure of the 2015 NPT review at the UN to reach a consensus this past June was due in large part to the failure of the nuclear weapons states to define any specific procedures or time scales to divest their nuclear weapons.

Given that the current U.S. nuclear arsenal represents extraordinary overkill capacity, there is no increase in national security to be derived from increasing its destructive power. In 2012, a committee chaired by former Vice Chairman of the Joint Chiefs of Staff General James Cartwright, concluded that: “No sensible argument has been put forward for using nuclear weapons to solve any of the major 21st century problems we face including threats posed by rogue states, failed states, proliferation, regional conflicts, terrorism, cyber warfare, organized crime, drug trafficking, conflict-driven mass migration of refugees, epidemics, or climate change.... Nuclear weapons have...become more a part of the problem than any solution.”

We conclude that a major reason behind the shortfall in civilian R&D is diversion of federal tax dollars to the continuing excessive, wasteful, and dangerous spending on new and upgraded weapons systems, including destabilizing nuclear weapons, which dwarf civilian investments. Continuing investment in such non-productive and provocative weapons programs will result in a declining standard of living and quality of life. As President Eisenhower warned us, in the long term undermining of the civilian economy only decreases our national security. ■

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## A Critical Look at the Plan for MIT's East Campus

O. R. Simha

### Planning Principals

**MUCH OF THE DISCUSSION** about the East Campus so far has been about feel-good things. An exciting addition to the Kendall Square eco system; a new source of Endowment income; a promise of an increase in tax revenue for the City; preservation of historical anecdotes; graduate student housing; and so on. But lost in the discussion has been the central question: Shouldn't the use of the East Campus be for the creation of buildings that enhance the flexibility and ease of academic uses for the long-term future?

The most successful of MIT buildings, including the main group, have been those interconnected both above and below ground, giving MIT the ability to move quickly in response to changing research and educational needs. Where we have diverted from this system-building tradition, the buildings have failed to meet MIT's academic and research needs. Tall buildings isolate people and reduce the flexibility of easy expansion and or contraction; horizontal buildings, with plenty of daylight, encourage communication and continue a powerful tradition of shared community.

The prior plans for the East Campus have always featured the extension of the MIT building system from the Main campus to the Sloan campus, underground parking and service, retail services at street level, generous open space, tree-lined streets, a pedestrian- and cycle-safe environment, and residential uses at the eastern end of the campus. The faculty should insist that any plan for the East Campus respect those guidelines. Indeed, a faculty committee under the chair of Professor Kochan made similar recom-

mendations when the implications of the MITIMCo (MIT Investment Management Company) real estate development group's plan first emerged. A careful look at the result of the MITIMCo building plan now being presented to the Cambridge Planning Board for approval reveals quite a different picture.

Notwithstanding the acceptance of a primary change in land use from academic and research to commercial uses for the area south of Main Street (enshrined by both commitments made by the City of Cambridge and MIT to the federal government to reserve this area for the natural growth of MIT, as well as the Cambridge Planning Board's own designation in the Cambridge Zoning Ordinance of this area as an "Institutional Zone"), this proposal requires very close scrutiny, because it is rife with bad planning, bad design, and illusory benefits.

### NOMA

There are two distinct areas that are being proposed for development under MIT's sponsorship: the area north of Main Street identified as NOMA (North of Main), and the area south of Main Street (SOMA).

NOMA was originally proposed to be developed as another office building, but under pressure from the East Cambridge Community and in exchange for their support of the larger projects south of Main Street, the real estate group at MITIMCo elected to convert this site to a primarily residential project. This 416,000 gross square foot building, 250 feet in height, will provide 285,000 feet for 290 units whose average size will be under 1,000 square feet. The project sponsor has

provided no description of the unit types and sizes, with the exception of the micro units which they describe as "innovation housing" – the latest euphemism for a tiny studio apartment.

The City requires that a small portion of these units be set aside for "affordable housing" and the project meets the City's requirements. The bulk of the units will be market rate housing and if the current pattern continues, many MIT students will be renting units in this building at market rates. There is no indication of the proposed rent structure for both market and affordable units. Comparable rental housing at Third Square on Third Street, one block away, charges over \$2,600 for a studio apartment, \$3,000 for a one-bedroom apartment, \$4,000 for a two-bedroom apartment, and from \$5,000 to \$6,000 for a three-bedroom apartment. It is heavily occupied by MIT graduate students at Sloan as well as young professionals working in the Kendall Square area.

The plan indicates that parking space will be offered in the building garage at market rates. Given that current and expected market rates for parking in this area are \$250/per month and above, one might ask why some of these units are not leased by the MIT housing system and offered at discounted rates to the MIT community. Almost every department at MIT has been embarrassed by the lack of housing for visiting faculty; here is a chance to correct that need.

If this project should proceed as is, it would lack usable open space for over 300 new residents and their families who will clearly place an increased burden on public facilities. Where will residents

access public open space and recreation areas? How will young families with small children access safe and usable open space? As part of its obligation to support these needs, will MIT contribute to the development of the new Kendall Square Park at Broadway and Third Street, as proposed by the winner of the City's competition?

The response on the need for a more effective connection from NOMA to the southside of Main Street and the Sloan Campus seems below the standard to which MIT should aspire. The current proposal of a disjointed surface crossing where pedestrians are screened from speeding traffic by landscape materials will not be adequate. It will, in fact, create a false sense of security since there do not appear to be any traffic controls proposed to stop fast-moving traffic for pedestrians crossing at this point. Such controls exist only at the corner of Broadway and Third Street. Why does MIT not propose and help to fund a handsome pedestrian bridge across this always-busy roadway that would provide safe passage and could also act as a gateway to the City?

With regard to the overall need for housing in the City, MITIMCo's plan assumes the demolition of Eastgate graduate student housing, which was built in 1965 as an expression of MIT's faith in the future of Kendall Square, and now offers apartments for rent from \$1500-\$1900 per month. Further, there is no mention of the disposition of other existing buildings in the south of Main Street area. Will MIT commit to retaining and rehabbing the 270 units at 100 Memorial Drive for MIT housing needs upon the completion of the current leasehold?

#### **SOMA**

The area South of Main Street (SOMA) is planned as a Mixed Use district. There are many questions about the MIT plan for the area that have gone unanswered. Let's begin with traffic and street work issues that include:

- Amherst Street. Why is this missing from the list of streets to be improved? What

happened to the MIT plan, approved by the Cambridge Traffic Department in the 1990s, to widen the sidewalks on Amherst Street as was done as part of the N51Tang Center project near Wadsworth Street? What will the new volumes of parkers and service vehicles mean to the Amherst Street environs? How will the Wadsworth Street intersection at Memorial Drive, Amherst Street, and Main Street accommodate all of the new traffic that this project envisions without a serious decline in safety for pedestrians and cyclists?

- Why isn't the entry for service vehicles and underground parking consolidated at the entrance to the Sloan garage and brought underground to service all of the buildings in the Planned Unit Development (PUD)? This would reduce the traffic/pedestrian conflicts on Ames, Hayward, and Carleton Streets. A prior MIT plan for this area anticipated such a solution, and thereby was able to provide more usable open space for both the public and the MIT community. The present plan is a step backward, also acknowledging more vehicle/pedestrian conflicts that were never described in earlier public meetings for the MIT community.

- Why is there no direct access below grade to the MBTA station platform from both existing MIT buildings and the new buildings proposed? This would assist patrons in all weather and provide for more humane accommodation to persons with disabilities.

- While MIT must be given some credit for funding a traffic study which surveyed prospective use of the Redline station, there does not appear to be any proposals in this submission that suggest the need to work with other developers to ensure that the transportation plan will reflect other proposals that are making their way down the pipeline. It has been reported that Boston Properties, in addition to the recently authorized increased development of an additional million square feet in the MXD District, plans to replace the

low density Coop building with another tower. Do we know what the impact of that addition, should it be approved, will have on the present Kendall Station? Will the Coop, in the future, be accommodated by MIT in Kendall Square?

With respect to the specific building proposals I would offer the following observations:

**Building 2.** The design of this 200-foot building is extremely awkward and, if built, will be a continuing embarrassment to the Institute. In addition, our community will experience extreme wind conditions in the vicinity of the building that will be difficult to correct. The building overshadows existing Sloan campus buildings, making the MIT campus and the Sloan campus in particular even less inviting than it is now. Contrary to the statements made to the Planning Board about MIT's commitment to create a handsome pedestrian route along Wadsworth Street to the Charles River, this building introduces a truck and parking entrance from Wadsworth Street that will negate any notion of a pedestrian-friendly access to the River from Kendall Square.

**Building 3.** At 238 feet with its large, almost 40,000-foot floor plate, this building will also negatively affect the movement of pedestrians and cyclists along Wadsworth Street. The shadows this bulky building will cast will make walking on Main Street even less appetizing in the winter time than it is now. In addition, the building's dimensions are a reflection of an antiquated notion about the flexibility needed for scientific research buildings. Buildings with large floor plates with extensive areas where daylight does not penetrate into space occupied by human beings are not ideal for the kind of flexibility that is essential for research. The proposal to use this building for laboratory purposes should be closely reviewed. If the MIT wind consultant is correct, the

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**A Critical Look at MIT's East Campus**  
Simha, from preceding page

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wind will carry effluent from east to west and will directly affect the residential building MIT proposes to build for graduate students.

**Building 4.** At 299 feet this building is adjacent to a proposed new MBTA station head house but has no direct all-weather connection to the station platform. This all-weather feature was anticipated in earlier MIT plans for the East Campus south of Main Street as far back as the 1980s when the new station was developed.

The childcare facility open space will be a most unfriendly place with a majority of the space in shadow from the adjacent Suffolk Building and the bulk of the tower portion of Building 4.

The replacement residential building proposed for graduate students raises a number of questions that are unanswered in the proposal. Will the building be air conditioned to avoid the pollution that will be generated by the adjacent laboratory buildings being built as part of this project? What will be the rent structure for this project? What are the unit sizes? How affordable will these apartments be for graduate students? What proportion of the families living here will have children in the childcare center? If most of the patrons of the childcare center are non residents, how will their vehicles be accommodated during the morning and evening rush?

The floor plan and architecture of this building is cruel. It is far below what should be an MIT standard for good design. The two principal elevations are east and west. The residents will enjoy none of the southern exposure and views over the Charles River Basin that would make for a pleasant living experience. Few of the amenities that have been available to Eastgate residents for 50 years will be available in the new building. There will be no view of the Charles River Basin from a building common room and no laundry and play area at the top of the building for young parents. Access to the

apartment house from the center of the site is painfully awkward and one can imagine how difficult it will be for residents with packages or baby carriages to negotiate entry to the building during winter conditions.

**Building 5.** This 280-foot office and research building proposes to accommodate the MIT Museum on two levels. There is no all-weather access provided to the T station platform, something that would only make access to the museum even more important for the public. The proposal to rebuild the head house entrance to the T station further into the MIT campus has drawn criticism from the staff and members of the Cambridge Planning Board as being insensitive to the needs of the general public. This building, with its overpowering bulk, will have a negative impact on the Kendall Hotel and will eliminate all of the light enjoyed by the occupants of the building occupied by MIT's Health Science program in E25, the Whitaker Building. The building will create an ugly canyon on Deacon Street, a private way, not owned by MIT.

Another major fault of this building is its lack of a direct connection to the MIT corridor system that would bring both the MIT community and the public from the T station to and from their many destinations at the Institute.

The large floor plate approach to this and other buildings does not bode well for the future. These buildings offer substantially reduced natural light to the occupants and raise questions about MIT's commitment to a quality working environment. It also belies the notion of flexibility which has been a hallmark of MIT-built buildings. Will these buildings be useful in years to come? And for whom?

**Building 6.** This is a small building that has as one of its objectives the screening of the ugly face of the loading docks serving the physical plant shops and other services in the Ford Building. At this it fails miserably. Instead of a building that blocks this unfortunate view with portals that can be closed off when not in use, it continues to convey

the back side of the Institute to the public. For the thousands of patrons of Legal Sea Foods that is their view of MIT now, and if this project goes forward will continue to be at least their partial view in the future. Furthermore, the lack of any future connection to the Ford Building (E19) that would correct the awkward entrance and elevator service for the public at 400 Main Street is very shortsighted.

The architecture of these buildings, as has been gently suggested by the City's Planning Staff report, is far short of what the City should expect of MIT. The designs are mundane and lack the most elemental sense of belonging to the MIT environment. The City is questioning this level of design in one of the most important sites in the City. Should the MIT faculty not step forward and make their views known about an architecture that is offensive to the eye and impractical for generations to come?

This proposal has many faults and questionable ideas. As suggested by the City's Planning Staff report, a substantial effort to revise and improve this proposal must be made. It should not be approved until the proponent shows a real effort to improve the quality of the proposal.

### **Financial Implications**

With regard to the financial advantages of this proposal, namely a Cambridge tax revenue of ~ \$10 million per annum and perhaps twice that much to the MIT Endowment income, we should understand that when the time comes that academic pressures are such that a future administration will seek to take these buildings into the academic plant there will be some serious financial adjustments. The City, based on MIT's current in lieu of tax agreements will have a call, for a number of years, for the tax revenue it has lost. That real estate tax cost may have to be levied against the Institute's academic budget. In addition, the cost of the buildings transferred from the Endowment to the academic plant will likely be at market value. Given the expectation that these buildings will command



rents in the \$70 per square foot range, the cost could be challenging to either the academic budget or to the decapitalization of the Endowment. Perhaps solutions for these prospective problems have been developed. If so they should be shared with the faculty. As a non-trivial aside, one should not expect to have the City take this reduction in revenue lightly and the calls for increased payment in lieu of taxes on an ongoing basis beyond current agreements will certainly be held. In the worst-case scenario it may lead to a campaign to remove the tax exemption from educational institutions entirely.

### What can be done?

If MIT wishes to build out the East Campus with buildings that initially may be used for commercial purposes, those buildings should be designed so that they also meet academic/research criteria, not just the most current fashion for commercial buildings. MIT has, in the past, prepared design criteria for the extension of our building system in the North and East Campus. Those criteria should be a guide for the future of the development of buildings in the East Campus.

Insisting on the prudent development of the East Campus for academic pur-

poses will be the greatest test for the faculty. The result will determine whether or not future generations of faculty and students will have the space resources to pursue their work. Notwithstanding the current stress in research funding – something that has happened many times – the judgments that need to be made with regard to the East Campus should take the long view now so as not to cripple the Institute's future. ■

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## Our Faculty Agenda

Rafael L. Bras

*This article, by then MIT Faculty Chair Rafael L. Bras, is reprinted from the Faculty Newsletter, Vol. XVI No. 4, February/March 2004.*

**THE FACULTY OF MIT IS A** very diverse group who see the Institute through the lenses of schools and units with different cultures and experiences. The above is the overarching conclusion I reached during my visit last school year to practically all academic units of the Institute.

The idea of visiting each unit arose from the realization that the position of chair of the faculty is poorly defined and even less understood, and by the fact that in my 27 years in the faculty I do not recall a visit by a chair, at least to my departments. Steve Graves, outgoing chair, resonated with the idea and we embarked on a nine-month long trip.

The focus of the meetings was a discussion of issues that could become the faculty agenda over the next few years. Following I will try to discuss six of those issues and attempt to summarize the feedback received. It should be clear that any

one of these issues is sufficient to occupy us for some time, and that furthermore the issues are not independent – addressing one will have impact on others. That interconnectivity should be the key to a successful engagement strategy.

### Governance

Is the system of faculty governance working? Is the faculty informed and involved in important policy decisions? What are the mechanisms for faculty input in the business of MIT? Why are faculty meetings so poorly attended?

MIT's system of faculty governance has been in place for a long while, dating to the time when the Institute was a fairly small organization. It is quite unique among universities. At MIT, the president of the Institute also holds the title of President of the Faculty. As such, the president chairs faculty meetings and, with the provost, chancellor, and officers of the faculty sets the agenda of the meetings. The current officers of the faculty are the Secretary (Ken Manning), Associate Chair (Paola Rizzoli), and Chair. All of us were identified by a nominating committee and "voted" into office by the faculty at

large – the few that showed up to that particular faculty meeting. The chair of the faculty floats in the organization diagram, under the president, in parallel to other officers of the Institute, but has no staff or budget and her/his appointment lasts for two years. The influence of the chair as a representative of the faculty lies in the fact that he/she sits on Academic Council and the Deans sub group. Equally important, the chair has good access to the president and works closely and collaboratively with him in a myriad of issues, large and small. As chair of the Faculty Policy Committee, the position also influences all the standing committees of the faculty.

Faculty committees are where all the work is done. Some committees are extremely powerful and influential; others struggle with defining a substantial agenda. Less than 10 percent of the faculty are involved in standing committees and even fewer are the number of faculty that consistently influence the decision making in the Institute through standing committees. But at any one time there are probably as many presidential or ad hoc

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## Our Faculty Agenda

Bras, from preceding page

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committees and task forces active, which do a significant portion of the important work. These are generally appointed by the president, normally in consultation with the chair of the faculty. The opportunity for the faculty at large to influence the governance exists in the monthly faculty meetings, which are very poorly attended. Discussions during departmental meetings yielded three main reasons for faculty not attending the monthly meetings. Many feel that the issues discussed are unimportant. Many argue that all decisions are effectively made before they reach the floor of the faculty meeting and hence their influence is very limited. Many state that they are too busy and that the timing of the meetings is inconvenient. I believe all of the above are true. Some are happy with that state of affairs and argue that the committees do their work well and that they will attend faculty meetings when the occasion demands it. Others simply have given up for the reasons stated above, and are somewhat cynical.

My own sense is somewhat in the middle. I do feel that the faculty at large is not participating in the decision process to the extent that it should. I also believe that the governance system works because of a long tradition of inspired and quality leadership, but could become unstable in times of financial and other stress, when difficult decisions need to be made. To make the analogy to New England towns: Is it time to move from a town meeting of the whole to a representative town meeting where the responsibility to represent the opinion of the faculty resides in a significant subset of the faculty?

I invite your thoughts on faculty governance in general. I will revisit the topic in future columns. I have asked the Faculty Administration Committee to do a quick assessment of our system and catalog the models of other institutions.

## Faculty Diversity

The Institute has taken a very proactive and visible position in favor of diversifying the faculty in terms of gender and race. The Women in Science report and the more recent companion papers dealing with the four other

schools have been influential in and out of the Institute. There is no doubt that consciousness has been raised. Many would argue that we have turned the corner and that biases in hiring, retention, and promotion of women are on the way out. Indeed we have had very successful hiring seasons over the past few years, with excellent women joining the faculty. This was particularly true in some of the departments in the School of Engineering. My own sense is that it is too early to claim victory. We still need to prove that we can retain women on the faculty and that we can keep up the hiring pace that will be necessary to make a difference in a reasonable time frame.

In the case of underrepresented minority faculty I believe, and most agree, that we have failed in hiring and in retention. We have not made progress. We need to do better. Pipeline arguments are the most common explanation provided for this failure. The same argument used to be made for the past failure to hire women. I did not believe it then and I do not believe it now.

The great majority of the faculty I met agreed that this is an issue we can and should address, working closely with the Council for Faculty Diversity. Nevertheless, the feeling was not unanimous. The officers of the faculty and the administration do feel that we can and should do something about hiring more minorities and keeping the momentum in the hiring of women.

## Promotions

There is nothing that consumes more time, hundreds of person-hours, of administration and faculty deliberation than promotions. There is probably nothing more important. There is universal agreement that the overall quality of our faculty is excellent and that we must keep it that way, hence the promotion and tenure processes are extremely important.

If promotion and tenure are time consuming to senior faculty and administration, they are nerve wracking to most junior faculty. During my conversations with junior faculty I was surprised at their perception of the process. Many see it as less than transparent. Many do not understand the mechanics of the process. Many feel that the signals they receive relative to what constitutes a successful case are mixed and confused.

MIT has three main promotion steps: assistant to associate without tenure (AWOT); AWOT to associate with tenure; associate with tenure to full professor. All the promotions essentially involve outside evaluation letters, inside evaluation letters, personnel record and personal statement, and a written statement by the department head. The promotions are generally vetted by subunits, senior department faculty, school councils, Academic Council, and ultimately the Corporation. Except for the corporation, cases are known to fail in all steps, albeit with decreasing frequency as they move up the decision ladder. Should all promotions receive the same treatment? Should the criteria be the same for all levels of the decision process? Are all those promotions necessary? For example, is AWOT a necessary step? Should tenure imply full professorship? The five schools and even some departments differ on answers.

Finally there is the issue of consistency in the process, particularly from year to year as the decision-making bodies and the institutional culture evolves. Given the necessarily subjective nature of all decisions, this is a difficult and almost impossible issue to resolve. One could argue that the decisions are necessarily absolute judgments and comparisons meaningless. Every situation, like every individual, is unique.

## Quality of Life

The results of the survey distributed last fall on the quality of life of faculty and staff, were disturbing. It is clear that we are all working significantly harder than a decade ago. For the most part all faculty feel that pace and pressure is increasing to the detriment of their life. But even more disturbing is the fact that the level of unhappiness and stress reaches alarming levels, particularly for younger faculty and women. There were not enough minorities in the survey to gauge their condition. Almost all faculty responded enthusiastically to this issue. Ironically, few had read the Quality of Life report and even fewer had attended the faculty meeting dedicated to its discussion. Once again, the failures of governance do impact our ability to influence our well being.

The survey identified individual actions that could improve the quality of life of faculty

and staff. They range from housing programs to child care. These do have solutions and the provost is trying, through several working groups, to come up with action plans. More difficult to deal with is the pervasive culture of increasing demands on our time. Some argue that our hyperactive personalities are responsible. Maybe partly so, but I believe that we find ourselves caught in a web of internal and peer pressure to respond to too many initiatives and opportunities, or mandates, which we cannot control or influence.

### **Undergraduate Education**

The discussion of undergraduate education took several dimensions. First, is it necessary for all programs to have viable undergraduate majors? In fact, times have changed so that in many disciplines graduate education is a necessity and undergraduate education in a particular field is, on its own, of little value. Even in fields of engineering the first professional degree is quickly becoming the Masters degree. Is a major in management science consistent with the philosophy of the professional MBA, which is the core of the business/management education nationwide? In some schools and departments of the Institute, a lack of undergraduate students is the source of much anxiety. That the same unit has a very successful graduate education program does not matter much, particularly in the competition for resources. The reality of MIT is nevertheless that we live and die by research and its inseparable education of graduate students, yet for some units a graduate program alone is not a viable option.

Second, should we worry about the fact that a handful of departments have the overwhelming majority of undergraduates? This imbalance reflects our entrenched belief that students vote with their feet and they are in turn very sensitive to markets, public perception and, more importantly, peer pressure. Selection of majors is highly non-linear. It is very hard to choose a small major when during your first year you never meet (particularly within the housing system) an individual in that major. On the other hand, when four-tenths of your peers are, for example, EECS majors, it is easy to enthusiastically embrace what is, after all, a good program. The quandary we face is that if we truly want

to be a university we must maintain a diversity of programs, attracting a diversity of students with varied interests.

Third, and certainly most urgent, is the discussion of our educational core. In essence, the concept behind our educational commons, which defines an MIT student, has not changed much in 50 years. Yes, we have added courses, redefined HASS requirements, changed the content of courses. But basically we still require largely the same body of knowledge that the Lewis Report defined some 50 years ago. Yet MIT and its students have changed a lot since then. We have all new fields of endeavors. Management science is one of the largest majors. Humanities and social sciences have gone far beyond playing a service role for engineers and scientists. Professional education means something very different nowadays. Demographically our students are very different. The administration and the dean of students are seriously exploring initiating a major effort to review our undergraduate education, particularly its common. Discussions started in earnest during a retreat this past August 20th. The president, chancellor, provost, and all academic deans are involved in the discussion. The Faculty Policy Committee will discuss it September 4. Input from all of you would be welcomed.

### **Graduate Education**

The discussion on graduate education is also multi dimensional and inseparable from that of undergraduate education. Foremost is what I call the schizophrenia that we have between undergraduate and graduate education and to which I alluded in the previous section. MIT depends on its excellence in graduate education. As a research educational institution it could not survive without it. But in many ways graduate education, the realm of academic units and individual faculty, gets short changed in the discussions at the center of the institution where undergraduate education, in my opinion, dominates. The bottom line is that we must excel in both and nobody is going to compromise on that point. To continue to excel, though, we must elevate the discussions of graduate education and provide a better forum for it at the policy discussions that occur at the highest level of the Institute.

Is the balance between the number of graduate and undergraduate students correct (approximately 6200 vs. 4200)? How can we reconcile increasing sponsored research (generally a very good thing) and the idea of controlling the graduate student population? How do we keep our competitiveness in terms of cost of graduate students stipends and tuition, in an atmosphere of increasing cost of living for the students and decreasing Institute resources to subsidize graduate student education?

On another topic, we must keep vigilant to maintain our education accessible to foreigners, while at the same time encouraging U.S. citizens to pursue graduate studies, particularly at the doctoral level. This is particularly true in the case of women and minorities that begin to leak out of the pipeline in graduate school.

### **Final Remarks**

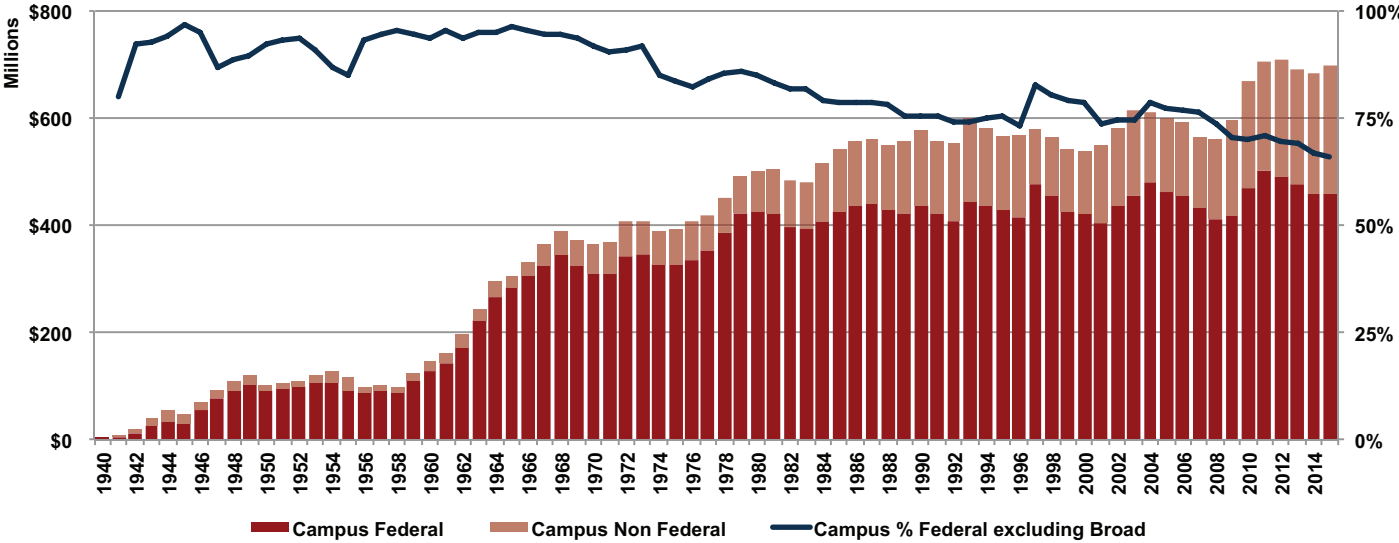
It should be clear that we do not lack agendas for the next few years. I expect to initiate efforts to address at least some of the above issues during my two-year tenure as chair of the faculty. Honestly, I do not expect that many of the major issues will be fully discussed or resolved, if there is a need to resolve anything, in the next two years. But jointly we can try. To do so, I beg you to consider getting more involved in faculty governance. Let's make the meetings worth attending and let's have open debates on many of these issues. For that, you must participate.

Underlying all of the above is the unpleasant budgetary reality that we will face in the next two years. The budget crunch is real and serious and you will hear more about it soon. The president, the provost, and many others are working very hard on this issue, and I hope we can arrange for them to address us frequently. I urge you to pay attention and attend at every opportunity, because it will affect all of us and all of us need to cooperate to weather the tight times to come. Nevertheless, I think everybody I have heard is enthusiastic about the direction of the Institute and the opportunities that we have and must take. The budget issue will be resolved and, as usual, we will come back stronger.

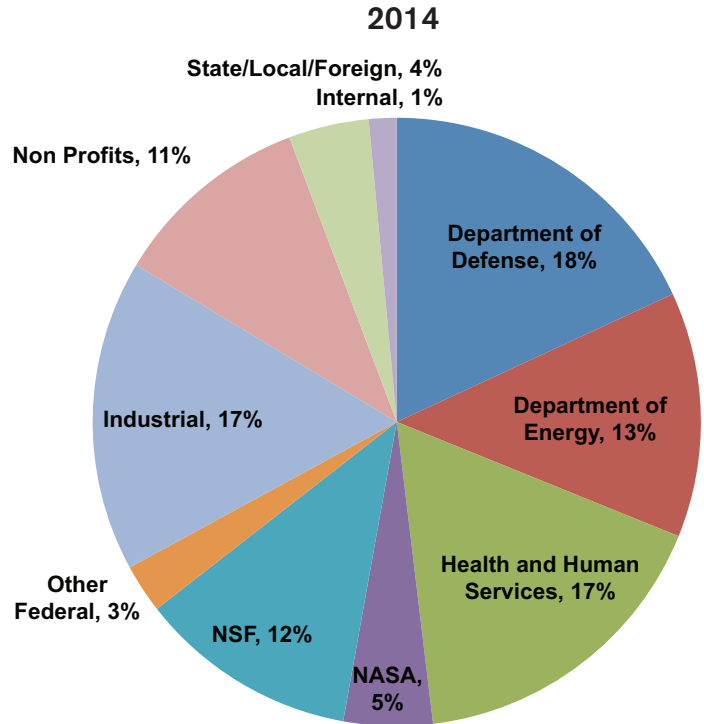
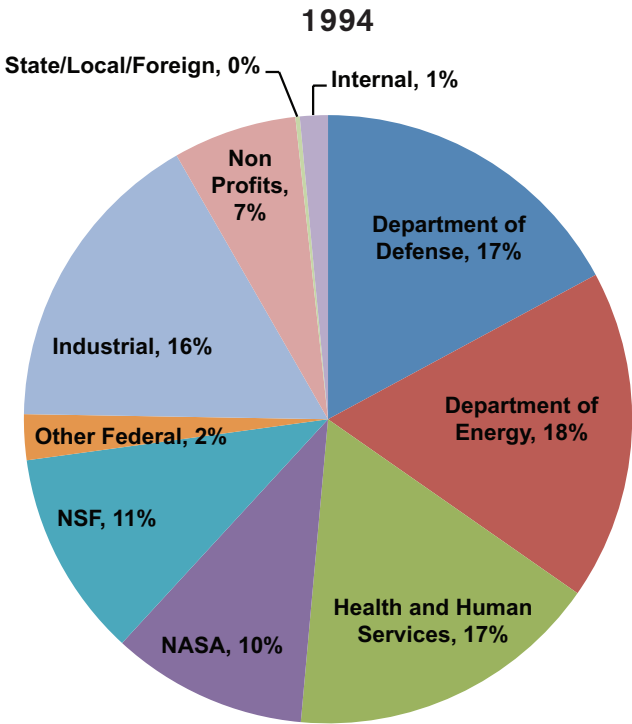
Let me end with one promise. I will not write this long again! ■

# M.I.T. Numbers

## MIT Campus Research Expenditures\*



\*(excludes Broad Institute)  
 in Constant \$ (2015 = 100)



Source: Office of the Provost/Institutional Research