

MIT Faculty Newsletter

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

in this issue we feature an interview with the new MIT Corporation Chairman and an editorial that asks "What Are We Willing to Pay for Clean Energy?" (both below); the Faculty Chair on "The Year Ahead: Accelerating the Pace of Innovation" (page 4); and a piece on Random Faculty Dinners (page 14).



Pelicans After Deep Water Horizon Oil Spill

Interview with New MIT Corporation Chairman John Reed

THE FOLLOWING INTERVIEW BY the *Faculty Newsletter* (FNL) with MIT Corporation Chairman John Reed (JR) was held on July 27 of this year.

FNL: *As a broad opening, how come you wanted the job and what kind of vision do you have for MIT?*

JR: I am not sure *wanted* is the right word. I was asked by the Chairman of the Search Committee to think seriously about taking the job. I love the Institute and have been involved with it for a long time. I am a graduate, as was my father, so I thought that being asked to consider it was fair. I talked about it with my wife, I spoke to Dana [Mead, retiring chairman], to Susan [Hockfield]. I read the By-Laws and discussed it with the Search Committee. At the end, I thought that maybe I could be useful, and so here I am.

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The Role of American Universities in Large Disaster Management

Ernst G. Frankel

AMERICAN UNIVERSITIES AND scientists have played leading roles in large-scale challenges or disasters facing the nation throughout our national history. During World War II, MIT led major efforts, such as the development of radar, which gave the allies a major advantage in the war with the axis powers.

More recently, American universities and scientists developed effective tools for managing nuclear reactor safety, and even during the ill-fated and largely mismanaged Katrina disaster there was a determined and active involvement by American universities and scientists. (The U.S. Senate [Senator S. Collins, for example] called on MIT to study and report on the cause of failure of the New Orleans levees and ways to assure future safety of the dikes [Professor Ernst

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Editorial What Are We Willing to Pay for Clean Energy?

THERE IS NO DOUBT that an abundant supply of clean energy to power the planet ranks as one of the top issues that must be satisfactorily addressed if future generations are to enjoy life as good or better than we know it today. We can no longer afford to burn fossil fuels indiscriminately without further endangering our atmosphere through the release of CO₂. But unless a dramatic invention materializes to alter the economic advantage that oil, gas, and coal have over alternative sources of energy such as conservation, wind, nuclear, or solar, the future looks bleak.

We begin with conservation. One only has to observe the service vehicles, both those from MIT as well as outside contractors, parked on campus with their engines running, or the failure of efforts to get pedestrians to use revolving rather than conventional doors as they enter and

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Photo credit: *Page 1*, Wikimedia Commons

What Are We Willing to Pay?

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exit our buildings, to map the scope of the problem. Most people just don't think about conserving energy unless it hits them directly and immediately in their pocketbooks.

Are the residents of Massachusetts and elsewhere willing to pay more for clean energy and, if so, how much more? Are there engineering solutions that MIT laboratories can provide to reduce the cost?

The Cape Wind project nearly 100 miles to our south dramatically illustrates the economic conflict underlying clean energy. Leaving aside the debate over the aesthetics of having a wind farm that destroys the beautiful vistas from the shores of Cape Cod, the islands, and all boating in the area, the electricity rates of homeowners in the vicinity of the wind farm will definitely rise, the only question being by how much. Are the residents of Massachusetts and elsewhere willing to pay more for clean energy and, if so, how much more? Are there engineering solutions that MIT laboratories can provide to reduce the cost?

Nuclear energy has been with us for a long time, starting with the power plant in Shippingport, Pennsylvania. This technical marvel produced electricity that cost about seven times that of fossil fuel-based electricity generation plants. Matters have improved, but nuclear energy is still costly, owing to the price of dismantling outmoded facilities and the removal of spent fuel. And then there is the matter of what to do with nuclear waste and the concerns about safety. Since the late 1950s when the Shippingport plant went on line, the number of nuclear scientists being trained in the United States has declined dramatically. MIT used to have one of the best nuclear chemistry groups in the world, but after the mid-'60s the training of PhD nuclear chemists diminished to the point that very few are awarded annually in the U.S. Improvements in nuclear energy technology might come through engi-

neering, but we are ill equipped to address this potential source through basic science.

Solar energy has tremendous potential. Life on earth relies on the conversion of sunlight to chemical energy through photosynthesis. Green plants collect visible light photons from the Sun and use them

to split water, forming chemical bonds from the hydrogen and oxygen atoms in H_2O that can be subsequently broken with release of the stored energy to run all life processes. We ingest these chemicals in the form of salads or indirectly by eating animal products that consume green plants to live, and the fossil fuels that we burn were ultimately derived from the same source. To utilize sunlight for energy may be the best solution for the future. The process converts H_2O photochemically and in a catalytic manner to O_2 and H_2 , which in turn would be recombined in a fuel cell to make H_2O , releasing the stored energy in the process.

An appropriate way to store that energy would be required to provide power when sunlight is not available. New, efficient, light collecting devices, catalysts for splitting water, storage devices, and a mechanism to distribute the electricity are all required. These needs are precisely what MIT research laboratories are exquisitely primed to address, and indeed important efforts are in progress across the Institute today, and in startups based on MIT inventions, to address them. The question only remains whether sufficient resources and leadership can be mustered to achieve success, again given the economic disadvantage versus burning fossil fuels that solar energy generation will surely face as it ramps up to the level needed on a global basis.

Finally, and as illustrated by Ernst Frankel's article in the present issue of the *Newsletter* (see page 1), when things go

wrong in energy production, as occurred at the BP oil spill in the Gulf of Mexico, science, engineering, and public policy must all share the blame. Again, economics and politics seem to play a part. Are there corners cut in the design and implementation of deep sea drilling? Should we be even doing it? What policy makers are involved in the process now and going forward? Should the cost of the cleanup and assuring appropriate safety measures for future drilling not be factored into the economic equation that compares fossil fuel energy with alternative sources?

MIT faculty, students, and lab personnel have the perspective to help guide the country through these issues. Judging from the enormous enthusiasm for addressing energy-based topics on campus, we also have the will. No one can accurately forecast what the future will bring, but we can no longer afford to move forward with only the cheapest solutions, as we have done in the recent past decades. The young generation appreciates this point and wants to pursue clean energy even if it costs more. Will the older, and wealthier, leadership let them?

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Join the Faculty Newsletter

In the latter part of October, all faculty will receive e-mail inviting them to sign up for participation on one or more faculty committees. One such choice will be the *Faculty Newsletter* Editorial Board.

We encourage all faculty members to seriously consider joining the FNL. Time and work commitments are minimal, but the potential to positively influence your colleagues and the Institute at large is substantial.

If you would like information on workings of the *Faculty Newsletter* please visit our Website [web.mit.edu/fnl] and click on "Policies and Procedures of the MIT Faculty Newsletter" or send us e-mail at: fnl@mit.edu.

We sincerely welcome your participation and hope you'll consider joining the *Faculty Newsletter*. ■

Editorial Subcommittee

From The Faculty Chair **The Year Ahead: Accelerating the Pace of Innovation**

Thomas A. Kochan

AS I BEGIN THE second year as your Faculty Chair, I'd like both to reflect on some lessons learned in my first year and invite you to join me in making this a year of innovation and strategic action. By doing so we can demonstrate that our unique faculty governance system is a model for getting things done.

Two impressions stand out. First, a wide range of problems and issues are brought to the attention of the Faculty Chair, some of which are clearly within the defined responsibilities of this role, but many that can only be addressed by serving as a bridge between faculty and administration leaders. The malleability and imprecise boundary of this role is a strength of MIT's unique governance system that allows us to invent ways to solve problems without being slaves to some rigid rules or traditions. This flexible and permeable boundary is a true advantage, one we need to preserve.

Second, this role also provides opportunities to bring the faculty's voice into the processes that end up, de facto or by design, shaping our future. I see a number of such opportunities that I believe warrant faculty consideration and action this year.

One of the biggest strategic issues on the minds of many faculty is our international strategy. A number of faculty have asked: "What is MIT's international strategy?" "Indeed does it have one, and, if so, are we following it?" Last year two important international reports ("Mens et Manus: New Directions for Global Education and Research at MIT," a report

of the MIT Global Council, and "Guiding Strategies for MIT's International Activities," a report of the International Advisory Committee) were produced that together help sketch the principles their authors believe should guide MIT's international strategies. The Inter-

One of the biggest strategic issues on the minds of many faculty is our international strategy. A number of faculty have asked: "What is MIT's international strategy?" "Indeed does it have one, and, if so, are we following it?" Last year two important international reports . . . were produced that together help sketch the principles their authors believe should guide MIT's international strategies.

national Advisory Committee, co-chaired by Associate Provost Philip Khoury and Vice President for Research and Associate Provost Claude Canizares, has continuing responsibilities for reviewing new and existing international programs. This year we are likely to have opportunities to apply the principles laid out in these reports as proposals for new alliances are considered with countries as diverse as Russia, Haiti, and Brazil. These come on top of major new initiatives signed in recent years with Singapore, Portugal, Abu Dhabi, and others. The requests for MIT to partner with countries and universities around the world are bound to escalate in the years ahead. We need to be proactive and purposeful in developing our international footprint or it will be

defined for us as we respond to individual requests and opportunities proposed by others.

Our role in helping Haiti recover from the devastating earthquake illustrates both the strengths and weaknesses of how we respond to requests for engagement.

Clearly, the magnitude of the devastation and the close proximity of this neighbor moved all of us to respond in our individual ways. Many at MIT made financial contributions. Previous issues of the *Faculty Newsletter* also highlighted various projects students and faculty groups initiated. This is MIT at its best – grass roots initiatives bubbling up in response to a clear need or opportunity. Now we are in a second phase in which MIT is being asked to help rebuild the university system in Haiti by drawing on some of our unique capabilities and resources such as OpenCourseWare and experience with faculty mentoring programs such as the Sloan School's International Faculty Fellows initiative. A group of interested faculty is exploring

ways to do this in partnership with Haitian education leaders. But unlike most of our other international partnerships that come financed by the partner country, our work with Haitian partners needs to be funded by outside donors and/or with in-kind MIT resources and time commitments. How should MIT respond to requests such as this? Should some of the funds generated in well-funded partnerships such as those with Singapore and the Middle East be used to support worthy projects and partnerships in less well-endowed regions of the world?

A second long-term challenge facing MIT is how to adapt our governance system to an increasingly interdisciplinary world. Power and authority are concentrated within MIT's departments and Schools. Appointments, promotion and tenure decisions, course and degree requirements, teaching allocations, and budgets, all flow through departmental and School structures. Yet increasingly the world's big problems do not reflect departmental boundaries. MIT has historically been quite innovative in building cross-disciplinary laboratories in response to emerging problems. The MIT Energy Initiative and the Energy Minor are two recent examples of this type of response. Hopefully, this coming year equivalent cross-disciplinary research and educational programs in the Environment and Sustainability area will be launched. The Koch Cancer Research Center will be another highly visible interdisciplinary effort to attack a major national priority and need. Each of these required invention of new governance arrangements. My sense is there will be many more initiatives like these coming in the years ahead. I suggest now would be an excellent time to review the positive and negative lessons learned in putting prior and existing cross-disciplinary initiatives in place and to use these lessons to ask how our governance processes might better reflect the changing boundaries of knowledge, research, and education.

The future of undergraduate education is another strategic topic and locus of innovation that continues to be discussed in a variety of forums and modified at the edges. Is the standard two-semester, fall-spring, classroom-focused model still the best way to organize student learning? That model may have been optimal when students were needed back on the farm to help with the summer harvest, but this is

departments have already taken steps to strengthen their processes. One area highlighted in the report is the need to strengthen faculty mentoring. The Associate Provosts for Faculty Equity and I are planning to bring together some of our best and most experienced mentors to explore how we can spread the skills and practices that have demonstrated their value across the Institute. Keep an eye

Is the standard two-semester, fall-spring, classroom-focused model still the best way to organize student learning? . . . How can we take full advantage of project based learning, team projects, UROP, the multitude of internship and related off-campus field experiences, OpenCourseWare, and other e-learning technologies?

hardly a current constraint. How can we take full advantage of project based learning, team projects, UROP, the multitude of internship and related off-campus field experiences, OpenCourseWare, and other e-learning technologies? None of these are substitutes for intensive classroom teaching and learning. The question we need to keep exploring is how these and other learning tools might best complement and reinforce what we do when we have students in our classrooms. In the best MIT tradition, I expect this to be an arena of considerable local experimentation and innovation this year and beyond. We might do well to capture the changes occurring in our undergraduate programs as we go along so we can consolidate and build on lessons learned.

A critical part of the innovation process involves implementing ideas to get things done. Last year's report on Faculty Race and Diversity identified a number of ways to strengthen recruitment and retention of minorities. Each School Council has now reviewed and discussed the report and its recommendations and a number of Schools and

open for more communication on this issue as the year moves on.

The Institute-wide Planning Task Force is likewise now well into its implementation phase. My hope is that we continue to demonstrate our ability to follow through and implement many of the ideas proposed by this creative process. Some ideas are already in place – Digital MIT took big steps by implementing electronic payroll and travel reimbursement processes and project teams are hard at work developing implementation plans on the host of other ideas that were generated. More decisions lie ahead as the groups exploring revenue generation options complete their work. Stay tuned as these reports are circulated for further input, discussion, and decisions.

These are some of the more proactive, strategic questions on my mind at the beginning of the term. I invite you to join me in exploring them and demonstrating the value added of our faculty governance system. ■

Thomas A. Kochan is a Professor of Management and Faculty Chair (tkochan@mit.edu).

Interview with John Reed

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I do not have an agenda. I hope to be engaged in the conversation that touches on our problems and opportunities. I hope to work with the Corporation so as to bring our talents to the table.

FNL: If you had to list, not necessarily in order, the five duties that you view as being most important for the chairman, what would they be?

JR: Clearly, my role is to engage the members of the Corporation and strengthen their involvement with the Institution.

We should be engaged with the routine of the Institute, the Visiting Committees that include Members of the Corporation, and the reports of these committees that go to the Executive Committee and then to the Corporation itself are the primary mechanism for this. The President also makes a report at each meeting.

We should be engaged with the Institute's finances.

We should be engaged with the Institute's plans and visions for the future and understand the human and financial dimension of these.

We should be somewhat engaged with the human fabric of the Institute as a community.

FNL: Isn't the chair usually a member of the Corporation?

JR: Always.

FNL: So isn't that administration?

JR: No, because the Corporation sits above the administration. What you have is the Corporation, which has a set of fiduciary responsibilities with regard to the well-being of the Institute; they basically delegate the day to day to the

Executive Committee. So if you had to define legally who is accountable for the proper functioning of the Corporation, it would be the Executive Committee of the Corporation.

FNL: What type of things would you do if we had more money?

JR: One thing is you might renovate this main building, if you happen to have an extra billion dollars. We have quite a bit of deferred maintenance that would be nice to start chopping in on. So we have a deferred maintenance problem. We need to renovate the main building. We probably need to build a few buildings.

FNL: But we're a faculty newsletter, so let me phrase the question slightly differently. How accurate do you think the information you get through the Visiting Committees is in respect to reflecting the faculty point of view?

JR: A Visiting Committee is not designed to reflect the faculty point of view. The Visiting Committee is designed to allow the Corporation to have insight as to how these various units are functioning. We talk to students, graduate students, undergraduates – we talk to junior faculty, we talk to senior faculty, we talk to the administration (typically the dean) and so forth and so on. So it's intended to give a rounded view.

FNL: What type of things would you do if we had more money?

JR: One thing is you might renovate this main building, if you happen to have an extra billion dollars. We have quite a bit of deferred maintenance that would be nice to start chopping in on. So we have a deferred maintenance problem. We need to renovate the main building. We probably need to build a few buildings. I mean the Energy Initiative would be well served if it had space that was contiguous and so

forth. And we're tight. Were we to want to redo this main building, we'd need some swing space while the construction was going on and we don't have a lot of space sitting around campus. And there are other programs we'd like to pursue.

FNL: But what would we need to cut out?

JR: I wouldn't cut out anything. Look, if this were a private sector company, there probably are some savings that I'd be able to identify for you. But this isn't a private sector company. Our reason for being isn't to make a profit. It's to educate people and move forward on some intellectual frontiers. We're not going to be as efficient as the company that's run on a profit making mode.

FNL: I was referring to whole programs.

JR: I don't have any insight as to programs. That will be something you'd have to ask the faculty and the administration. The Corporation wouldn't claim to have sufficient understanding of the academic programs. They could respond to recommendations. They could think about things.

FNL: So that opens up an interesting question as to the relationship between the Corporation and the administration and by extension through to the faculty. You mentioned the Energy Initiative. One thing we were going to ask you was given that BP is the founding and a major sponsor of the Energy Initiative, and given the incredibly

negative publicity BP has received recently, does that reflect on MIT or is that something you would not get involved in?

JR: The Corporation, we're fiduciaries. We worry about the proper functioning of the Institute and we worry that we have the resources necessary to evolve in a reasonable way. BP is important, but I don't think a singularly important part of the Energy Initiative. They are probably more important to the Sloan School. They have a major executive educational activity with the Sloan School, which I could imagine them expanding, because the purpose of the educational effort at the Sloan School was to help them improve their management of large projects. Yet on the other hand, you could say that they've had this relationship with Sloan for a couple of years, and it doesn't seem to have accomplished its mission.

BP's a good company. They had a major blowout; they've had a bad history of accidents in the United States. Having run a big company, I know something about how one has to worry about that, and BP clearly has a cultural problem. They have not managed the U.S. organization, or figured out how to deal with some of these safety issues. And that's an organizational problem and a management problem. And it's something BP's obviously going to have to address and do better. But I don't think there's any problem with MIT. It is, however, really a great engineering problem, and something that I think some people here could have a deep understanding of. But that doesn't have anything to do with the Corporation.

FNL: *That segues into one of the questions that some members of the Newsletter editorial board wanted us to ask. It revolves around the issue of BP and the U.S. government essentially ignoring advice and offers of assistance from the leading scientists in the field regarding the Gulf disaster. There are particular people at MIT who made overtures and were rebuffed and who early on did calculations and had MIT expert insight, and they were totally ignored. These*

people were very upset, and I guess the question is, do you have any insight as to why this would be, or is there some way we can deal with this?

JR: Frankly, I'm not surprised. I think the government's response was totally political. And having MIT experts probably didn't change the political equation much. I don't think the administration would have been seen to have been better or worse for having engaged such people. As it was, the administration, frankly, didn't have much to contribute. They had very little expertise. They aren't particularly expert at cleaning up oil spills; the oil industry is. So the government was there because people were ticked off and the people expect the government to be at least doing something, so the government responded. It had very little practical implications. And probably, they wouldn't have known what to do with MIT advice because they did not have the substantive expertise to use it.

Now, the industry group is different. This was run by BP and was a consortium of all the expertise of the people around the Gulf. There I think you have a legitimate question. I mean, if there was some outside engineering or scientific advice that could have helped, that is the unit that should have reached out for it. My guess is they were just overwhelmed and were unable to necessarily reach for the advice. You know, this was very much an engineering problem, and very much an engineering solution. It wasn't a scientific solution. So no one sat back and said, OK, let's figure out what is the best pathway to reduce this; they just said, hey let's try this, let's try that, let's try the other. I mean, it reminds me of engineering. They tried a thing, it doesn't work, you try something else, maybe it'll work, somebody else has an idea, and finally they get the well capped. I also don't think they had a particularly good idea of how to try to disperse the oil once it was in the water. They, again, were experimenting. There may very well have been some knowledge here at MIT that could have guided them more

intelligently. They don't know to this day whether the chemicals they used at deep depths were net positive or net negative. So I think that the faculty at MIT just has to understand that under these kinds of circumstances the government's doing politics, and the people involved probably were too busy. Truthfully, I'm not at all surprised. I mean, I've been around various crises, and rarely are they dealt with in a theoretically wholesome way.

FNL: *We interrupted you with your list of duties.*

JR: Well I said get the people engaged, and then I said manage and get the engagement. Then I talked about the financial and the cognizant, both in terms of things we need to do, like deferred maintenance and things of that sort, as well as moving forward. Next you want the Corporation to have some sense of the people, of the human fabric of the organization. You want them to know senior faculty, deans, people of that sort, because you don't get to know the faculty through the administration. The administration is typically all faculty but they're in different roles and they're playing different roles.

FNL: *How do you manage that one?*

JR: Well, it's a question of having faculty presentations, including the faculty at various lunches, and there's a fair amount of interaction, but I doubt that it's representative. It's sort of arbitrary.

FNL: *Former Associate Provost Jay Keyser runs what he calls Random Faculty Dinners.*

JR: I hadn't heard of them.

FNL: *They're monthly dinners, where he invites randomly faculty from across the Institute, and brings them in and just gets them together. You ought to go to one of those.*

JR: If invited, I would go.

FNL: *I'm sure we could get you invited.*

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Interview with John Reed
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JR: But getting to know the people is quite important, and not only the faculty, but also the people responsible for construction or people of that sort. I mean, we're spending a lot of money building things. It's not a bad idea to have some idea of who's doing the building.

FNL: *One of the things that's happened recently, I think in part because of financial concerns, is that some of the really very best people, from my limited, anecdotal point of view, have been let go. Sometimes without any obvious cause. Occasionally when I've looked into it I learn that these were choices that were made in order to make things more efficient. We were talking about that indirectly before. So that's just a concern I thought I'd bring out. Colleagues are often not sure why these people were let go; sometimes they weren't even told why they were let go.*

JR: Well, sometimes you're let go just because you're shrinking down an organization. That has nothing to do with the individual performance. It's just that you decide that although you have 15 people, you really only need 10. It's a managerial decision.

FNL: *Right. But the managerial aspect of the Institution over the last 10 years has become, many of the faculty feel, too corporate. That is American corporate, not MIT corporate.*

JR: I am aware of these things, and by the way one of my jobs, not the Corporation's job but my job, is to know about them. One of the reasons they want me to be here is to just get insight, because there are times, particularly when the Executive Committee might want to have a view that isn't just necessarily the administration's view, but somewhat, I say somewhat, separate from the group. When I was in a management position – which I'm not here – I liked two voices. We never

let anybody go without getting two opinions. Because one person is more inclined to make mistakes. When you have to discuss and explain it to somebody else there is usually more balance. But in any event, this management thing is an issue.

If I were running a business enterprise, I could tell you some things of the cost sort that you could cut here. But I don't think we are particularly well-designed for that. I would like to . . . find ways to not be so tightly coupled to the value of our endowment. One of the things that I've seen not only here, but at Stanford and Harvard and all over the place, is that when the endowment goes down, there is a feeling that they immediately have to cut the budget down.

You know, the faculty and the whole idea of the university is great. I mean you have 1,000 independent practitioners, basically, each of whom has certain interests and disciplinary expertise, and they're willing to agree to teach a certain amount, but by and large they're independent. Yet they have to somehow coalesce around the meaningful whole.

FNL: *So you have no boss until you become a member of the administration.*

JR: Yeah, that's right.

FNL: *Once you do that, you've taken a step down from the top of the mountain.*

JR: I was on the board of Sloan-Kettering Memorial in New York for about 30 years. And doctors have a certain quality that's not dissimilar from professors. And attaining efficiency within hospitals is hard, because you're really there to improve the health of your patients, and that may or may not allow for efficiencies. I think this government medical plan is probably going to destroy some good medicine because it's hard to run efficient systems when you're dealing with something like human health. But anyway, I'm sensitive to it maybe, in some ways, more

than most, because I probably know more about management than most of the folks around here. But I also have some appreciation for the academic enterprise, and that's why, when you said what do you cut, well. . . .

If I were running a business enterprise, I could tell you some things of the cost sort that you could cut here. But I don't think we are particularly well-designed for that. I would like to – and this is a conversation that I'll have with the administration – find ways to not be so tightly coupled to the value of our endowment. One of the things that I've seen not only here, but at Stanford and Harvard and all over the place, is that when the endowment goes down, there is a feeling that they immediately have to cut the budget down. Now, obviously, you can't totally ignore the financial reality, and if you have resources that have been reduced, then you have two problems. Number one is you've got fewer resources. And the second one is you're trying to maintain an image with donors of being responsible, which does play a role. If that weren't there, I'm not sure the universities would all respond as they do. But many of them, such as universities and hospitals and libraries and museums and others that live off endowments, are not particularly well structured for managing costs as you might in a business. There you would manage your revenue and expenses tightly. And you expect that you will adjust your expenses if your revenues fall. In fact, one of the characteristics of this recession is that the businessmen have done spectac-

ularly well at cutting their costs, which is why we have unemployed people and relatively low investment and good corporate profits. Because they haven't given up much in the way of margin. I took the S&P 500 companies and I got rid of the financial sector, because that's different, and I took revenue and expense for 10 quarters for the remaining companies, going backwards, and they absolutely matched. As revenues slowed down, expenses slowed down. And so private-sector business is designed to have those kinds of response capabilities. Universities, hospitals, museums are not. Nor would you want to architect them so that they could.

FNL: *The recent faculty wage freeze was obviously a concern.*

JR: And there's also another thing. You inevitably have a catch-up later. In other words, if you hold wages for three years or so and created a bubble, and then things get back to normal, and then you start to look at Stanford and Harvard and everybody else, and then all of a sudden you discover that because of this three-year interval that you're way out of whack. And then you end up having to play catch-up ball, and the net of it is that you look at it over five years, you haven't saved a nickel.

FNL: *So how do you communicate as chair or as part of the board those ideas to the administration, the ideas about perhaps not restricting the endowment so much, or the salary freezes? What is the process?*

JR: I talk to the administration; I talk to Susan. We set up scheduled meetings every two weeks between now and next June. I see her more frequently than that, but we set it up just so we have some points on the calendar. I see Rafael [Reif, the provost]. I've walked the hall here, and I'm around the corner from everybody, and the men's room is on the other side of the hall. So I can't get to the men's room without walking past the offices of the president and provost. And I offer advice.

Susan and I have a good rapport. She and I were working together before I had anything to do with this particular job. I used to see her about every three or four weeks, and we'd talk about managerial kinds of things. Because I've had more experience than most academics. It doesn't mean that I'm more correct always, but I have had more experience. So I offer advice. It is accepted 15-20% of the time, and that's fine. I'm not in the administration; I have no responsibility for any of these things. So my role is to be useful, and if I have some insight and advice, if I think something's truly serious at the corporate level, then I would take it to the Executive Committee, and I would just say that I don't agree with the administration, and we have to decide whether or not the executives want to do anything about it. But I can't conceive of that happening.

FNL: *A related question. One thing that has concerned the faculty, perhaps more in the last half dozen years or so, is the idea of there being really no administrative accountability; no checks and balances.*

JR: The Executive Committee is a clear balance.

FNL: *Yes, but you just said that you could hardly imagine something happening where the Executive Committee would actually comment.*

JR: Well first of all, I have not yet been to the Executive Committee meetings. I've seen the minutes, because the minutes are circulated to the Corporation. They're deeply engaged. I was quite surprised to find that they're meeting eight and nine times a year for a full day. You know, I ran a much bigger enterprise than this with much less need for that kind of meeting. And there is also an executive session, where all of the administration leaves and the chairman runs the Executive Committee where we talk amongst ourselves, see if there's anything we'd like to talk about that we don't necessarily want to share with the administration, and

that's good corporate practice. So there are checks and balances here. The administration runs the place, as it should. The president is selected by a search committee that has the Corporation well represented, and the president serves at the pleasure of the Corporation. Were the Corporation ever to feel that the president wasn't doing his or her job properly, there would be a reaction. And I think you probably know that after five years there was a review of Susan. I wasn't at the time chairing the Corporation, so I was asked for some of my own comments, but I didn't see the results. I presume Susan was given feedback. MIT has a very traditional organizational structure, in the sense that legal responsibility clearly resides at the corporate level. And the management works on a day-to-day basis, and all the academics decisions are approved at the corporate level – tenure appointments and degree granting and so on. That's the rubber stamp, because we have no insight whatsoever on the substance of any tenure discussion or any degree decisions. That's really totally in the hands of the faculty.

FNL: *So in an overall sense, perhaps the Institute is being run a little more corporately than many faculty would like. And there's certainly been an increase in the legal staff. The basic idea seems to be that for many years, MIT worked from the bottom up. That the ideas – and not only scientific ideas but money-raising ideas as well – came from the faculty and were administered by the administration. Far more frequently now it appears that the administration initiates the moneymaking procedures and participates to a far greater degree in the distribution of that money, and that there is some concern about that top-down versus bottom-up process. Some of this obviously has to do with the nature of the relationships the Institute is now forming, not only with companies, but with foreign governments. And the need for more legal input and perhaps corporate input. But it is, just to express it to you, it is somewhat of a concern within the faculty.*

continued on next page

Interview with John Reed
continued from preceding page

JR: I've had no particular insight into that. I presume, but I don't know, that Susan and Rafael spend a lot of time with the faculty, their deans, the department heads, and so on and so forth, and that ideas generate from there. For example, take the Energy Initiative, or bioengineering, which are the two things Susan spoke about early on when she became president. I doubt seriously that she arrived from Yale with either one of those thoughts.

We also have joint ventures: Whitehead and the Broad institutes, and so forth, which require senior attention and staff.

FNL: *I'm sure you're right.*

JR: You know, we're basically a research and educational institution, and the question is how best to create the right kind of environment so that we function well. And we certainly better be listening to the folks who are doing the work. And I have to presume that we are. But that certainly is not the responsibility of the Corporation. If we wanted the Corporation to have knowledge of the ideas generated from individual faculty, we'd have to totally reconfigure, and we'd have to have meetings every other week. And remember, there are four meetings during the year. You've got 75 people who meet four times a year. I set my first objective for the Corporation as engagement. It's an issue when you meet only four times a year. One way you get the engagement are the Visiting Committees. That brings them on campus for other reasons, and then we make a big deal over graduation, which also tends to bring people back onto campus. But we want this engagement. But listening to the faculty and where it drops down or bottoms-up, that has to come from the administration.

FNL: *One small thing that we try to do, is that we do send each issue of the Faculty Newsletter to all the Corporation members so that they can get at least roughly 20 pages of the unfiltered view – to get some idea.*

JR: That is good. By the way, I think we do get a fair amount of unfiltered comments.

FNL: *E-mails?*

JR: We do get e-mails, and also faculty and student publications. One thing is that if somebody is going to send an e-mail, sign it. What I do, and I've done this for years, is if it's not signed, I throw it in the wastebasket. You just can't deal with allegations that a person isn't going to put his name to. And I understand the problem of retribution and all of this kind of stuff. You've got to create an environment where that doesn't happen. You know, every person has a "contract" with the Institute that sort of says, this is what I expect of the Institute, and this is what they can expect of me. It's got to be clear what's expected of each professor or each graduate student, or whomever. But they also have a claim on the Institute. There are certain things that they can demand, and should expect. You should think about those things from time to time and make sure we keep those contracts alive and well. And on average, by the way, I think MIT does quite well. I've seen a lot of institutions, and it's hard to judge performance, but if you judge performance precisely in the sense of will we attract the kind of people we'd really like to into the faculty and into the graduate students, without much exception, you'd have to answer yes.

FNL: *The faculty is definitely aging. One of the things contributing to that is that the department centers has squirreled away a lot of money for a rainy day. And it's been raining for several years now, and the money is more or less gone. And one of the reasons it's gone is because there's no*

administrative help either from the provost or the dean for new hires. And so all that is very expensive; it can cost a million dollars for a new hire. And so that's an issue. And then as the faculty ages, there are changes in the retirement portfolio. Health benefits and financial benefits have continued to erode to the point where people feel that they can't retire and maintain the standard of living they've had before, whereas there was a time when that wasn't true.

JR: Although the people retire quite well.

FNL: *Not as well as they used to, and not as well as the expectation.*

JR: The expectation I can't comment on. Professors as a group in the top universities have moved up at least two levels in the hierarchy of standard of living, you know. Full professors at good universities live awfully well, are paid well, amazingly well. And the other thing is, I'm told by Human Resources, that the typical 401K of retiring people from MIT is quite full. Now this is money that's been matched, but also contributed by the individual, but the point is, it used to be that if you chose to follow an intellectual life and become a professor, you were sort of in the lower middle class and maybe the middle of the middle class in income distribution in the United States. Culturally, they're probably in the top 1%. But now, you know, the professors at major universities, at MIT and Harvard, Yale, and all these places, do quite well and are well up in the distribution of incomes.

FNL: *Well thank you for sharing some of your time with us.*

JR: Thank you. And I might suggest that we talk again say in a year. I'm pretty new at the job and some of my ideas now might be different then.

FNL: *We certainly will.* ■

MIT Ranked 7th in Latest *U.S. News* Poll

Institute still top engineering school

MIT WAS RANKED SEVENTH (tied with CalTech) in the latest *U.S. News & World Report* undergraduate national universities rankings, announced in the magazine's "America's Best Colleges" issue published in late August. Harvard, Princeton, and Yale were ranked first to third, respectively, in the national universities rankings, the same as in the 2010 rankings.

The Institute maintained its place as the number one undergraduate engineering school in the country, and also remained second (tied with the University of California at Berkeley) to the University of Pennsylvania in the undergraduate business school category.

U.S. News made two changes this year to the Best Colleges ranking methodology. The changes that may have influenced MIT's drop from fourth last year to seventh, are:

1. **Undergraduate academic reputation less heavily weighted.** MIT has always ranked at or near the top in this category (formerly peer assessment, and this year with the addition of high school counselor's ratings). This year MIT, along with Harvard and Princeton, received the highest score (98 out of 100). However, because the weight applied to this category dropped from 25 percent of the final score to 22.5 percent, MIT's relative rank may have suffered.

2. **Graduation rate performance is more heavily weighted.** This measure now accounts for 7.5 percent of the final score (compared to 5 percent previously). This variable measures the difference between a school's actual graduation rate

and the one predicted by *U.S. News* based on students' test scores and institutional resources. MIT's actual versus predicted graduation rate is frequently lower than

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peer universities, perhaps due to the rigor of the demands of the Institute's heavily based science and engineering curriculum. CalTech also often underperforms in this area.

Categories (and weights) used by *U.S. News* to judge colleges include:

- Undergraduate academic reputation (22.5%)
- Graduation and retention rates (20%)
- Faculty resources (20%)
- Student selectivity (15%)
- Financial resources (10%)
- Alumni giving (5%)
- Graduation rate performance* (7.5%)

*The difference between actual and predicted graduation rates.

U.S. News also rated individual engineering and business departments. [Note that not all programs are rated each year.] Several of the Institute's programs in these areas were ranked in the top 10. They are:

Engineering

- Aerospace/Aeronautical/Astronomical (1st)
- Biomedical/Biomedical Engineering (4th)
- Chemical Engineering (1st)

- Civil (6th) [tied with Stanford]
- Computer Engineering (1st)
- Electrical/Electronic/Communications (1st)
- Environmental/Environmental Health (5th) [tied with Georgia Tech]
- Materials (1st)
- Mechanical (1st)

Business

- Entrepreneurship (5th)
- Finance (3rd)
- Management (9th)
- Management Information Systems (1st)
- Marketing (10th)
- Productions/Operations Management (1st)
- Quantitative Analysis (1st)
- Supply Chain (1st)

Data was taken from the 2011 edition of the *U.S. News & World Report's* "America's Best Colleges."

See "MIT Numbers" (back page) for the top 10 rated schools over the last decade. ■

Teach Talk

Pedagogic Scenarios: Where's the Metric?

Malcom W. P. Strandberg

LAST YEAR, THE NEW YORK TIMES [13 January 2009,12:2] published an article that was a very supportive discussion of the creation and operation of the TEAL physics course. It quoted a staff member of the course saying that the student failure rate in the course TEAL replaced had reached 30 percent, signaling that a course change was needed. Doubtless that conclusion is bolstered by other factors, but taken by itself it is a rational opinion and all opinions are true.

The problem with rational opinions is that other rational opinions will exist, so reaching a conclusion is a matter of compromising opinions in some arbitrary fashion. On the other hand, a logical system would yield the same conclusion for all who consider the situation.

A logical system would have the characteristic metric and an arithmetic that contains the basic assumptions of the system that determines how the elements of the metric transform. In simplified form, this is Euclid's axiomatic form of plane geometry, a metric of theorems and the assumptions, that parallel lines do not intersect, etc., or the form Newton used to establish logical physics, with the laws of motion the metric and the calculus the arithmetic. These forms admit closure, so no matter by whom or where a conclusion is drawn the answer will be the same for metrics embodying the same assumptions. After one has established the basic assumptions about grades, it is too simple to think the logic based on those assumptions can be used to model the total education environment.

James A. Garfield, a professor of Classics at Hiram College who became the

twentieth President of the United States for four months before he was assassinated, said [See Diane Zabel's occasional column at *rusq.org* for an essay listing what might be the original expression and its many plagiarisms], "The ideal college is Mark Hopkins on one end of a log and a student on the other."

In the terms of the present discussion this statement places the teacher in the determining position. The student on whom the lecture focuses is also in a determining position, for the student must be capable of being engaged by the lecture, by having made the preparation to possess the capability to provide a basis on which the lecture can build. And the log, it expresses the determining effect of the adequacy of the classroom to support this activity.

Any one of these elements can be judged in terms of rational opinion that can range from religious faith to something approaching pure logical results. It is a fact that a lecturer can hold the attention of an audience and transfer no information. Or for a lecturer to have much information to transfer to an audience yet be unable to do so because of a lack of the ability to hold their fascinated attention. Luther Burbank, the genius horticulturist, is said to have been one of the unfortunate latter types [Jane S. Smith in the review of her book by Janet Maslin in *The New York Times*, 04 May 2009, C4:1]. He was also Visiting Lecturer on Evolution at Stanford University, 1904-1906.

It appears then that all these factors, teacher, classroom, student selection, syllabus, examinations deserve metrics and arithmetics to be used to define a given

teaching environment. The metrics will not be as simple as the one Newton presented to the world, force equals mass times acceleration, with the arithmetic, the calculus, to determine transformations of the metric. But the basic assumptions, which compose the metric, can be assembled at least in part. I have given a start for a metric for examinations and grades [M. W. P. Strandberg, *Design of Examinations and Interpretation of Grades*, *Am. J. of Phys.* 26, 555 (1958)].

The arithmetic, the function that transforms examination elements is logical steps.

In the '30s, when K. T. Compton and J. C. Slater began their renovation of the MIT Physics Department, they used what could be called unarticulated metrics to fashion the physics course structures. After all, the structure and implementation of the courses in a physics department is intuitively obvious. For the first two years all students were required to take physics courses. N. Frank wrote an introductory physics book that was strong in mathematics and taught from it. F. Sears wrote an introductory physics text that was lighter in mathematics and more graphic and taught from it. At times a course and syllabus based on some field of application of physics but light on a professional level was added.

It is clear that the lecturer, syllabus, and student metrics were exercised to satisfy the need to try to approach an environment that was different for different students. Admittedly, a triage of the students does not get to the one student and Hopkins scenario, but it is an attempt that rational opinions made, and that logical analysis might have improved.

So what about the high failure rate in the course? Was the selection of students to take the course a poor choice? Were the examinations unintentionally difficult as evaluated by a grades metric? Or was the lecture and recitation section format a poor one for this course material? Obviously these are not easy questions to answer without using a logical process and a good deal of rigor.

This essay is meant to be a challenge and so it lacks the explicit elements of a course design system. But the elements of the metrics controlling various aspects of the course are known or readily discovered and need to be declared as assumptions.

The scheduling matrix is readily diagonalized for the college course, for there cannot be more courses taught than there is staff, a given, to present them. Even the addition of attributes does not make the scheduling much more difficult. Considering attributes does make staffing more difficult. The lecturer who charms audiences and leaves them with a slight

grasp of the topic of the lecture, and the lecturer who can embed the topic of the lecture in the mind of the audience in spite of not charming them, are two different people. Or, in the future, the lecture room may be supplied with netbooks that the lecturer could use to interact with each student separately by storing the response of each student to a query the lecturer makes, in a modern multi-dimensional version of Mark Hopkins' log. Are these three different lecturers or three similar people adapting to course needs?

The classroom metric in a similar manner contains the indisputable properties of each class environment and how they are modified by the client taking the course. At one time student seating was assigned and roll was taken by an empty seat scan. How important is attendance?

The student metric has to do with preparation and interest of the student in the course material and its mode of presentation. Richard Feynman organized a physics course with three students in order

to get the material he wanted presented at a level he wanted. The human factor is so dominant in this metric that it is certainly the most difficult to be satisfied.

As for grades and grading, I have presented elements of a metric in the Logical Steps Rule referenced earlier. My experience tells me that my colleagues are offended if one does not understand or accept their intuitive judgment as to the difficulty of a question. And they are puzzled by the degree of difficulty that students find a question to have that does not mirror my colleagues' views. If I had to guess, I would probably say that remedial work on an effort to broaden the population with a logical basis for an understanding of the design of examinations and the meaning of grades would yield the richest dividends when compared with work on any of the metrics discussed above. ■

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Teaching this fall? You should know ...

the faculty regulates examinations and assignments for all subjects.

Check the Web at web.mit.edu/faculty/termregs for the complete regulations.
Questions: Contact Faculty Chair Tom Kochan at x3-6689 or tkochan@mit.edu.

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

First and Third Week of the Term

By the end of the **first week** of classes, you must provide a clear and complete description of:

- required work, including the number and kinds of assignments;
- an approximate schedule of tests and due dates for major projects;
- whether or not there will be a final examination; and
- grading criteria.

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

For all Undergraduate Subjects, Tests Outside Scheduled Class Times:

- may begin no earlier than 7:30 P.M., when held in the evening;
- may not be held on Monday evenings;
- may not exceed two hours in length; and
- must be scheduled through the Schedules Office.

No Testing During the Last Week of Classes

Tests after Friday, December 3, 2010 must be scheduled in the Finals Period.

Collaboration Policy and Expectations for Academic Conduct

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

Random Faculty Dinners Approach 30th Anniversary

Samuel Jay Keyser

I BECAME ASSOCIATE PROVOST at MIT in 1985. That was why I happened to be present at a Faculty Policy Committee meeting when Joel Moses – he wasn't to become Provost for another 10 years – complained to the committee about the low ebb of collegiality at the Institute. There was, he said, a crying need for the faculty to get together socially. He followed his observation with a suggestion: Why not have weekly dinners at which faculty were randomly invited?

As a newly minted associate provost I was looking for things to do. I was also primed by a comment that a member of EECS had made to me just a few weeks earlier. He said that he had an office just two doors away from another colleague in his department. He told me that if he saw that colleague once a year he'd be surprised.

I asked close friends at the Institute what they thought of the idea. Most of them thought it would never work. People were too busy to take time out for collegiality. I decided to give it a try. My first dinner suggested the doubters were right. An inauspicious 13 people showed up.

To ramp up the attendees I tried ramping up the number of invitees. That did the trick. The magic number was 20%. If I sent out 200 invitations, I could expect 40 acceptances. (That percentage, by the way, is roughly the percentage of faculty who belong to committees outside their departments.)

The dinners have truly been random. At the start of each year, Allar Toomre provides my assistant, Charlotte Gibbs, with a list of numbers from 1 to 1000 randomly generated. Charlotte matches the

numbers on the list to an alphabetically sorted list of faculty and voila, the invitees for each monthly dinner. Of course, people decline. When they ask to be kept on the list, we do. So the randomness leaches out as the year goes on. Even so, there has not been a single dinner that I have hosted where someone has failed to meet a colleague he or she did not know before the dinner.

The dinners were first held in the Greer Conference Room in Building 36 thanks to the generosity of Joel and then Paul Penfield. I had them catered from outside. They invariably involved chicken and some outlandishly rich dessert. The monthly ritual was the same. Come at 5:15 pm for wine and cheese. Sit down to dinner at 6:15 pm. Leave at 7:30 pm.

The dinners coasted along in this pleasant fashion for a decade. I was pleased that faculty were pleased to come. I enjoyed hosting them because it gave me an opportunity to meet faculty that I would otherwise not have met.

Over the course of the Random Faculty Dinners, as they came to be called, I made two important changes. The first was to move the venue from the Greer Conference Room to the Emma Rogers Room. This room is among the Institute's most elegant with an incomparable view of Killian Court, the Charles River, and the Boston skyline beyond. I thought the faculty deserved a little class. It also made it possible for me to use the services of Tim Healey, the chef in charge of the room and his assistant, Simoney Cantieri. They added several more stars to the rating. I should have done that years earlier, but Tim and Simoney weren't around then.

The second important change came about as a result of a comment made at a dinner about 20 years ago. One of the guests, Robert Fogelson of the Department of Urban Studies and Planning, said, "You have a unique opportunity here. This collection of people belongs to no particular unit. At these dinners they aren't constrained by departmental politics. Also, they will never meet again. Why not set some time aside at the end of the dinner and ask them what's on their minds?"

From that point on I relegated 45 minutes at the end of dinner to ask the faculty what was on their minds. I took careful notes and prepared a summary of that evening's discussion, always anonymous. If a faculty member did not want to be anonymous, I would ask him or her to send me an e-mail that I would append to the end of my summary, again only with the faculty member's approval. I sent the summary to the President, the Chancellor, the Provost and to all the faculty officers. I have been doing that for the last 20 years.

Perhaps that is why these dinner discussions have become something of an event in themselves. First and foremost, they have provided the faculty with an opportunity to vent, pure and simple. That's not a small thing.

More importantly, these summaries constitute a record of the faculty pulse. Going back over them I find certain recurring topics. The one that most often occurs is the character of an MIT education and the character of its students. It is remarkable the extent to which faculty care deeply about these

issues. You might expect faculty to be primarily concerned about their own situations: tenure, salary, space, research support. It is true that these topics often arise. But never with the regularity of undergraduate teaching. The most recent take on undergraduate education was a complaint that students seem more interested in meeting course requirements than mastering course fundamentals. In the dinner I am referencing, this complaint came from faculty across all the Schools except for SHASS.

In recent years a recurring topic concerns what has been called “corporatization” of the Institute. This word has been used to cover a multitude of sins, from excessive form filling, to complicated rules and regulations, to a change in the sense of MIT as a community of faculty, staff, and students. What I think it amounts to is the failure of the old rules to apply with respect to the faculty and the administration. The old rules were about an administration that the faculty saw as themselves in suits. The new administration has

brought in a multitude of new faces, many not from academia. This novel situation requires a new protocol. “Corporatization” is a way of saying the protocols aren’t yet clear.

Here, in random order (pun intended) is a short list of the issues that have come up over the past two years:

- Pace and pressure
- Grade School initiatives
- Electronic publishing
- Faculty lunchroom
- Retirement options
- Organ transplants
- Faculty renewal
- MIT Medical
- Daycare
- Tenure and promotion

One of the things I’ve noticed over the years is that the tone of the discussion is often set by the tone of the first issue. If the opening salvo is critical, then the evening follows suit. If it is positive, then the evening is a love-in. I haven’t fretted too much about that because whether

critical or adoring, the comments of the faculty are invariably interesting. I wish there were some way to bottle these discussions and sell them.

The dinners have been solidly supported all these years by the administration. That said, they have not been immune to cutbacks. We no longer have fresh flowers on the tables. Not to worry. Charlotte made up a sign with a picture of a bouquet and the legend “Ceci n’est pas une composition florale” with thanks to Rene Magritte’s painting *Ceci n’est pas une pipe*. These signs are displayed on each table. So far no one has been disposed to take one home. Pace the flowers, the food continues as good and as elegantly presented as the conversation.

As for the future of the dinners, well, I hope they outlive me. I turned 75 in July! ■

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His new book, *I Married a Travel Junkie*, is reviewed here: alum.mit.edu/pages/sliceofmit/2010/08/23/traveling-reluctantly/.

Universities in Disaster Management
Frankel, from page 1

Frankel’s report to the Senate Committee on Homeland Security and Disaster Management].)

It is curious and unfortunate that during and after the largest environmental disaster, the BP deepwater Horizon spill, neither the government nor BP sought active advice and/or help from renowned, experienced, and readily available ocean engineering and science experts in American universities. Nor did they at any time take advantage of any of the tools and facilities available and offered to them. For example, MIT/Woods Hole Oceanographic Institution’s deep diving manned (three-crew) submarine, the Alvin, was in the area on its way to San Diego at the time

and has robotic arms and a long endurance. It could have helped to investigate the blow out preventer failure. Yet, though offered, it was not used.

Four months after the BP spill, the largest environmental disaster in American and possibly human history, the well is finally capped, but controversies continue. The millions of tons (not barrels or gallons) of oil that were discharged are still there, although they are submerged in a huge underwater cloud. Millions of gallons of poisonous dispersants and other liquids were used to sink the oil and in the process introduce further danger to ocean life and fauna. Much of this mess may stay there for decades and not just decimate Gulf waters, but slowly filter around the South Florida Keys into the Atlantic and up the U.S. East Coast.

It is now evident that this disaster was the result of lack of oversight, lax enforcement, as well as gross mismanagement by the operators. Many warning signs were there, but safety suggestions were overridden to save time and money. The blow out preventer failed and subsequent tests, required by law, were not performed. Even more shamefully, advice, offers of assistance and equipment made after the disaster were not accepted, although many of them could and probably would have greatly reduced the oil pollution.

Although many experienced ocean engineers and scientists from MIT/Woods Hole offered advice and help, it is curious or unfortunate that neither BP nor any branch of the U.S. government sought or accepted advice from the many renowned academic and research institutions in

continued on next page

Universities in Disaster Management

Frankel, from preceding page

ocean engineering/science in the U.S. In fact, some of us who aggressively offered advice through various channels such as the Coast Guard, Congress, White House czars, and BP received form letter replies, if any reply at all.

This is shameful, particularly as BP and its supporters showed early in the event that their main interest was not to solve the problem but to downplay it. We calculated the outflow two days after the explosion simply from data such as riser diameter, oil viscosity, and pressure, and came up with an estimated daily outflow of 60,000-80,000 barrels per day, when BP and the government insisted that the outflow was a bare 500-1,000 barrels per day just a few days after the explosion. We similarly advised that the so-called 100-ton top head dome with a top outflow pipe would not work, since gas would collect on top and crystallize, clogging the outlet. In fact, we proposed to insert a gas separator such as a smaller dome with a separate gas extraction pipe inside and let the oil flow out from under the small dome into the surrounding space to be extracted by a pipe about halfway up the larger dome height.

None of these or subsequent suggestions were considered. Later, when it became evident that none of the capping solutions worked, and even after insertion of a take-up pipe into the riser that captured 10,000-15,000 barrels/day, a much larger volume of oil continued to escape into the sea. Early on, we suggested the chartering of a number of very large tankers and sub-surface, high capacity suction equipment to suck up and load much of the highly concentrated oily water at the spill site of these tankers. In fact, we mobilized a major tanker company with about a dozen Aframax tankers home ported in Galveston (a few hours sailing distance from the spill site) to offer the use of their tankers; this to capture as much of the oil at the site at comparatively low costs compared with the cost of collecting it on the beaches and

marshes of the Gulf Coast. None of these offers were accepted or even considered, even though this approach had been very successfully used in a large spill in Saudi Arabia.

In fact, some of us who aggressively offered advice through various channels such as the Coast Guard, Congress, White House czars, and BP received form letter replies, if any reply at all.

We now face what has become the world's – not America's – largest environmental disaster ever, with economic, environmental, and social costs that are, in my opinion, immeasurable. Before long we will not only have to deal with coastal cleanup, idle fishermen, and empty resorts, but rolling shutdowns of electric power plants, slow steaming ships, and a sub-surface oil cloud which will float from the Mexican Gulf around the Florida Keys up the U.S. East Coast and then be driven by the Gulf Stream over the rich Georges Bank toward the English Channel and the North Sea, where it will finally hit home for BP. Not only will the \$20 billion currently budgeted to pay for this disaster be woefully inadequate, but the international and legal implications will impact the world for decades to come, as countries impacted by the spill, such as Cuba, Jamaica, the Bahamas, Bermuda, Portugal, Spain, and later France and even the U.K., charge us, the U.S., with willful negligence for letting it happen and not taking decisive action to minimize the effects. To me, at least, it is not only inexplicable but simply highly irresponsible that none of the decision makers approached used the readily available and freely offered advice of world renowned ocean engineering/scientists instead of blindly trusting BP, the perpetrator, to deal with the problem.

Unlike the Katrina disaster, this was completely man-made and required an even more focused and determined approach. While many advised the Obama administration to stand aside so that it would not own the problem, I must

say that I am afraid this disaster will be the major legacy of the Obama administration. Finally, I would say that I would have expected a more assertive approach by American academic and research estab-

lishments. It is not too late to help reduce the long-term impact of this disaster, but actions will have to be more aggressive.

While BP may not be alone in underestimating the probabilities of a low risk, large damage event, they have a long history of putting profit ahead of risk reduction and safety and were unfortunately aided by the lack of effective supervision and control. BP underestimated risks in several other cases in the recent past, such as the breakage of a corroded oil pipeline in Alaska and an explosion at their Texas refinery in 2005 that killed 15 workers. In fact, BP is known to take safety risks to save money and increase profits.

It is increasingly important that experts from academia and other independent engineers/scientists be involved in helping to ameliorate the effects of large disasters, assure effective emergency response management, and honest/true evaluation of both the reasons and effects of a disaster. With the experience of FEMA during and after Katrina, and now with the BP disaster, we can no longer just sit on the sidelines and observe and comment on these developments. I believe, as independent academics, we have a responsibility to assist in the amelioration of disasters and then offer independent expert views on what has happened, why it has happened, and how to prevent its recurrence. We cannot just sit idly by and let things happen, particularly if we are aware or believe that there is a coverup or disaster mismanagement. ■

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Institute Initiates Written Information Security Program (WISP)

Allison Dolan

ACCORDING TO A JANUARY 2010 story in *The Chronicle* regarding educational data breaches, most of the instances of losing “data on the move” occurred “when a professor took home a laptop that was subsequently stolen or lost.” [chronicle.com/blogPost/Educational-Data-Breaches-D/20462/]

Due to a recent set of Massachusetts data protection regulations, such incidents are no longer merely embarrassing; they are a potential legal risk for MIT.

In response to the regulations, MIT has been rolling out a campus-wide written information security program (WISP), which includes administrative, technical, and physical safeguards for certain types of personal information. The WISP can be found at web.mit.edu/infoprotect/wisp.html.

In conjunction with the WISP, MIT has defined a new term: PIRN (Personal Information Requiring Notification) that includes, along with the name:

- social security number,
- driver’s license or Massachusetts issued ID,
- or financial account number including credit card and debit card numbers.

If PIRN is lost or stolen, then MIT may be required to notify state officials, as well as the individuals whose information was compromised.

We would like faculty (as well as all other members of the MIT community) to pay special attention any time they are handling paper or electronic documents with PIRN. The easiest ways to reduce risk are to not collect any PIRN, to redact PIRN from paper or electronic files you still need, and to securely

will often redact such information, it could slip through and get scanned into SAP.

However, if you need to retain PIRN, then you must take additional steps, specifically:

In response to the regulations, MIT has been rolling out a campus-wide written information security program (WISP), which includes administrative, technical, and physical safeguards for certain types of personal information.

destroy any files you no longer need. Please see web.mit.edu/infoprotect/ for more information.

A couple of common areas where faculty may be exposed to PIRN:

- If you are reviewing student applications, SSNs maybe be included. Although an SSN is useful for the Admissions Office to have, reviewers generally do not need SSNs. Where possible, redact the SSN. Lost or compromised application files would generally be considered a data breach.
- For your personal protection, avoid providing unnecessary PIRN on backup documentation for travel or other reimbursements (e.g., remove your personal credit card number from any receipts or statements). Although administrators

• Minimum security standards are required for your computer as well as other devices.

• Encryption is required if PIRN is on a laptop or other portable device, or included in a file that is being transmitted across the public network.

• If a third party has access to PIRN, then the contract must describe the third party’s responsibility for the protection of the data.

If you have questions regarding the above requirements, or if you are concerned that paper or electronic files with PIRN may have been compromised, please e-mail infoprotect@mit.edu. ■

Allison Dolan is Program Director of the MIT Audit Division (adolan@mit.edu).



David A. Mindell

WILLIAM BARTON ROGERS, a Southerner, came north to pursue his dream of a new kind of technical education because he found warm reception in the culture of New England and because he fell in love with a Boston abolitionist woman, Emma Savage. Fulfilling Rogers's dream, the governor of Massachusetts signed MIT's charter on April 10, 1861, creating this unique and innovative educational institution. Those familiar with American history will recognize that week as the start of the American Civil War (the firing on Fort Sumter, April 12, 1861). More than a coincidence, the proximity reflects how MIT's history and that of the nation have intertwined from the beginning.

In the spring of 2011, MIT will be celebrating the 150th anniversary of its founding. The celebration will last for 150 days (January 7 to June 5) and consist of numerous events and programs. As chair of the MIT150 Steering Committee, I'd like to describe some of these events and explain some of the thinking behind the MIT150th. The steering committee, composed of faculty, students, senior administrative staff, and alumni has the broadest representation of the Institute of any committee on which I have served. The tagline of MIT150, "Inventional Wisdom," aims to capture the blend of imagination and knowledge inspired by *mens et manus*, ideals of MIT from the beginning.

Two years ago, when the steering committee began its work, we sought to create

some signature events that would mark the emotional and intellectual cores of the celebration. Then came the fall of 2008 and the global financial crisis, with its

actual anniversary, April 10. The convocation is inspired by earlier events such as the 1916 celebration of the move from Boston to Cambridge, the centennial cele-

The emotional center of the celebration will be the convocation, held on the actual anniversary, April 10. The convocation is inspired by earlier events such as the 1916 celebration of the move from Boston to Cambridge, the centennial celebration in 1961, and particularly the 1949 "Mid-Century Convocation," when Winston Churchill addressed the MIT community in the Boston Garden and challenged it to attend to the moral and social implications of the science and technology it creates.

impact on MIT's endowment and budgets. How could we celebrate at such a critical, defining moment? Of course, no one knew whether the spring of 2011 would bring depression or recovery, or something in between. Yet all agreed that MIT ought to celebrate its legacy and thank the numerous people who have helped make the place what it is. We resolved to do an excellent, appropriate celebration. The majority of the resources will be spent on campus supporting projects and programs initiated and executed by faculty, students, and staff.

The emotional center of the celebration will be the convocation, held on the

convocation in 1961, and particularly the 1949 "Mid-Century Convocation," when Winston Churchill addressed the MIT community in the Boston Garden and challenged it to attend to the moral and social implications of the science and technology it creates. The convocation will be held in the Boston Convention and Events Center to accommodate the greatest number of students, alumni, staff, and faculty who wish to attend, on a Sunday afternoon, which allows groups to hold their own gatherings and celebrations earlier that weekend.

A formal event, in full academic regalia, the convocation will celebrate

MIT's highest intellectual and educational accomplishments. It comes at a time that calls for diligence and integrity to help the nation and the world escape downturns and face daunting problems. It will celebrate how serious, sustained study of the natural, technical, and social worlds develops a spirit of rigor, creativity, service, and wonder, exemplified by MIT's researchers and students alike, a spirit with ramifications beyond science and engineering. Hence the convocation will celebrate MIT's moral accomplishments as well as its intellectual ones.

Where the convocation is the emotional core of the anniversary, the six MIT150 Symposia form its intellectual center. For the steering committee, the deepest, most meaningful celebration is to feature MIT's strengths by bringing intellectual leaders together to discuss the great problems of the day, make significant progress on some of them, and inspire and educate the leaders of today and tomorrow. The MIT150 Symposia will show by example how MIT fosters innovation, reflecting on historical accomplishments and envisioning the future.

What are the major topics? This question could only be answered by the community itself. Hence we formed a subcommittee of faculty (from all five Schools), senior administrative staff, alumni, and students. It sent out a call for proposals last fall and received great response. From the submissions, the subcommittee selected six proposals as MIT150 Symposia. The committee did not choose topics but rather specific proposals and the faculty and staff who stepped forward to lead them. Each symposium focuses on large, synthetic questions, crosses multiple Schools and departments, and undertakes to be a significant, watershed moment in the intellectual history of its subject. The six symposia in no way cover the full range of research and activity on campus. Rather, as select examples, they epitomize MIT: economics and policy; integrative cancer research; women in science and engineering; the age of computation; exploration

of earth, air, sea and space; and brains, minds, and machines. Stay tuned for much more on these exciting events, which promise to draw the attention of the world.

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Another component of the celebration will be the MIT Open House on April 30, when the Institute opens its doors to the public. People will be able to come inside MIT's educational and research facilities and see where the daily work of MIT gets done (reviving an old tradition at the Institute that fell into abeyance). Departments, labs, and centers have critical roles to play in showing off their research and facilities with mini-lectures, tours, and hands-on activities to educate people about MIT's work, mission, and culture. The Open House coincides with the Cambridge Science Festival, so many young people are expected to attend. Simultaneously, the Festival of Arts, Science, and Technology (FAST) will build on an old tradition at MIT of combining innovation in the arts with that in science and technology and will push the synthesis to new levels.

Numerous other events and projects will commemorate various aspects of the MIT community. Martin Luther King Day celebrations will pay special attention to the Institute's historical and contemporary commitment to diversity. The Class of 1954 is sponsoring a student design competition to complete the original plans for topping the plinths in Lobby 7. The Global Challenge will connect students, faculty, and staff with alumni

around the world to inspire innovative entrepreneurship as public service. The Infinite History project has logged more than 150 hours of oral history interviews with those who have shaped, or been

shaped by, MIT (the videos will be made available on the Web). The MIT Archives is producing a detailed, interactive Web-based timeline; two new scholarly books on the history of MIT will appear next spring.

A major theme of MIT150 is community participation. Very little of it is centrally organized: the Steering Committee's primary job is to coordinate efforts arising from the community. Therefore, we invite faculty, staff, students and departments, laboratories and centers to plan their own celebrations and to think about how you might participate in displaying MIT at the Open House in April. To become involved, please e-mail: mit150@mit.edu.

Working on MIT150 for the past two years, which has included developing and teaching a course on MIT's history, has underscored for me the unique, consistent character of this place, stemming from Rogers's original vision. Yet MIT150 is designed to celebrate and reflect on not one, but many MITs, each slightly different in our minds' eyes, collectively comprising our past and our future. ■

David A. Mindell is Chair, MIT150 Steering Committee; Director, Program in Science, Technology, and Society; Dibner Professor of the History of Engineering and Manufacturing; and Professor of Aeronautics and Astronautics (mindell@mit.edu).

MIT OpenCourseWare: A Decade of Global Benefit

Shigeru Miyagawa

AMONG THE MANY MILESTONES we will celebrate during the Institute's 150th anniversary next year, I am particularly proud of the tenth anniversary of MIT OpenCourseWare, the start of which was announced on the front page of *The New York Times* on April 4, 2001. Since the announcement, MIT has published materials from more than 2,000 courses, presenting the undergraduate and graduate curricula from all 33 of MIT's academic departments through the OCW Website (ocw.mit.edu). By the anniversary, these materials will have been visited more than 100 million times by an estimated 70 million individuals from nearly every country. More than 200 other universities around the world have joined MIT in publishing their course materials freely and openly, and have collectively published materials from more than 13,000 courses. This dynamic community, the OpenCourseWare Consortium, will gather on the MIT campus shortly after the anniversary to look back at the movement's first 10 years and look forward to the next decade.

As a member of the original committee that proposed the program, I can say with great confidence and pride that OCW has exceeded every expectation we had at the start. By any measure – number of courses, number of visitors, amount of public attention, benefit to MIT faculty and students – the site has surpassed the vision developed by the Lifelong Learning Committee that met in the summer of 2000. I am most proud, however, that MIT OpenCourseWare is truly an achievement of the entire MIT community, a site that

shares the voluntary contributions from nearly 1,400 MIT professors and teaching staff, and a similar number of MIT students. It is a collective act of intellectual philanthropy that truly reflects the MIT community's commitment to the dissemination of knowledge for the public good.

Over the past 10 years, OCW has moved from a bold experiment to an integral part of MIT. Currently, more than 93% of undergraduates and 82% of graduate

and informal learning around the world. As a member of the OCW Faculty Advisory Committee, I have the opportunity to hear regularly from the OCW staff regarding the impact of OCW worldwide. While the raw numbers mentioned above are striking by themselves, it is the stories of OCW use from around the world, the real instances of how the site is changing lives, that remind me most powerfully of why MIT decided to undertake OCW in

Currently, more than 93% of undergraduates and 82% of graduate students say they use the site as a supplement to their course material or to study beyond their formal coursework. Eighty-four percent of faculty members use the site for advising, course materials creation, and personal learning.

students say they use the site as a supplement to their course material or to study beyond their formal coursework. Eighty-four percent of faculty members use the site for advising, course materials creation, and personal learning. More than half of MIT alumni report using the site as well, keeping up with developments in their field, revisiting the materials of favorite professors, and exploring new topics. Open publication of course materials has become an ordinary element of scholarly activity for MIT faculty, and the ubiquitous availability of that curriculum to our own community has become the everyday reality of teaching and learning at MIT.

Perhaps because of this transition of OCW from experiment to regular scholarly activity, it is easy to lose sight of the transformative effects it has had on formal

the first place. As we approach the tenth anniversary of OCW's announcement and the OCW Consortium meeting that will follow, I have asked the OCW team to share OCW stories in the coming months through a series of articles on the *MITnews* site.

Just one of the stories of OCW use that has moved me recently is that of Jean-Ronel Noel and Alex Georges, entrepreneurs working to bring renewable energy to communities throughout Haiti. Through their company, Enersa (enersa-haiti.com/) they planned to create solar panels to serve the needs of their country, but in their research and development process, they required guidance in electrical engineering. Noel found the materials he needed on MIT OpenCourseWare. "I was able to use the OpenCourseWare to

MIT OpenCourseWare Recognized by the AAAS Open education site noted for providing exceptional online materials

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE (AAAS) has named MIT OpenCourseWare (OCW) as a recipient of the Science Prize for Online Resources in Education (SPORE). MIT OpenCourseWare is Massachusetts Institute of Technology's groundbreaking effort to share the core academic content – including syllabi, lecture notes, assignments and exams – from the entire MIT undergraduate and graduate curriculum. The site currently includes materials from more than 2,000 MIT courses and has received more than 68 million visits since OCW's launch in 2002.

The Science Prize for Online Resources in Education was designed to promote exceptional online materials that are available free of charge to science educators. The acronym SPORE refers to a reproductive element adapted to develop, often in less than ideal conditions, into something new. The winning projects are intended to be the seed of progress in education, even in the face of formidable challenges to educational innovation. *Science* publishes an article about each winning project by the project's developer. The article about the OCW site, which is called "MIT OpenCourseWare: Unlocking Knowledge, Empowering Minds," was published in the July 30 issue of *Science*.

"We're trying to advance science education," says Bruce Alberts, editor-in-chief of *Science*. "This competition will provide much-needed recognition for innovators in the field whose efforts promise significant benefits for students and for science literacy in general. The publication in *Science* of an article on each Web site will help guide educators around the globe to valuable free resources that might otherwise be missed."

In responding to the announcement, OCW Executive Director Cecilia d'Oliveira said, "This is a wonderful recognition of the thousands of voluntary contributions of materials from MIT community members that make MIT OpenCourseWare possible. These contributions are a dramatic demonstration of MIT's widely held commitment to knowledge as a public good."

learn the principles of integrated circuits. I found out that I could use an existing integrated circuit to make things more efficient, and I wanted an explanation about how it worked. I was able to learn this through the MIT OpenCourseWare."

Enersa's work has been supported by the non-profit Appropriate Infrastructure Development Group (AIDG). AIDG Executive Director Peter Haas describes how Noel and Georges leveraged OCW to build a successful business. "I was immediately impressed by [Noel], an engineer who taught himself the electrical engineering he was missing by using the free

online engineering resources of MIT OpenCourseWare," said Haas. "Also, after seeing the dramatic bootstrapping JR and Alex had done in starting their business, it was clear this team was different." [www.aidg.org/incubation/enersa.htm]

Jean-Ronel Noel, a mechanical engineer by training, describes why OCW was his resource of choice: "It was much better than any other information I found on the Internet, since the other sites were written by electronics experts who assumed that it would be read by other experts. I didn't want to just copy the circuit without understanding it. MIT OpenCourseWare

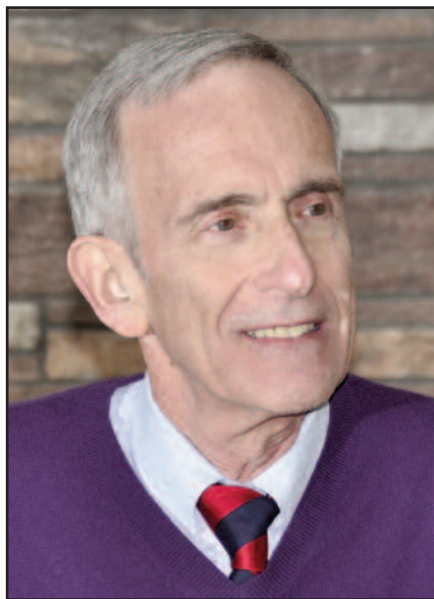
was different because it explained things step by step. Using the OpenCourseWare saved us a lot of time and money."

Through Enersa, OCW touches lives well beyond Noel's and Georges'. Enersa employs 18 full-time solar technicians drawn from the communities they serve, and Enersa's products affect the daily lives of thousands of Haitians. Enersa produces residential and commercial solar systems and solar chargers for smaller items such as cell phones and lamps, but their signature product is a solar street lamp. In just two and a half years, they have installed more than 500 of these in 58 cities and remote villages in Haiti. Enersa's activities were briefly interrupted by the January 12, 2010 earthquake, but with an emergency loan from AIDG, they are back to full operation.

Enersa is just one example of the hundreds of uses of MIT course materials the OCW team has documented in the past 10 years. Whether it is the educator in Australia who is able to quickly prepare to teach computer graphics despite a five-year hiatus from the subject, the home-schooling mother in the United States who finds the educational resources she needs to provide a quality education for her children, or the student in Nigeria who brings MIT curriculum into his classroom for the benefit of his fellow students, these stories highlight the tremendous benefit generated by the intellectual philanthropy of the MIT community. Although MIT OpenCourseWare still faces significant financial challenges – which have been much discussed in the past year – it is also important that the MIT community remember the millions of lives that have been touched by this project. I invite you to read more of these stories on the OCW site (ocw.mit.edu/about/ocw-stories/) and in the upcoming series of articles, and to remember in this year of celebration the global benefits generated by your simple acts of sharing. ■

Shigeru Miyagawa is Chair, MIT OCW Faculty Advisory Committee (miyagawa@mit.edu).

In Memoriam Michael S. Feld



The following is an MIT Faculty Memorial Resolution for Michael S. Feld, approved at the Institute faculty meeting of May 19, 2010.

IT IS WITH GREAT SORROW that we report the death of our friend and colleague Michael S. Feld on April 10, 2010. Michael succumbed to multiple myeloma after an eight-year struggle. His passion and compassion for life and people from diverse communities left a strong mark on all of us and many others. We mourn the loss of a champion of science and racial equality.

Michael grew up in working class communities in New York in the 1940s and 50s. From an early age he not only excelled in math and science, he also developed a sensitivity for the underdogs of society.

He came to MIT as a freshman in 1958 and became interested in both physics and philosophy, writing a dual bachelors and masters thesis that combined laser spectroscopy experiments with the history of the recently invented laser. He joined the Pi Lambda Phi fraternity, which admitted the first black members at MIT. There Michael developed a lasting belief in encouraging minorities in science.

After a year of studies at the University of London, Michael returned to MIT as a graduate student in physics. He worked with two laser pioneers who had just joined the MIT faculty, Professors Charles Townes and Ali Javan, and completed his PhD thesis under Javan's supervision in 1967. After a short stint as a postdoc, in 1968 he joined the MIT faculty. Just before starting his assistant professorship, Michael participated in the March on Washington organized by Ralph Abernathy and Jesse Jackson held after the assassination of Martin Luther King, Jr. Michael became a champion of civil rights and affirmative action.

During these early faculty years Michael conducted a series of experiments with Ali Javan to study the spectroscopy of atomic systems and the role played by coherent Raman processes. This work laid the foundation for the important topics of two photon Doppler-free spectroscopy, lasers without inversion, and electromagnetically induced transparency. In 1973, Michael made the first experimental observation of superradiance, a phenomenon in which an assembly of excited atoms acts collectively and spontaneously to emit light as a single

giant radiator. From 1976 until his death, he directed the George R. Harrison Spectroscopy Lab at MIT.

During his career, Michael supervised more than 50 PhD students including five African Americans. Among the departments in which these students took their degrees are Physics, Chemistry, Chemical Engineering, EECS, and Mechanical Engineering. Some of these students also resided in the Division of Health Sciences and Technology; a few earned MD degrees. The diversity of departments vividly shows the interdisciplinary range of Michael's interests.

Michael's first African-American student was Ronald McNair, who first came to MIT as an undergraduate summer research student in the late 1960s. McNair returned to MIT as a graduate student, where he completed his PhD under Michael's supervision. The two men had an enormous impact on each other. McNair soon became famous as a black physicist and NASA astronaut. He died in the space shuttle Challenger explosion in 1986.

Ron McNair introduced Michael to karate; each became both apprentice and master to the other. Michael earned a brown belt under McNair's tutelage and he then enrolled his 8-year-old twin sons, David and Jonathan, as students with McNair at a Baptist church in Central Square. The boys both earned black belts. As reported by *The Boston Globe*, David Feld noted, "My dad was very strong. One time I saw him rip a phone book in half; I saw him just grab it with his two hands and somehow tear it in two."

In an interview with the online trade magazine *BioOptics World*, Michael said, “Then someone at MIT called to invite me to give a Christmas lecture on the physics of karate. ‘Sure,’ I said. As soon as I got off the phone I was gripped with terror – I realized that I had just agreed to give a lecture on a topic I knew nothing

As reported in *BioOptics World*, Michael said, “All of my role models were in the area of fundamental physical science, not biomedical science – and that has given me a different perspective. It has sometimes put me at odds with the conventional wisdom of biomedical science.” At odds in the beginning,

His work also turned to applications of lasers, light and spectroscopy to biology and medicine, especially to imaging of diseased tissue. In 1985 he founded the NIH-supported Laser Biomedical Research Center at MIT.

about! Motivated by fear, I began a crash research program, including taking strobe movies of karate strikes. Fortunately, we managed to get our act together and did well, and so we were invited to give presentations at two annual meetings of the American Association for the Advancement of Science, the first in Washington, DC, and the second the following year in Denver. In the course of our research we wrote a 1979 *Scientific American* article, ‘The Physics of Karate,’ which attracted worldwide press interest.” Michael’s demonstrations of breaking a board with his hands became legendary in the freshman physics classroom.

Michael’s research into laser physics continued generating important results. In 1987, he began a series of experiments to study the radiation of a single, isolated atom in an optical resonator, which led to the first demonstration of enhanced and suppressed spontaneous emission and radiative level shifts in an open optical resonator. In 1994 he developed the single atom laser, a fundamental system in which a two-level atom is coupled to a single mode of the optical field.

His work also turned to applications of lasers, light, and spectroscopy to biology and medicine, especially to imaging of diseased tissue. In 1985 he founded the NIH-supported Laser Biomedical Research Center at MIT.

perhaps, but his methods proved successful. In 1994 Michael co-founded Newton Laboratories in Woburn, MA, which applies optics and other physics methods to solve biomedical problems. His son Jonathan is an engineer there. In 1991, Michael developed the use of Raman spectroscopy in medicine, leading to its clinical application in 2006 for diagnosing atherosclerosis and breast cancer. He pioneered the application of several light-scattering techniques to tissue for diagnosing disease. Long before cancer spread in his body, he had imaged it in many others.

At the request of President Paul Gray, from 1978 to 1982, Michael chaired the MIT Equal Opportunity Presidential committee. His leadership was recognized in 1980 with the MIT Minority Community Distinguished Service Award and in 1982 with the Gordon Y. Billard Award. With Leo Osgood, from 1992 to 2007 Michael co-chaired the Dr. Martin Luther King, Jr. committee at MIT and established the Dr. Martin Luther King, Jr. Visiting Professor program. More than 60 visiting faculty have come to MIT through this program. In 2008 he received MIT’s MLK Leadership Award for this work, “recognizing your extensive and persistent efforts to make MIT a more open, more welcoming and more harmonious workplace.”

Michael also received numerous awards for his optics work, including the Willis E. Lamb Award for Laser Science and Quantum Optics (2003) and the William F. Meggers Award of the Optical Society of America (2008), for major contributions to the foundations of laser spectroscopy, and for pioneering developments in the application of spectroscopy to biomedicine.

As reported in his MIT obituary, Michael enjoyed singing and started a group called the Spectratones, whose repertoire included songs based on poems that Michael composed about his students and colleagues. In 2009, the Spectratones performed at “Feld-Fest,” a symposium celebrating Michael’s 50 years at MIT.

Michael is survived by his wife, Alison Hearn, his sons David of California and Jonathan of Somerville, MA, and his daughter Alexandra of New York City.

MIT and the scientific community have lost a man of great compassion who devoted his life to improving the diagnosis of disease using lasers and to improving the condition of underrepresented minorities in science. We miss him deeply.

Be it resolved:

That the faculty of the Massachusetts Institute of Technology, at its meeting of May 19, 2010, record its profound sense of loss on the death of our beloved colleague, friend, and leader in civil rights, Michael S. Feld, and express its deepest sympathy to the family.

Respectfully submitted,

Edmund Bertschinger
Ramachandra Dasari
Wesley L. Harris
Charles Holbrow
Ali Javan
Daniel Kleppner
Patrick Lee

M.I.T. Numbers

U.S. News & World Report

Best College Rankings for National Universities, 2002-2011

