

# MIT Faculty Newsletter

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

**in this issue** we offer commentary on the increasing concern around climate change “Time to Up Our Game” (below), and “An Update on MIT’s Climate Action Plan” (page 6); introduce the new Chair of the Faculty (page 8); report on MIT’s Random Faculty Dinners (page 10); and write on the Faculty Committee on Campus Planning (page 14).



Marble Arch, Greater London

## From The Faculty Chair Time to Up Our Game

Susan S. Silbey

**THIS IS MY FINAL COLUMN** as Chair of the Faculty. It is uncharacteristically short in hopes of communicating an unambiguous and urgent message: we can no longer engage in business as usual at MIT. Time is running out. MIT, the United States, and the world face an existential threat unprecedented in human history.

It may already be too late to reverse the catastrophes that wait as the warming climate continues to raise sea levels, acidify the oceans, worsen droughts, wildfires, storms and floods, and accelerate extinction rates, with a UN scientific panel reporting this month that 1 million species are threatened by extinction caused by human activity. All this has happened when we have so far raised mean global surface temperatures “only” about 1°C (1.8°F) above preindustrial

continued on page 4

## Greetings to You the Graduates – And to Your Families!

Faculty Newsletter Editorial Board

**WE JOIN WITH THE THOUSANDS** of family members and friends gathered for Commencement in sharing the excitement of your graduation. MIT’s Faculty value and take pride in your accomplishments as MIT’s new class of 2019. Teaching and mentoring you has been a source of deep satisfaction. As you have learned and grown, absorbing and generating knowledge and new insights, so have we. Now, as you take the next steps along career paths, your contributions to your communities and to society will be among the most gratifying outcomes of our academic efforts.

You will be entering a world of considerable uncertainty and an increased level of social and political polarization. After the last Presidential election, you rose to the challenges presented by the new administration and its method of governing.

continued on page 3

## Editorial The Danger to Civilian Science from the Growing Pentagon Budget

**ONE OF THE clearest** expressions of national values and national priorities is the annual budget voted by the U.S. Congress, the Congressional Discretionary Budget (see back page). This does not include the major mandatory federal programs Social Security and Medicare, which are essentially trust funds that citizens pay into and then receive payments back later in life. However, for higher education and for basic, climate, energy, and biomedical research, the discretionary budget is key.

Research intensive universities such as MIT are deeply dependent on federal budget investments that come through grants and contracts from the National Institutes of Health, the National Science Foundation, the National Oceanic and Atmospheric Administration, the Environmental Protection Agency, the Department of Energy, and other related

continued on page 3

# contents

## The MIT Faculty Newsletter Editorial Board

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\*Editorial Subcommittee for this issue

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From The Faculty Chair	<b>01</b>	<b>Time to Up Our Game</b> Susan S. Silbey
	<b>01</b>	<b>Greetings to You the Graduates – And to Your Families!</b> Faculty Newsletter Editorial Board
Editorial	<b>01</b>	<b>The Danger to Civilian Science from the Growing Pentagon Budget</b>
	<b>06</b>	<b>An Update on MIT’s Climate Action Plan</b> Maria T. Zuber
	<b>08</b>	<b>Rick Danheiser New Faculty Chair</b>
Letters	<b>09</b>	<b>Should MIT Break All Ties With Saudi Arabia?</b> Dick Larson
	<b>10</b>	<b>Random Faculty Dinner Notes Academic Year 2018-2019</b> W. Craig Carter
	<b>13</b>	<b>Hayden Library Renovation: What You Should Know</b> Chris Bourg
	<b>14</b>	<b>Introducing the Faculty Committee on Campus Planning</b> Deborah L. Ancona
Numbers	<b>16</b>	<b>U.S. Discretionary Spending FY 2017</b>

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## Address

MIT Faculty Newsletter  
Bldg. 10-335  
Cambridge, MA 02139

## Website

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

**Telephone** 617-253-7303

**Fax** 617-253-0458

**E-mail** [fnl@mit.edu](mailto:fnl@mit.edu)

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**The Danger to Civilian Science**  
continued from page 1

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agencies. These pay the salaries and benefits of graduate students, research assistants, and postdoctoral fellows; fund the purchase of instruments and computation; and support the overall operation of the host institution paying for a fraction of heating, electricity, and general support services. It is these investments that generated within the U.S. the world's most productive scientific teams over the past 70 years. And it is this pool of highly trained scientific workers that spawned the historic explosions of computer science and manufacture, and biotechnology and pharmaceutical industries in and around Cambridge. And that same pool brings the leading technology corporations in the world to establish centers nearby, such as Google, Microsoft, Pfizer, Novartis, Takeda, and Shire.

The federal budget process begins each year when the President introduces his budget. The Congress, not required to follow the President's proposals, then develops its own Budget Resolution. In the final stage the budget is broken into 12 areas, each overseen by House and Senate Appropriations Committees that vote on the actual sums to be made available.

The political reality of the discretionary budget is that more than 50% – that is 50% of our income tax dollars – goes to Pentagon

accounts. About half of that goes to the corporations of the defense industry for weapons purchases. There is a compelling literature indicating that a great deal of this spending – such as the proposed \$1.7 trillion nuclear weapons upgrades – will not increase national security, but are better understood as the business plans for ensuring the continuing profitability of the weapons industry.

All other civilian programs in housing, education, basic and biomedical research, environmental protection, food stamps and social services, Veterans Administration, agriculture, and sustainable energy development have to be funded by the remaining dollars.

President Trump's budget this year calls for one of the largest peacetime increases in Pentagon spending since the end of WWII. The total request is more than the military budgets of the next seven largest nations combined. Given the tax cuts passed last year, to fund the increases the President called for across-the-board cuts of 5%-15% in all the programs on the civilian side of the budget. These cuts would significantly retard and damage almost all the research programs that our nation depends upon for a better future.

The Pentagon budget does fund a significant amount of research, addressing military needs. But this spending is not focused on major civilian needs – alleviating chronic dis-

eases such as Alzheimer's, limiting climate change, developing sustainable energy sources, preventing environmental pollution and degradation, and increasing the efficiency of civilian mass transit.

Congress is unlikely to follow the President's lead, but as this issue went to press the Defense Appropriations Committee voted for a budget of more than \$700 billion, approaching 60% of the discretionary budget.

Interested citizens trying to follow this process will encounter the obscure process of "budget caps" dating from 2012 budget legislation. These have been used as mechanisms by Congressional hawks to limit civilian spending, and by Congressional human service advocates as a mechanism to limit Pentagon spending. Lifting the caps allows both sides of the budget to grow, probably funded by increasing the deficit. Maintaining the caps would limit both sides of the budget to lesser totals.

Unfortunately, although most Americans have annually paid their income taxes, no agency of the U.S. government reports back to the taxpayers how Congress spends their tax dollars. This is an arena that desperately needs more transparency and better Congressional communication back to constituents, if citizens are to be able to express their budget priorities. ■

**Editorial Subcommittee**

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**Greetings to You the Graduates**  
continued from page 1

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Many of you joined efforts to protect international members of our community from the threat of exclusion or deportation. You became attentive to issues such as immigration, climate change, nuclear disarmament, the reduction of global poverty, and the need to protect fundamental democratic rights. Many of you joined or supported the Women's March, the March for Science, and the March for Climate.

The values of scientific investigation and assessment, previously taken for granted, have now become arenas for contention and even denial. Defending these values will require the urgent involvement of us all. In the international area, conflicts among nations that may have once seemed very far away have intensified. We have to take more seriously our responsibil-

ities as citizens to ensure that our nation's actions in the world increase the prospects of peace and prosperity for the world's peoples, rather than undermining them.

During your time here the campus experienced a revival in student engagement. Examples include the Fossil Fuel Divestment campaign; the creative Days of Engagement after the Presidential election; the continuing opposition to MIT's agreements with the Saudi Arabian monarchy; the campus die-in led by Black students; the protest and counter forum to Henry Kissinger's role as spokesperson for ethics in artificial intelligence; the revival of MIT Students Against War; and many other expressions of social, economic, and political concerns.

We hope you will look back on your years at the Institute aware that your presence and involvement contributed to enhancing the MIT

environment and experience for the coming classes. Note that by remaining active as alumni you can continue to have a positive impact on the Institute's work and environment.

During your years with us, we on the faculty have watched the burgeoning of your many talents, your creative ambitions, your resilience in the face of setbacks, your thoughtful and quirky self-expression, your creative and entrepreneurial energy, and your myriad achievements. We hope that, as your various individual paths unfold, you will put your powers to work on solving some of the problems that confront us all, and on making our society more responsibly productive and more supportive of those in need. On behalf of the entire Faculty, we wish you vision, strength, commitment, wisdom, success, and much happiness in addressing these challenges. ■

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**Time to Up Our Game**

Silbey, from page 1

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levels. To have any decent chance of limiting warming to the 2015 Paris Accord goal of “well below 2°C” (3.6°F), global emissions must peak immediately and fall by about 80% by 2030, then continue to drop to zero well before the end of the century – that is, within the normal life span of today’s undergraduates. Importantly, 2°C of warming is not safe, merely less catastrophic than where we are headed without a major course correction. Even full implementation of the Paris agreement would yield warming well above 3°C by 2100, depending on how sensitive the climate is to the greenhouse gases we continue to spew into the atmosphere at increasing rates. Worse, it appears that no nation is on track to meet its Paris commitment. The threat is real, we know the cause – ourselves – and the consequences of continued inaction are irreversible on any human time scale.

If we truly want to make a better world, why have we not embraced this existential threat as the single most important challenge for MIT? Why is climate change not the first and largest item on our agenda?

When I think about climate change, I often wonder what kind of people do not put this as the highest priority – locally as well as nationally and globally. Maybe some people do not believe the science. But this is MIT; we are not science deniers. We know that the science is valid and sound. Perhaps, some people just live for the moment, seeking hedonic pleasures above all else. There are such people, but are they our organizational or political leaders? Maybe a culture valuing celebrity of all kinds has lost the ability to distinguish the pursuit of self-indulgence from self-interest rightly understood. Even so, do they really not care about their children and grandchildren? Are they willing to relegate their, and others’, children to a world of massive, disruptive migrations – far exceeding what recent wars, droughts, and violent states are currently producing,

and the subsequent anarchy or authoritarianism likely to emerge if liberal democracy does not recover from the present digitally driven threats?

Perhaps climate change is not our highest priority because we at MIT are culturally, after all, techno optimists. We like to believe that somehow we will engi-

If we truly want to make a better world, why have we not embraced this existential threat as the single most important challenge for MIT? Why is climate change not the first and largest item on our agenda? . . . Perhaps climate change is not our highest priority because we at MIT are culturally, after all, techno optimists. We like to believe that somehow we will engineer our way out of this. Could that be why MIT, specifically, has not embraced climate change as the most important priority?

neer our way out of this. Could that be why MIT, specifically, has not embraced climate change as the most important priority? Do we think that MIT entrepreneurs will produce the planet-saving innovations? I have actually heard such claims. Perhaps it will be small, mass-produced nuclear reactors, or biologically inspired solar panels and batteries, or perhaps fusion. We were told recently that nuclear fusion energy is making such progress, as exemplified by the high temperature, superconducting magnets that MIT and CFS entrepreneurs are developing, that we can now expect carbon-free, fusion energy within several decades.

But here’s the problem. Climate change is a social as much as a technological problem. Even if we accept the unlikely scenario that fusion is on the near horizon, the political, economic, and social obstacles will not produce functioning power plants before the temperatures rise above those catastrophic two degrees Celsius. Long delays between any technological breakthrough and the processes of siting, building, and also overcoming NIMBY (Not In My Back Yard) resistance will impede deployment in time to avert the disasters. Nor is climate change some-

thing that will be adequately addressed by individual, micro-level actions. Of course recycling, driving electric cars, reducing water usage are important. We should all strive to cut our personal ecological footprints. But the climate threat cannot be solved without collective action sufficient to bring about the legal, institutional, and

political changes needed to make responsible choices probable and drive the rapid transformation of our energy system needed to keep the fossil carbon in the ground.

Americans consume much more energy per capita than any other populace, we also lose almost twice as much energy in transmission as we actually generate. Also, the technologies we need to dramatically reduce energy consumption in residential, commercial, and industrial buildings exist today, on the shelf: insulation, high-performance windows, high-efficiency HVAC systems, heat-recovery ventilation, passive design, and so on. They are the fastest, cheapest, safest ways to cut emissions, improve occupant health and comfort, and often generate positive economic returns. But they are not being deployed fast enough. The barriers are not technological so much as social, organizational, and political. We have variations in cultural habits and preferences, geographic conditions, economic and legal constraints including regulatory capture by vested interests that shape the path dependencies to which we have become habituated and which we will not easily abandon.

How do we get past the initial boundary condition: ignoring the existential threat of climate change? Has MIT been promoting innovation and entrepreneurship instead of critical thinking through fundamental as well as ethical education? Have we been green washing with sustainability initiatives instead of addressing climate change? Have we been investing in solar farms in North Carolina at the expense of reducing our campus emissions locally, when we could and should do both? Are too many of our students working on autonomous cars and clever apps instead of public mass transit? How can we, MIT, change our commitments?

What could we learn about human agency and organization if we devoted our social science to solving the institutional and political problems of climate change? How do we solve the “presentism” that animates too many voters? How do we overcome the collective action

problems of mobilizing both the populace and the world’s leaders? How do we get past the selfish economic interests of fossil fuel companies possessing unmatched political power? What if we stopped dis-

We have promised to raise one billion dollars to advance socially responsible computer science. What will happen to this ambition when the Charles River is three feet deep on Vassar Street, as predicted in recent models?

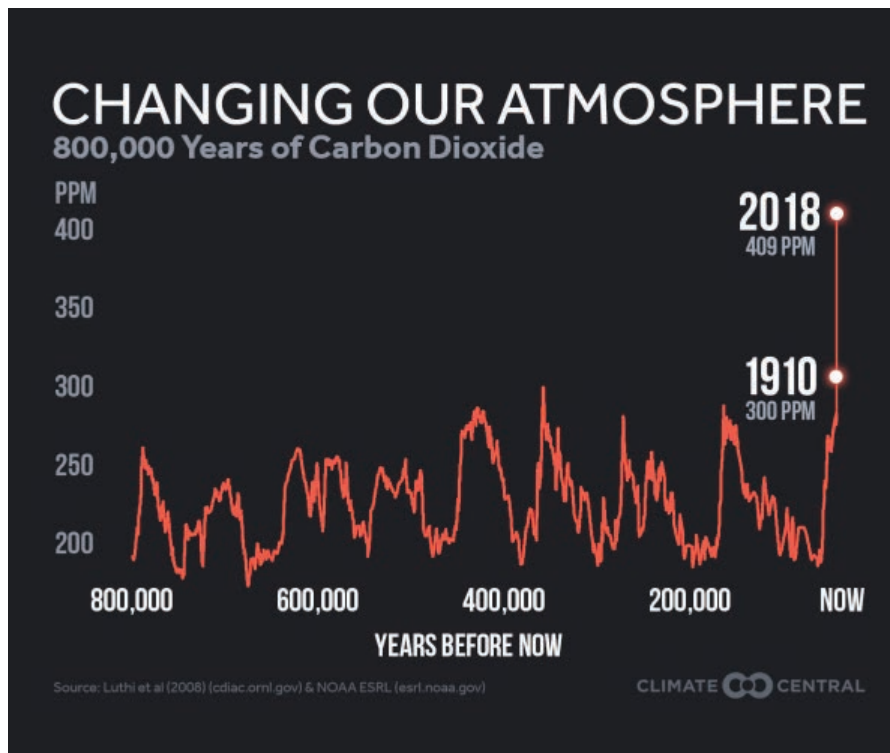
counting the future in our models so that creating a sustainable world is no longer economically inefficient? Why do we make the decisions we make rather than others? Who determines what decisions we get to make? Who is setting the agenda? What do we know about changing minds that might help change directions? These are social questions.

We have promised to raise one billion dollars to advance socially responsible

computer science. What will happen to this ambition when the Charles River is three feet deep on Vassar Street, as predicted in recent models? Perhaps we should rebrand our new School as the

Schwarzman College of Computing for the Climate. As my last act as Chair of the Faculty, I beg the Corporation and the Administration to do the right thing, now. Time is running out. ■

**Susan S. Silbey** is Leon and Anne Goldberg Professor of Humanities, Professor of Sociology and Anthropology, and Professor of Behavioral and Policy Sciences, and Chair of the Faculty ([ssilbey@mit.edu](mailto:ssilbey@mit.edu)).



## An Update on MIT's Climate Action Plan

Maria T. Zuber

**I AM PLEASED FOR THIS** opportunity to share with you some thoughts about MIT's progress under our Climate Action Plan (CAP). Let's begin by going back to 2015. It was the hottest year in Earth's recorded history, a title held only until 2016. It was also the year that representatives from 196 countries came together in Paris and committed to holding the global temperature increase to well under 2 degrees Celsius since the beginning of the Industrial Revolution, and to pursuing efforts to limit that increase to 1.5 degrees. Here at MIT, 2015 was the year when a year-long campus-wide climate conversation culminated in President Reif's announcement launching our Climate Action Plan.

The Climate Action Plan has five pillars; I will touch on just a few examples from each of them.

*The first pillar is to improve our understanding of climate change and advance novel mitigation and adaptation solutions.* Susan Solomon (EAPS/ Chemistry) and her colleagues have used historical March stratospheric ozone concentrations in the Arctic to predict April surface temperatures in the Northern Hemisphere. Our Joint Program on the Science and Policy of Global Change has developed a highly detailed model that integrates the future of energy and land use, water and agriculture, and emissions and climate. In their most recent analysis, John Reilly (Sloan), Ron Prinn (EAPS) and their co-authors provide fresh evidence that, absent major changes in policy and practice, greenhouse gas emissions will continue increasing after 2030, leading to rising average land temperatures and rising sea levels throughout the century.

*Our second pillar is accelerating progress toward low- and zero-carbon energy technologies.* It is through this second pillar that MIT may ultimately have the greatest impact, through inventing new solutions. Lots of options already exist for slowing climate change: more deployment of renewables, more efficient use of energy,

Examples of promising work under this pillar range from Commonwealth Fusion Systems' efforts to accelerate the commercialization of fusion energy to the work of Vladimir Bulovic (EECS) and his team to develop ultrathin, flexible solar cells that could transform almost any surface into an energy source. Other

Because the climate problem is so vast, MIT has sought partners from industry, government, NGOs, and other universities to collaborate on the search for solutions. In addition, because the path to solutions is uncertain, it will take immense new funding to support the range and intensity of research that can ultimately yield breakthroughs that match the scale of the need.

energy conservation, pricing that reflects fossil fuels' real costs to the environment, and so on. But even if we do all of that and more, we are going to need new technologies to be developed and deployed at scale if the world is to slow down, stop, and ultimately reverse climate change.

MIT's eight Low Carbon Energy Centers (LCECs), based at the MIT Energy Initiative, are the principal unit charged with making progress in this area. Each focuses on a crucial technology: advanced nuclear energy systems; carbon capture, utilization, and storage; electric power systems; energy bioscience; energy storage; materials in energy and extreme environments; mobility systems; and solar energy. The LCECs work with partners from many sectors to develop deployable solutions that can meet global energy needs sustainably.

research under way includes Elsa Olivetti's (DMSE) work to use artificial intelligence to speed the process of fabricating novel materials for energy storage and Gabriela Schlau-Cohen's (Chemistry) research to better understand how plants reject excess energy that could lead to increases in yields of biomass and crops.

*The plan's third pillar is educating a new generation of climate, energy, and environmental innovators.* A few thousand new students, undergraduate and graduate, come to MIT every year. They, along with our faculty, are our greatest resource, and the investments we make in them will pay dividends for them and for humanity for many decades to come.

With the impetus of the CAP, we established our new undergraduate minor in Environment and Sustainability in the fall of 2017. Our MIT Environmental

Solutions Initiative (ESI) runs the MIT Action Sustainability Corps (MITASC), begun just this spring to help both undergrad and grad students find work related to sustainability, as well as to provide mentorship and funding. Twenty-five students will take part in MITASC this summer. Also, since the launch of the Climate Action Plan, the number of students receiving the Sustainability Certificate from the Sloan School of Management each year has nearly tripled, with steady growth each year.

*The fourth pillar is for MIT to share what we know and are learning about climate with the broader world.* To that end, late in 2018 we held a “soft launch” of our climate web portal, [climate.mit.edu](http://climate.mit.edu), a place for the MIT community to learn about, discuss, and innovate around climate issues and for us to share what we know and what we are doing with the wider world. We have recently started a podcast, TILClimate (“Today I Learned”), to bring science-based climate information to new audiences. We are currently adapting Kerry Emanuel’s (EAPS) primer on what we know about climate change for web use, with a goal of making a basic understanding of climate change accessible to the public generally. John Sterman (Sloan) is using simulation games to help diverse audiences, including policymakers, develop a hands-on understanding of the climate problem and the major contributors to it. Adam Berinsky and Evan Lieberman (Political Science) are exploring the extent to which MIT’s reputation for rigor and objectivity makes us a more credible communicator of climate science.

*The fifth pillar is to use our MIT community and campus as a test bed for change.* The Climate Action Plan set a goal to reduce campus emissions by at least 32 percent by 2030. As of last year, MIT’s net contribution to greenhouse gas emissions has been reduced by 20% against a 2014 baseline, putting us almost 2/3 of the way to our goal. Our actual campus emissions last year were a modest 4% below that

baseline, having ticked up in 2018 due chiefly to a colder than average winter. The balance of reductions are attributable to our partnership in Summit Farms, a 650-acre, 60-megawatt solar farm in North Carolina which has the additional advantage of retiring dirtier coal-fired energy from that region’s electric grid.

These efforts, which I oversee with the invaluable assistance of a Climate Action Advisory Committee made up of faculty, students, staff, alumni, and Corporation members, represent just some of the important work proceeding on all pillars of the Climate Action Plan. In terms of executing stated elements of our plan, we are making excellent progress.

Underpinning our plan are two core elements of strategy: engagement and investment. Because the climate problem is so vast, MIT has sought partners from industry, government, NGOs, and other universities to collaborate on the search for solutions. In addition, because the path to solutions is uncertain, it will take immense new funding to support the range and intensity of research that can ultimately yield breakthroughs that match the scale of the need.

Looking ahead, beginning this October MIT will present a series of six Climate Action Symposia to consider climate science, policy, technologies, and the role of universities. The symposia are intended to give the MIT community an opportunity to consider what we have learned from these initial years of MIT action on climate change and what should come next.

Here are a few questions I believe we should consider:

- How might we increase the probability that our work leads to the breakthrough innovations the world needs?
- How do we contemplate engagements with partners who don’t share our sense of urgency?

- How can we secure a level of investment in decarbonization research sufficient to accelerate the development of practical, scalable alternatives to fossil fuels, particularly in the absence of major federal government support?

- In the spirit of risk management, are we investing sufficiently in adaptation, including research into possible geoengineering methods to slow or reverse climate change?

- How can we expand use of our campus as a test bed? Our efforts to date have taught us that while progress is possible, the work of MIT is inherently energy intensive. Once we have taken many small steps to increase efficiency, eliminate waste, etc., we are challenged in further reducing our carbon footprint by both the limited availability of low-carbon energy options and the lack of a price on carbon that reflects its true costs.

The next couple of decades are crucial to dealing with climate change. We know that over those decades hundreds of millions more people will be turning on the lights and air conditioners as development comes to parts of the world that have not yet experienced it. That future development will need energy to run on, and our challenge is to help humanity find new and sustainable ways to power the world our children and grandchildren will inherit.

While the climate challenge facing the world is certainly daunting, I remain optimistic that MIT can make a major contribution to overcoming it and I look forward to working with our faculty to help make it happen. I encourage faculty members to reach out to me with new approaches or ideas. ■

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**Maria T. Zuber** is the Vice President for Research and the E. A. Griswold Professor of Geophysics ([mtz@mit.edu](mailto:mtz@mit.edu)).

## Rick Danheiser New Faculty Chair

Newsletter Staff



### **RICK L. DANHEISER, A. C. COPE**

Professor of Chemistry, will succeed Susan Silbey as Chair of the Faculty on July 1, 2019. Rick has been Chair-elect during the current academic year and has served as the Associate Chair of the Faculty for the past two years. This is the first time in several decades that an Associate Chair has been elected to serve as the next Chair of the Faculty. Joining Rick as faculty officers this summer will be Duane Boning (EECS) as Associate Chair and David Singer (Political Science) as the Secretary of the Faculty. Rick believes that maintaining the high standard of inspiring and exemplary leadership set by the prior two chairs, Krishna Rajagopal and Susan Silbey, will be no easy task, but he promises to do his best.

Rick grew up in the suburbs of New York and Los Angeles and attended Columbia as an undergraduate, initially majoring in astrophysics. By the time of his junior year, however, Rick had come to

realize that his fascination with the wonders of the heavens might be better satisfied as an amateur rather than professional astronomer, and he began to cast about for an alternative major. Chemistry, with its colored crystals, gleaming glassware, and fuming liquids had always excited his interest, and encouraged by an inspiring general chemistry class (taught by Steve Lippard, then a Columbia professor), Rick switched fields, cramming the chemistry major requirements into his final two years. During his senior year Rick also found time to undertake research in organic chemistry in the laboratory of the late Gilbert Stork, successfully completing a total synthesis of the natural product beta-vetivone and developing his first “name reaction”, the “Stork-Danheiser alkylation” while still an undergraduate.

Rick received his PhD in 1978 at Harvard, where he completed the first synthesis of gibberellic acid working in the laboratory of Nobel laureate E.J. Corey (MIT SB 1948, PhD 1951). Rick joined the MIT faculty at age 25 as an Assistant Professor in the Department of Chemistry and rose through the ranks becoming the Arthur C. Cope Professor in 2000. Rick served two terms as Associate Head of Chemistry (1995-2000 and 2000-2005) and also was Acting Head of Chemistry in 1997.

Rick is a synthetic organic chemist. His research is concerned with the invention of new methods for the construction of complex molecules and the application of these methods in the chemical synthesis of organic compounds, especially biologi-

cally active natural products but also including molecules with interesting electronic properties. The synthetic methods developed in his laboratory include two “name reactions,” the “Danheiser Benzannulation,” and the “Danheiser Cyclopentene Annulation.” Natural products synthesized in his laboratory at MIT include the neurotoxic alkaloids anatoxin a and quinolizidine 217A, the immunosuppressant agent mycophenolic acid, the host defense stimulant maesanin, the anti-tumor agent ascochlorin, and a number of diterpene quinones derived from the Chinese traditional medicine Dan Shen. “Green chemistry” has been another area of interest in his laboratory, and for many years he collaborated with Jefferson Tester in Chemical Engineering investigating environmentally friendly methods for organic synthesis using water and supercritical carbon dioxide as reaction media.

In addition to having served on various journal advisory boards and having edited volumes of several important reference works, Rick has been Editor in Chief of *Organic Syntheses* since 2004. *Organic Syntheses* is a unique journal in which every experimental result must be reproduced in the laboratory of a member of the Board of Editors prior to publication. As an outgrowth of his role at *Organic Syntheses*, Rick has become an advocate for increased reproducibility in the chemical sciences, writing articles on the subject and presenting invited lectures at conferences and universities in the U.S. and abroad.

Rick is passionate about teaching. His educational contributions at MIT have



been recognized with the Graduate Student Council Teaching Award (1989), a MacVicar Faculty Fellowship (1996), the School of Science Prize for Excellence in Undergraduate Teaching (1998), and the School of Science Prize for Graduate Education (2014). Over the years Rick has taught a number of chemistry lecture and laboratory subjects, most recently graduate-level organic synthesis and the spring version of Chemistry 5.12, the introductory organic chemistry class taken by 100-250 students, including mostly freshmen. As Associate Department Head of Chemistry in 1995-2005, Rick's responsibilities included directing both the undergraduate and graduate programs in the department. His accomplishments during this time included the development of the IAP "bootcamp" Freshman lab 5.301, the creation of the Digital Techniques Manual, and the design of the "URIECA" modular

laboratory curriculum. Rick has also supervised the PhD theses of 58 graduate students (so far!) in addition to mentoring close to 100 postdocs and UROP students.

Rick served on a number of Institute committees prior to becoming Associate Chair of the Faculty. These include the Committee on the Science Requirements (1989-91) which ushered in the biology GIR and replaced the science distribution requirement with REST, the Committee on the First Year Program (1997-1998), the Education Design Project (1998-99) whose report led to the creation of Terrascope, CUP (1998-2001), the FPC (2005-2008), SOCR (2009-2010), and the Task Force on the Future of MIT Education (2012-2014). Rick has been heavily involved in laboratory safety at both the Institute and National levels. He has been Chair of the Chemistry Department Committee on Environmental

Health and Safety, and the Chair of the Institute Committee on Toxic Chemicals since 1989. Rick has also served as a member of the Institute Council on EHS since 1989 and played a pivotal role in the development of the current MIT EHS management system.

Rick's interests outside of science include photography, Japanese art and culture, jazz and classical music. He collects Japanese woodblock prints, watches, and fountain pens. Rick enjoyed playing baseball in his younger days, and his softball team ("Toxic Waste") won the MIT Community Summer League championship three summers in a row (2004-2006), at which point Rick decided it was a good time to hang up his cleats and glove. Rick's favorite sports teams are the Sox and Pats, his favorite single malt is Highland Park 18, and his favorite place to vacation is the Big Island of Hawaii. ■

## letters

### Should MIT Break All Ties With Saudi Arabia?

To The Faculty Newsletter:

**WHILE I AGREE WITH THE** deep concern of many of my MIT colleagues with regard to formal ties to Saudi "State-Controlled Entities," the situation is more complicated. These entities are far from homogenous enterprises. They are collections of human beings, male and female, young and old, all very different one from the other in their attitudes and priorities.

These individuals, when engaging with MIT in projects – research and/or educa-

tion – become exposed to MIT's inclusive culture and values. Some come to Cambridge as students, undergraduate or graduate, and become immersed in our culture and values. Positive change can and has occurred within these entities. In more than one instance, I have seen this happen myself with Saudi Aramco. I can give details if necessary.

While I can see the attraction of calling for a 100% abandonment of all formal ties to Saudi State-Controlled Entities, as usual in life, things are much more com-

plicated. I urge my faculty colleagues to consider the consequences of zero interaction on the human beings of these entities – male and female, young and old – with the human beings of MIT. Is isolation the best alternative that we have?

**Dick Larson**

Professor, Post-Tenure

MIT Institute for Data, Systems, and Society

## Random Faculty Dinner Notes Academic Year 2018-2019

W. Craig Carter

### THE MONTHLY RANDOM FACULTY

Dinners continue Samuel Jay Keyser's tradition of convening faculty from across the Institute for a meal and collegial chat. Toward the end of the meal, Jay would initiate a conversation by asking the faculty guests, "What is on your mind?" We continue to ask Jay's question at the monthly dinners, regularly hearing candid viewpoints and poignant questions. The lively discussions are informative, and often surprising.

Each conversation is summarized – with care not to identify the discussants – and communicated to the upper Administration. Thus, the dinner conversations provide a venue for collecting observations from across the Institute while providing a potent vehicle for communicating faculty perspectives to the Administration.

Jay Keyser, Faculty Chair Susan Silbey, and I believe the conversations provide a snapshot of current faculty opinion and deserve to be circulated broadly. Therefore, we summarize what was on the faculty's mind this past academic year. We do not adjudicate nor synthesize across the various voices.

Here are some of the recurrent themes:

1. The creation and implications of the Schwarzman College of Computing.
2. MIT's engagement with Saudi Arabia.
3. The nature of our students and increasing levels of stress.
4. The undergraduate curriculum and the GIR experiment.

5. Rising cost of living in Cambridge and Boston and its implications for faculty housing.
6. Climate Change.
7. Overspecialization and its educational implication.

Faculty reacted to rumors that EECS might be broken up, or might relocate as a group into the SCoC. The former choice may have adverse consequences for a universally recognized excellent department; the latter may create a bloc that would foil cross-School involvement. There were concerns that the SCoC is an attempt to fix internal (and public) squabbles within

Uncertainty about the future of EECS (Electrical Engineering and Computer Science) and involvement of faculty around the Institute were concerns. Faculty reacted to rumors that EECS might be broken up, or might relocate as a group into the SCoC.

### 1. The creation and implications of the Schwarzman College of Computing (SCoC)

There were many opinions and assumptions about the how the SCoC would be structured. Faculty raised concerns about the rate at which the SCoC was created and academic decisions may be taking shape. A principal concern was that faculty were not given reasonable time to deliberate, or to ask the question whether the SCoC was even necessary. They felt that there was no time or venue for collective dissent, or to suggest guidelines that ensure that the mission is not led astray. As a counterpoint, venues for discussion and input were created and more than 100 faculty are participating in working groups.

Uncertainty about the future of EECS (Electrical Engineering and Computer Science) and involvement of faculty around the Institute were concerns.

EECS and that the SCoC is the wrong way to do this. There is worry that the bridge-to-other-Schools model would fail and that many faculty would be hindered from participating.

Faculty see the SCoC as an opportunity for MIT to influence the moral hazards of artificial intelligence and the effects of the Internet on democracy, as it seems to enable coalitions of nefarious actors. Faculty want to ensure that this mission is not lost, and that multidisciplinary approaches and considerations are applied.

### 2. MIT's engagement with Saudi Arabia

Faculty ask whether we have general guidelines for engagement with other countries. This question addressed President Reif's meeting with the Crown Prince of Saudi Arabia, as well as new or renewed engagements with Saudi Arabia.

Some faculty expressed frustration that they had no influence on such decisions and had limited venues for dissent although the Institute's name gets attached to these actions. This frustration was not limited to the issue of international engagements with problematic nations, but other issues including the invitation of Henry Kissinger to attend the opening ceremony of the SCoC.

It was pointed out that Associate Provost Richard Lester did circulate a request-for-comment and received substantial input, although faculty participation was low. (Limited faculty participation was a common refrain and not limited to this topic). Faculty comments were varied, but there was significant criticism of MIT's engagement. As a consequence, President Reif has asked Faculty Chair Susan Silbey to form a faculty committee to deliberate and construct general guidelines for external engagement.

### 3. The nature of our students and increasing levels of stress

Discussions focused on recently circulated reports of a striking increase in self-reported student stress and melancholy. Eighty-three percent of the student respondents indicated that managing their course load was moderately or very stressful; overcommitment and concerns about the future were 70% and 65%. There are reports of similar trends at peer institutions showing increases over the last five years. (*Authors' note: Examination of the 2015 and 2019 enrolled student survey indicates that there is not a significant difference in self-reported stress; however, there is an increase in students' reporting feeling being overwhelmed: [ir.mit.edu/undergraduate-enrolled-student-survey-ess](http://ir.mit.edu/undergraduate-enrolled-student-survey-ess) downloaded 15 May 2019.*)

It was generally agreed that MIT's culture exacerbates stress, but that this is a national – if not global – trend. A member advising first-year students for many years remarked that such stress is observable in students when they arrive and before classes start, and has noticeably escalated.

There was general agreement that faculty have not changed the amount of work we are giving the students; in other words, MIT hasn't changed – the issue is larger than that.

Some wondered if this is a parenting issue: undergraduate students are not prepared to deal with stressful environments.

It was generally agreed that MIT's culture exacerbates stress, but that this is a national – if not global – trend. A member advising first-year students for many years remarked that such stress is observable in students when they arrive and before classes start, and has noticeably escalated.

Or, whether constant distraction through digital media is leaving students unprepared for what we are asking them to do: that is, concentrate on one thing with dedicated focus for extended periods of time. Others commented that the number of courses in which students are enrolling is a symptom or a cause.

Others suggested that the stress may derive from a misplaced desire to become an instant celebrity, entrepreneur, or other objects of envy. MIT's culture encourages this – not only in students but also in young faculty who specialize in and are rewarded for public affirmation. Others suggested sources of generalized anxiety from the financial crises that occurred within these students' adolescence, climate change, or the polarized political environment.

It was suggested that there is a need to incorporate how to deal with stress and societal pressure into our curriculum and faculty culture.

### 4. The undergraduate curriculum and the GIR experiment

Last summer, the CUP (Committee on the Undergraduate Program) sanctioned an experiment – for this year's incoming students – in which the Science/Engineering/Mathematics portion of the General Institute Requirements (GIRs) could be taken Pass/No-Record (P/NR) at

any time during the student's years before graduation.

There was general discontent that the SEM-GIR-P/NR decision was made over the summer. Some faculty felt as if oversight over curriculum had been relinquished. However, there is general agreement that MIT is about bold experi-

ments which should be encouraged. The general discontent about this experiment took two forms: a) its curricular implications were ill considered; b) there was insufficient time to obtain faculty input.

Most faculty who spoke up agreed that the GIRs are foundational and exploratory – and the experiment sends the message that they are not. The motivation for the SEM-GIR-P/NR experiment – to encourage more exploration of majors – had the consequence of sending the message that the GIRs do not involve exploration; furthermore, the experiment sends a message that the GIRs are not to be taken seriously. There was anecdotal evidence that a fraction of students were completing only enough work to pass SEM-GIR subjects.

The first semester P/NR was designed to reduce stress and provide an opportunity for variations in student preparation before MIT to have a chance to equilibrate. Some incoming students were taking advanced topics for which they lacked prerequisites. This may increase stress, especially for those who are taking advanced subjects with the objective of getting an internship.

Some faculty voiced a fear that we are making MIT too easy in response to perceived institutional competition or perceptions that students want an easier path

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**Random Faculty Dinner Notes**

Carter, from preceding page

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so they can have time to obtain other experiences. In particular, if MIT were to make things easier in response to perceived competition for students with other universities, then we will have lost what makes MIT special and decrease the value of the MIT brand.

Regarding the corollary effects of delayed GIRs, some believed that if a particular GIR has no direct bearing on a major, then it could be taken anytime. Others believed that learning a discipline without the context of fundamental GIR material created graduates who may be far too narrow in their understanding of the applications of their discipline.

The question is whether the GIRs should be designed for fundamental knowledge (as they are now) or whether they should be subjects that teach “skills of an educated person” for lifelong learning in the 21st century. For example, the GIRs could be organized around functions of “critical thinking,” “statistics,” “computing,” or “communication,” rather than around disciplines.

There was disagreement as to the extent to which students’ passion should influence curricular changes. Some believed that there is an obligation to provide opportunities for passionate projects or learning because that is the nature of the students admitted to MIT. Others thought that moderating freedom with a proscribed curriculum provides a more meaningful future passion, or allows the discovery of alternative passions. Others worried that we too often characterize the student body by focusing on a small set of the students.

**5. Rising cost of living in Cambridge and Boston and its implications for faculty housing**

The median sales price of homes in Cambridge has increased by a factor of three in the last 19 years; the current median price is currently just less than

\$1M. This price is likely to accelerate as MIT invests in Kendall Square and high-value companies locate nearby. Thus faculty costs of living are increasing more rapidly than their salaries and housing-assistance has not tracked housing costs: faculty express that we are a “victim of our own success.”

There are many consequences of faculty housing costs: a) our ability to recruit junior faculty; b) stress associated with financial insecurity; c) the need to move ever farther from MIT which increases commute time and traffic; d) reduced engagement with on-campus activities.

Faculty point out that MIT plays a role as a landowner and a developer – why not do the same with real estate to benefit the MIT community? There were suggestions that MIT might invest in housing along the Red Line.

There was an interesting suggestion that – in parallel to student interest groups that organize around common interests and housing locations that appear to reduce student stress – faculty would benefit from living groups with shared interests. It was pointed out that faculty who were here in the ’60s and early ’70s would have valuable perspectives on such an endeavor.

**6. Climate Change**

Climate change was a recurring topic. It is viewed as a grave existential crisis and the most important problem conceivable. There is a consensus that MIT should – must – lead in mitigating climate change. Predictions of sea-level rise suggest that MIT would be under water – literally and metaphorically.

There is also consensus that technological fixes alone will not suffice. This is a problem that will require a multidisciplinary multi-dimensional approach.

Some wonder if the SCoC is a distraction from this more important problem. Others express hope that mitigating climate change might become a primary focus of the SCoC.

**7. Overspecialization and its educational implication**

Many of the senior faculty bemoan the trend towards overspecialization of disciplines and its effect on scholarship. Previously, MIT had a substantial fraction of its faculty who were generalists – meaning that they had a conceptual understanding about a general discipline and could rapidly comprehend connections to other disciplines, and/or fields within their own. It was recognized that the value of such faculty transcend their nominative contributions and their influence was extraordinary. Such faculty could describe what they do, relate it to what others do – and were also able to converse about topics from any of the five Schools.

MIT has embraced specialization at the expense of promoting generalists. We do this in the way we hire faculty, promote faculty, and reward faculty. Now, it is becoming rarer that two random faculty can have a substantive conversation. (It was remarked that many faculty who attend the random faculty dinners do so because it provides a venue for substantive conversation and that the frequency could be increased to afford more such opportunities.)

There was great enthusiasm for the Killian Lecture that Prof. Gerald Fink delivered on “The Cell.” Those who attended remarked how uplifting it was to hear a colleague give an educational and inspiring lecture. It was suggested that once a year is far too infrequent. Why not one such lecture a month? Or, certainly several times a year?

In part, the rules of the academic system have changed. Nevertheless, the disappearance of polymaths has a correlative effect on comprehensive education and on the quality of faculty life. A junior faculty attendee said, “I wish I had the courage to write fewer papers.” ■

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**W. Craig Carter** is a Professor in the Department of Materials Science and Engineering; Secretary of the Faculty ([ccarter@mit.edu](mailto:ccarter@mit.edu)).

## Hayden Library Renovation: What You Should Know

Chris Bourg

**WHEN WE ANNOUNCED OUR** plans for the partial renovation of Hayden Library back in January, we shared that our goal for the project was to create a destination for MIT faculty, students, and staff on campus. The library should be a place to create, not just consume, knowledge, and we can provide that place to a wider variety of users and in more dynamic ways than ever before. The Institute-wide Task Force on the Future of Libraries challenged us to use library space to best serve the evolving needs of our community. This renovation is our opportunity to meet that challenge.

While some think that the availability of online information makes library space less relevant, our increasing foot traffic and frequent requests for using our spaces tell a very different story. The number of visits to the MIT Libraries has steadily grown over the last several years – to more than 640,000 at all libraries last year, and more than 232,000 at Hayden alone. Hayden is clearly an important space on campus. Yet the ways our community discovers, uses, creates, and shares knowledge has changed dramatically since Building 14 was built. As the Library Space Planning Group reported in 2017, a prime campus space like Hayden could be used much more effectively as the MIT Libraries’ “learning engine” and a community space, “while still incorporating essential physical holdings.”

While the renovation will provide comforts such as meeting rooms, a café, natural light, and abundant outlets, our

vision for Hayden will always keep research at the center. The MIT community needs access to tangible and digital collections, and ways to make connections between the two. They need computational access to information and serendipitous browsing, space to work together as a group and space for quiet reflection. We’re working toward flexible, multi-use spaces to accommodate it all.

We are currently in the design phase of the project with Kennedy & Violich Architecture. The project team’s explorations of how library space is and can be used at MIT has drawn from surveys of faculty, students, and staff; workshops with the MIT community; and open forums held by the Task Force on the Future of Libraries and the Libraries Space Planning Group. The design phase will conclude in early fall, and construction will begin in January 2020 with a reopening expected in fall 2020.

We are very appreciative of our partnership with Campus Planning and Facilities to minimize construction time so that Hayden will be closed for a single semester. Here are some of the key changes to collections and services that MIT faculty should be aware of:

- Hayden will close at the end of the fall 2019 term and is expected to reopen in September/October 2020.
- Many of the collections currently located on the first and second floors, such as journals, DVDs, graphic novels, and theses, will be moved by October 2019. Visit [\*tion\* for detailed information about access to these collections.](http://libraries.mit.edu/hayden-renova-</a></li></ul></div><div data-bbox=)

- There will be no access to general collections on the basement level during construction. All MIT community members have borrowing and on-site browsing privileges at the Harvard Libraries and can use services such as Borrow Direct and Interlibrary Borrowing to request materials from other universities.
- Course reserves will be available at other library locations. Faculty will be encouraged to submit requests for Spring 2020 course reserves before winter break to ensure students have access to the requested materials.
- The Lewis Music Library and Distinctive Collections (formerly Institute Archives and Special Collections) will remain open, however there may be periods where the construction in Hayden will be disruptive to other parts of the building.

I encourage you to read more about the available services and access to collections during the Hayden closure, as well as our FAQs about the project, at [libraries.mit.edu/hayden-renovation](http://libraries.mit.edu/hayden-renovation). If you have questions or concerns about the renovation’s impact on your work, please contact the renovation project team at [space-lib@mit.edu](mailto:space-lib@mit.edu) or reach out to your department’s liaison librarian (see the list at [libraries.mit.edu/experts](http://libraries.mit.edu/experts)).

**Chris Bourg** is Director of Libraries ([cbourg@mit.edu](mailto:cbourg@mit.edu)).

## Introducing the Faculty Committee on Campus Planning

Deborah L. Ancona

**AS THE CHAIR OF** the MIT Faculty Committee on Campus Planning (CCP) (see next column for the list of this year's members), I would like to introduce you to our work. Why should you care? We are in the midst of the largest change on MIT's campus in a hundred years and the CCP is the vehicle through which you have a voice. In this article we lay out what we have done, what issues still exist, and how you can help.

Our committee was created five years ago when faculty called for more input in the Kendall Square project. Since that time we have learned about the complex process of campus planning at MIT, created a set of principles for design (see table, next page), kept our fingers on the pulse of ongoing projects, ([capitalprojects.mit.edu/#gallery](http://capitalprojects.mit.edu/#gallery)), and sent lists of questions to consider on ongoing projects such as Volpe, West Campus, and now the College of Computing (let us know if you want a copy). These questions are being circulated to key stakeholders and architects: we now have a presence in the planning process.

But there are still many questions about how campus planning should evolve and what role faculty should have in it. The CCP outlines current issues and our actions below and asks for your thoughts. Issues include how to assure a faculty voice in the planning process, what kind of planning we should have, building priorities, and the existential threat of housing costs on the MIT culture. We have started to craft responses to these issues and want your feedback.

Faculty should have a strong voice in how our campus evolves, especially since

### CCP Committee Members

**Prof. Deborah G Ancona**, Chair  
*Sloan School of Management*  
**Prof. Jonathan P How** (June 30, 2020)  
*Aeronautics and Astronautics*  
**Prof. Heidi Nepf** (June 30, 2020)  
*Civil and Environmental Engineering*  
**Prof. Lisa Parks** (June 30, 2019)  
*Comparative Media Studies/Writing*  
**Prof. Brent Ryan** (L) (June 30, 2019)  
*Urban Studies & Planning*  
**Prof. Boleslaw Wyslouch** (June 30, 2020) *Physics*  
**Ms. Sarah Edgar**, Student '19 (June 30, 2019)  
**Mr. Jonas Brunschwig**, Student G (June 30, 2019)  
**Mr. Jon H Alvarez**, Director, Campus Planning, *Office of the Executive VP & Treasurer*  
**Prof. Peter H Fisher**, Designated Representative, Provost \* *Physics*  
**Prof. Erica C James**, Designated Representative, Provost \* *Urban Studies & Planning*  
**Prof. James Wescoat**, Designated Representative, Provost \* *Architecture*  
**Ms. Amy J Kaiser**, Staff to Committee  
*Campus Planning*

**Note:** Data in parenthesis designates term expiration.

**Legend:** \* Ex Officio Voting; L On Leave

we are quickly using up the space that is currently available for construction and the decisions made today will impact the MIT landscape and culture well into the future.

**Issue: The planning process is opportunity-driven and local.**

Emerging needs and opportunities drive renovations and new buildings across campus. MIT's preeminence in research and teaching triggers new opportunities continuously. The decision to take advantage of such opportunities is made by the administration and affected units relatively quickly, leading to surprises for everyone else. MIT is very good at leaving faculty to pursue their teaching and research within their units, which is a strength of the Institute, but with the consequence of something big being presented as a fait accompli for those just going about their business. Should this local response to opportunities drive the planning process? How should we lessen the impact of surprise and sometimes resentment? Adding to the confusion is the fact that MITIMCo (MIT Investment Management Company) builds commercial buildings close to, or on, what many faculty think of as campus. Should the faculty have any voice in MITIMCo decisions?

**Action: We plan to continue to push for representation in key decisions and greater communication on what is decided.**

**Issue: The Faculty is not well informed on campus planning.**

While faculty are asked for input in large planning projects, often we are ignorant of the issues involved. Should we demand housing at Volpe when it is much cheaper to build it on North Campus? Should we centralize student housing on West Campus or have it spread out across all of

### CCP Planning Principles

1. Create a healthy and vibrant living and learning community.
2. Create appropriate academic space to satisfy current needs, foster interaction across departments and anticipate future requirements – including what could be.
3. Create a campus that is attractive and affordable and that provides sufficient space for community housing, childcare, and interaction.
4. Place environmental and energy considerations as a key input in campus planning.
5. Ensure informed, continuous, and structured input from faculty on campus planning.

MIT? Should we be constructing faculty or student housing when MITIMCo's commercial investments bring a lot of money to the Endowment, which we need? These tradeoffs are difficult to assess and as such require an informed set of faculty participants to weigh in on major decisions. How can we get more faculty input when the learning curve to understanding the issues is so steep? Or should we just let the Administration make these decisions on our behalf? We believe that faculty should be informed and represented.

**Action: 1. CCP members will be available to give presentations on the key aspects of campus planning on an ongoing basis and prior to requests for faculty feedback.**

**2. We will also serve as faculty representatives so that there are educated faculty voices at the table.**

**Issue: There is no comprehensive planning process.**

MIT does not have a comprehensive plan for the campus as a whole; campus development is based around sectors. Sector-based planning has evolved over time because it recognizes different parts of the campus have different functions

(research, teaching, student life, administrative, services). The need to build dormitory space may be a priority on West Campus, while research space is needed on Central Campus, and with sector-based planning these decisions are somewhat decoupled. However, other MIT-wide needs such as parking, overall environmental and efficiency goals, and the allocation of scarce land resources, may not be as carefully coordinated.

**Action: We plan to examine the pros and cons of sector versus comprehensive planning and then to make a recommendation. Thoughts welcome.**

**Issue: Do we have the correct allocation of space on campus?**

The MIT physical plant is about 12 million square feet, 10 million of which is usable (not hallways, atria, bathrooms, etc.). Half is the Hotel, where our students live, dine, and exercise. Half of the rest, 2.5 million square feet, 20% of the total area, is services and administration, leaving about 2.5 million square feet for teaching and research – the part that matters the most to most faculty members. This allocation of space may seem like our “core” activities are being short-changed, but our teaching and research relies on the functioning of the whole campus complex to deliver healthy students to our classes and labs, make sure we get our travel reimbursements, provide a place to park our cars and all the other things that faculty assume happen as a consequence of nature.

**Action: We will be asking you if you have adequate educational and research space and if not, what your greatest needs are.**

**Issue: Is the high price of housing having an impact on our culture?**

Real estate prices in Cambridge and Boston are soaring. While this means our land is worth more, it also means that housing is getting more and more expensive and faculty, staff, and students (like other Cambridge residents) are being

pushed to live farther and farther away. Should MIT step in to address these housing needs? Right now housing assistance is given to faculty, but seems to be falling short of the mark. What will the rents be in the new graduate housing being built? Will our students be able to afford this kind of rent? These questions are not just academic ones, they are ones that speak to the very culture of MIT. If we start to lose students or faculty due to housing costs – what will this mean? Will our ability to get the world-class people we want on campus be compromised? What will it mean if students and faculty work more at home and stay on campus less?

**Action: Further explore the impact of housing prices on culture and discuss with the Administration.**

Faculty can usefully think about campus planning by following the broader evolution of MIT. The burgeoning campus is an expression of MIT's accelerating aspirations to meet bigger and more lofty goals, bringing both new construction and renovation, but also a remedy to long deferred maintenance and a commitment to efficient buildings. Our greater aspirations require money, leading to more development by MITIMCo close to campus. Understanding the planned evolution of the campus requires an understanding of how MIT as a whole is evolving. Planned, ongoing, and completed campus projects are listed here: [capitalprojects.mit.edu/#gallery](http://capitalprojects.mit.edu/#gallery); and the Report to the President is presented annually: [web.mit.edu/annualreports/](http://web.mit.edu/annualreports/).

The Faculty Committee on Campus Planning, CCP, is tasked to represent the faculty voice on the evolving campus plan. Let us know how we can better represent you.

Following this article will be future briefings on topics such as the Main group, parking, green space, academic space, and MITIMCo. ■

**Deborah L. Ancona** is Seley Distinguished Professor in Management, Sloan School of Management ([ancona@mit.edu](mailto:ancona@mit.edu)).

Numbers

**U.S. Discretionary Spending FY 2017**

U.S. Discretionary Spending, FY 2017; \$1.2 Trillion  
(billions of dollars)

