

## **MIT Washington Office**

### **Mission**

The MIT Washington DC Office (DC Office) was established within the Office of the President in 1991. The office reports to MIT's president and also works closely with the vice president for research. The staff during AY2010 included William Bonvillian, director; Alison Fox, assistant director (through March); Abby Benson, senior legislative assistant and now assistant director; Amanda Arnold, senior legislative assistant (beginning May); Helen Haislmaier, program coordinator; and Michelle Ashitomi, administrative assistant.

The mission of the DC Office is to support the science advocacy activities of the president and other senior MIT officials and faculty in Washington, DC, and to support MIT's historic role in Washington as one of the nation's premier research universities in providing leadership on national science and technology (S&T) issues. The DC Office contributes to a steady flow of information and ideas between MIT and Washington institutions, including executive branch offices, departments, and agencies, Congress, nongovernmental organizations, and other national organizations. The appendix to this report provides an overview of the engagement this year between Washington officials and MIT administration, faculty, and staff.

### **Summary**

Following is a summary of the major efforts accomplished by the DC Office between July 1, 2009 and June 30, 2010.

### **Congress and the Administration**

#### ***July–December 2009 Perspective***

The DC Office supported overall S&T funding with the new administration and Congress in both annual FY2010 appropriations and through the implementation of the 2009 American Recovery and Reinvestment Act (ARRA), also known as the stimulus bill. These efforts were remarkably successful. S&T programs overall received funding increases in FY2010, and some \$20 billion was included for research and development (R&D) in ARRA. Under ARRA, MIT has received over 150 grants totaling more than \$125 million to date.

A secondary effort in 2009, and continued in 2010, was to build strong relations with the new administration's S&T policy leaders. This effort met with success, with numerous administration leaders visiting campus (including president Barack Obama) and with MIT leaders, led by president Susan Hockfield, meeting with a wide range of senior S&T and policy officials in Cambridge and in Washington.

#### ***January–June 2010 Focus***

The 2010 focus for the DC Office was to support sustained S&T funding in a period of budget cutbacks and deficit controls. The proposed FY2011 budget from the

administration released in February marked an initial success, with federal S&T programs increased by \$3.7 billion, or 5.6% overall. Markups to date in congressional appropriations subcommittees have generally sustained these R&D numbers, but Congress will not take final action on these proposed levels until after the November 2010 elections. It is very likely that S&T funding will be rolled into a single continuing resolution.

Efforts to reauthorize the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act (America COMPETES Act)—first passed in 2007 to boost physical science R&D levels through major increases in three R&D agencies: the National Science Foundation (NSF), the Department of Energy Office of Science (DOE OS), and the National Institute of Standards and Technology (NIST)—led to House passage in May. Given the public’s deep concern over rising federal deficits, it is hoped that with Senate passage the American COMPETES Act will become flagship legislation supporting the concept that S&T investments are an important part of an innovation-based economic growth solution for the economy, not part of the deficit problem.

More needs to be undertaken to convince Congress of this case, however. In that regard, work began at MIT, backed by the DC Office, to develop new ideas and policies for innovation. Two roundtables were held in March with leading MIT faculty and researchers on innovation policies, emerging technologies, and manufacturing. Summaries and videos of these roundtables were widely circulated among policymakers. In addition, the DC Office supported two major filings with the White House, in response to requests for information (RFIs) on technology commercialization by universities and “grand challenges” in innovation. These filings were also widely circulated among Washington policymakers.

### **Research and Development Agency Engagement**

The DC Office, working with a series of faculty “engagement” committees organized around major R&D agencies and issues, supported activities in the following areas:

- *Energy*: Continued strong support for the ongoing effort to bring policy ideas and R&D results from the MIT Energy Initiative (MITEI) to DOE and other policymakers in Washington. Undertook major outreach to DOE officials, including visits to campus and meetings in Washington; tracked major energy and climate legislation; and supported the release and briefing in Washington of the latest major MIT energy policy report, *The Future of Natural Gas*.
- *NIH*: Continued efforts to encourage the National Institutes of Health (NIH) and other agencies to support “convergence” of the life, engineering, and physical sciences as a critical avenue for future advances. The DC Office provided support for the release (in September) and follow-up briefings for the National Research Council’s (NRC’s) report on this subject, *A New Biology for the 21st Century*, led by professor Phillip Sharp.

- *NASA*: Supported MIT faculty responding to the administration's efforts to reorient the National Aeronautics and Space Administration (NASA) into an advanced technology agency and to enable new approaches to space exploration and science. Efforts included organizing extensive congressional briefings, meetings, and discussions with NASA officials, and briefing and circulating a policy paper on NASA written by MIT faculty.
- *Defense*: Supported efforts by the new leadership at the Defense Advanced Research Projects Agency (DARPA) to rejuvenate its policies and programs, including the refocus in its FY2011 budget on basic breakthrough research.
- *Innovation group*: Created an innovation engagement group in fall 2009 with faculty leadership from Suzanne Berger, Charles Cooney, and Fiona Murray. The DC Office supported two March roundtables and two major administration filings on innovation.

### **Citizen Scientists at MIT**

The DC Office continued efforts supporting MIT's 16th annual congressional and executive branch staff seminar on life science convergence, the MIT summer intern programs, the annual independent activities period (IAP) "boot camp" course on S&T policy for MIT students, the annual congressional visits day for science funding advocacy for MIT students, and invitations for policymakers to come to MIT for meetings and speaking opportunities.

### **Connecting with the Policy Agenda in Washington, DC**

#### **Innovation and Competitiveness: The America COMPETES Act**

The DC Office worked closely with colleagues at other universities and higher education associations in support of legislation reauthorizing the America COMPETES Act. The bipartisan America COMPETES Act, originally signed into law by president George W. Bush in 2007, outlined a doubling path for research funding at DOE OS, NSF, and NIST over a seven- to ten-year period. The funding for DOE OS and NSF was authorized to double over seven years; the funding for NIST was authorized to double over ten years. Department of Defense (DOD) basic research, NASA science, and NIH were not included in the legislation. The 2007 America COMPETES Act also authorized major science, technology, engineering, and mathematics (STEM) education efforts and funded a new DOE initiative, the Advanced Research Projects Agency–Energy (ARPA–E), modeled after the successful DARPA for translational research in the DOD. The America COMPETES Act authorized funding for FY2007 through FY2010. Congress began to consider reauthorization of the legislation in early 2010 to start in FY2011.

This flagship legislation is important to furthering the country's innovation and competitiveness. President Hockfield held meetings with a series of key administration and congressional officials throughout the year to communicate the importance of the America COMPETES Act to MIT, the higher education community, and the nation.

These officials included President Obama's Science and Technology advisor John Holdren; Senators Jay Rockefeller (D-WV), John Kerry (D-MA), Scott Brown (R-MA), and Jeff Bingaman (D-NM), as well as senior staff for Senator Lamar Alexander (R-TN), and Representative Bart Gordon (D-TN). Abby Benson of the DC Office led task forces at both the Association of American Universities (AAU) and the Association of Public and Land-grant Universities (APLU) to track and advocate for this legislation.

Reauthorization of the America COMPETES Act was a particular priority this year for the House Committee on Science and Technology (House S&T Committee) and its chairman Bart Gordon, who announced early in the year that he would retire at the end of the 111th Congress. The House S&T Committee held over 20 hearings throughout February and March on various aspects of the act, and the full committee marked up the bill in late April. During this markup, the committee considered over 60 amendments to the 200-plus-page bill. Several of the amendments, offered by Republican members of the committee, aimed to reduce the length and amount of the authorization levels and to remove new programs, citing concerns regarding the rising federal deficit and duplicative federal programs. Understanding these concerns, chairman Gordon ultimately reduced the authorization levels by 10% from the track outlined in the original legislation. On April 28, 2010, the House S&T Committee approved the reauthorization language by a vote of 29 to 8, with all Democrats and five Republicans voting for the bill. The House bill was supported in letters signed by some 750 business associations, companies, science and university groups, and universities, including the Chamber of Commerce, the National Association of Manufacturers, the Business Roundtable, and the Semiconductor Industry Association.

Thus began a complicated and partisan effort to pass the bill on the House floor. The legislation was initially considered on the floor in early May. After two days of consideration and just before the final vote, the Republicans offered a "motion to recommit" the bill—a parliamentary tactic that gives the minority one final chance to amend legislation—that aimed to alter the legislation significantly. The motion to recommit would strike all new programs from the bill, freeze the three core agencies at the FY2010 authorized levels, reduce the length of authorization to three years, ensure that institutions serving individuals with disabilities receive a designation consistent with other institutions serving underrepresented populations in STEM programs, require institutions to allow military recruiters on campus to be eligible for federal funding, and prohibit federal funds to be spent on the salaries of employees who have been officially disciplined for viewing pornography on a federal government computer or while performing official federal government duties. The motion to recommit passed 292 to 129, as many members could not vote against it from a political standpoint due to the inclusion of the pornography provision. Democrats then pulled the bill from further consideration, rather than having it voted on with the significant changes included.

A week later, Chairman Gordon brought a new version of the America COMPETES Act to the floor under suspension of the rules. This version of the act reduced the length of the authorization to three years, thus dramatically reducing its overall price tag. By considering the legislation under suspension of the rules, this meant that no amendments could be offered on the floor but that a two-thirds vote would be required

to pass. Unfortunately, the bill failed, with a vote of 261 “for” to 148 “against,” falling short of the required two-thirds majority.

The following week, Chairman Gordon tried a third time by bringing the original bill back to the floor and called for the previously passed motion to recommit to be divided and split into nine separate roll call votes. This allowed members to vote on each specific requirement of the motion to recommit. The House voted in favor of prohibiting salaries to government employees who view pornography, which disrupted the prior vote, as well as in favor of a provision reiterating existing law prohibiting universities from receiving grants under the bill if they do not allow military recruiters on campus. The other seven votes, each representing separate portions of the previous Republican motion to recommit, including the reduction of the science authorization levels to the FY2010 levels and limiting the five-year authorization timeframe, failed. The legislation passed with a vote of 262 to 150, with 17 Republicans voting for the bill and no Democrats voting against.

In the Senate, Senators Bingaman and Alexander, Senate leaders of the 2007 act, helped lead a bipartisan effort to reauthorize a narrower version of the bill. Majority and minority staffs of three Senate committees—commerce, science, and transportation; energy and natural resources; and health, education, labor, and pensions—have been meeting weekly since December to draft the bill. The Senate Commerce Committee held two hearings on the America COMPETES Act in May.

If the legislation passes the Senate, the House and Senate will then have to reconcile their bills, which may be a challenge since they differ so much in scope. The legislation’s most expedient path to the president’s desk would entail the House adopting the Senate’s bill, but this likely will depend on inclusion in the Senate bill of Chairman Gordon’s priority programs, such as ARPA-E. The DC Office will continue to track and support bipartisan passage of the America COMPETES Act.

### ***Support for Sciences and Engineering Research and Development***

In 2009, Congress was unusually active in its support for sciences and engineering R&D infrastructure. Despite shortfalls in earlier years, Congress provided full funding for the 2007 America COMPETES Act in the FY2009 Omnibus appropriations bill and the FY2010 final appropriations (see table below). ARRA moved the three America COMPETES Act core agencies (NSF, NIST, and DOE OS) significantly ahead of the act’s pathway of straight-line increases. ARRA provided some \$20 billion in overall federal R&D support, a \$39 billion DOE energy technology program including \$5.5 billion in R&D support, \$3 billion for NSF, support for university infrastructure improvements, and major math/science education efforts and funding. In addition, NIH received \$10 billion. MIT’s legislative engagement increased significantly in 2009 and 2010 surrounding the ARRA, and continued in the same vein to try to avoid cutbacks in science investments during the FY2011 appropriations process, despite significant fiscal pressures.

The following table details R&D funding results for major research agencies for FY2009 and FY2010 (not including ARRA funding), and in the proposed FY2011 administration budget.

### Summary of Federal Research and Development Funding, FY2009–FY2011

Agency/Program	FY2009 Enacted	FY2010 Enacted	FY2011 Admin Request
National Science Foundation			
Total	6,469	6,872	7,424
Research and Related Activities	5,152	5,564	6,019
Education and Human Resources	845	873	892
National Aeronautics and Space Administration			
Total	17,782	18,724	19,000
Science Mission Directorate	4,503	4,493	5,006
Aeronautics Research Mission Directorate	500	507	1,152
Exploration	3,506	3,780	4,263
National Institute of Science Technology			
Total	819	856	919
Scientific and Technical Research Services	472	515	584
Technology Innovation Program	65	70	78
Manufacturing Extension Program	110	125	130
Department of Defense			
Basic Research (6.1)	1,759	1,798	1,999
Applied Research (6.2)	0	4,247	4,476
Department of Energy			
Advanced Research Projects Agency–Energy	15	0	300
Office of Science	4,808	4,904	5,121
Energy Efficiency and Renewable Energy	2,157	2,243	2,355
Energy Innovation Hubs	0	3 hubs 66	4 hubs 107
National Institutes of Health			
Total (discretionary)	30,467	31,159	32,089
National Cancer Institute	4,968	5,102	5,265
National Institute of General Medical Sciences	1,997	2,051	2,125
National Institute of Biomedical Imaging and Biomedical Engineering	308	316	326

*Sources:* Association of American Universities, Department of Defense, Department of Energy, National Aeronautics and Space Administration, National Institute of Science Technology, National Institutes of Health, and National Science Foundation.

### *FY2011 Research and Development Budget Request*

Given deficit pressures, the administration's proposed R&D budget for FY2011, released in early February, was quite promising (see FY2011 request column in preceding table). It included a substantial increase for non-defense R&D, which would rise by \$3.7 billion, or 5.9% above the enacted level for FY2010. The proposed FY2011 defense budget included a 3.6% increase overall for basic and applied research (categories 6.1 and 6.2) to \$6.475 billion. Highlights of the FY2011 budget request are summarized below.

- The spending plan maintains the America COMPETES Act path to a doubling by 2017 of budgets for three core science agencies: NSF, DOE OS, and NIST laboratories.
- The proposed increase in NSF funding to \$7.4 billion—an 8% increase—would expand efforts in climate and energy research and education, networking and information technology research, and research on environmental and economic sustainability. The FY2011 budget also would sustain the administration's effort to triple the number of new NSF graduate research fellowships to 3,000 by 2013.
- The budget halts NASA's constellation program, begun under president George W. Bush as an effort to send American astronauts back to the moon by 2020. The administration proposes to spend \$6 billion in new funds over the next five years to encourage the reemergence of NASA as an advanced technology agency seeking new solutions for exploration needs, including encouraging further commercial participation and international space cooperation.
- The budget for NIH would rise to \$32.1 billion, up 3.2% from the FY2010 budget approved by Congress and signed by President Obama. The budget would focus on five strategic priorities discussed by NIH director Francis Collins: (1) applying genomics and other high-throughput technologies; (2) translating basic science discoveries into new and better treatments and diagnostics; (3) using science to enable health care reform; (4) global health; and (5) reinvigorating and empowering the biomedical research community.
- The R&D budget for the National Oceanic and Atmospheric Administration (NOAA) would rise by 10%, or almost \$1 billion. The budget for the multi-agency United States Global Change Research Program would rise 21%, to \$2.6 billion overall. The funding reflects the administration's concerns about climate change and the declining health of the world's oceans. NOAA administrator Jane Lubchenco has noted that this is the largest increase in NOAA's science budget in over a decade.
- The budget for the Department of Agriculture's (USDA's) new National Institute of Food and Agriculture's key competitive research program, the Agriculture Food and Research Initiative, would rise 63% to \$429 million.
- The budget proposed to spend \$3.7 billion overall on STEM education. About \$1 billion—an increase of nearly 40%—would go to K–12 programs to encourage interest in those fields.
- The budget also proposed making the research and experimentation tax credit permanent. It provided \$300 million for ARPA–E, \$3.1 billion to DARPA (a 3.7% increase), proposed \$328.2 million for DARPA's 6.1 basic research—a major

increase compared to \$205.9 million in FY2010 and \$187.2 million in FY2009—and proposed \$679 million for R&D at the US Geological Survey, a 2.9% increase.

While the administration's FY2011 request was promising, its success in the appropriations process is unclear. The appropriations process has stalled, along with most other legislative initiatives, due to the political pressures and partisanship surrounding the upcoming November 2010 midterm elections. While we expect that initial appropriations subcommittee markups in early July will be promising for R&D, they may face additional hurdles during full committee consideration and during conference. We expect a continuing resolution will be put into place before the August recess that will last at least until after the November elections, but potentially into the next Congress, however, and it may or may not include the details of subcommittee marks for science funding.

These political difficulties for science funding faced in the contexts of both the America COMPETES Act and the appropriations process, as described above, underscore the need to better persuade Congress and other policymakers of the link between R&D, innovation, and economic and scientific advance. Thus, a third major effort at MIT focused around innovation, as discussed below.

### ***MIT Efforts on Innovation Policy Challenges***

MIT's longstanding focus on innovative research was highlighted on October 23, 2009, by a visit from President Obama, who met on campus with leading MIT energy researchers and then spoke in Kresge Auditorium to faculty and students. Efforts this year emphasized building the case for innovation investment and policies, including two faculty-led roundtables and two major policy filings with the White House, coupled with numerous visits from policymakers to campus for briefings (see Appendix) as well as related meetings in Washington by MIT leaders. This foundational effort around innovation policy will continue next year.

In March, the DC Office coordinated an on-campus effort to respond to a White House RFI on "grand challenges" in innovation. MIT's response was drawn largely from the results of two roundtables held on campus in March. On March 1, President Hockfield hosted a roundtable seeking ideas from MIT faculty and researchers on approaches that could contribute to the nation's innovation challenges. During this event, faculty participants considered emerging sectors that could contribute to the country's economic growth and policy approaches that would strengthen the US role in both propelling and prospering from these new innovations. On March 29, President Hockfield hosted a follow-up discussion focused on technology advances in manufacturing.

#### ***March 1 Roundtable: Innovation***

Professor emeritus Robert Solow introduced this roundtable with a discussion among faculty of the importance of innovation to economic growth. In the first panel, moderated by Suzanne Berger, Richard Lester discussed the need for innovation in the energy system to negotiate the transition to a low-carbon society. Phillip Sharp then outlined the importance of the convergence of computational, engineering, and physical sciences with life sciences as a major source of innovation. Rodney Brooks summarized advances in robotics over the last decade and the need to transform robotics in

manufacturing from the current generation of industrial robots that are fixed, precise, and repeatable, to future robots that are flexible, collaborative, and programmable.

Daniela Rus reviewed advances in computation that have affected the global economy and the trend toward more interactions in the physical world through robots that act in the world for people. Angela Belcher discussed the importance of innovation in areas such as bio-inspired materials, nanotechnology, and lightweight materials, and challenges to commercialization, including the lengthy approval process (average duration is 18 years) to bring a new material discovery to the market.

Fiona Murray moderated the second panel, during which Daron Acemoglu discussed “spillover effects” of investments in R&D and the importance of government funding for single-objective complementary technologies that are not measured using short-term performance metrics. Andrew Lo stressed the importance of using creative financing structures to fund R&D, and Edward Roberts discussed his 2009 report on the economic impact of MIT. Scott Stern closed the panel with a discussion of the success and importance of regional innovation clusters.

### *March 29 Roundtable: Manufacturing*

Suzanne Berger opened this roundtable with a discussion of the current state of the US production sector and an historical account of its challenges. Kaigham (Ken) Gabriel, deputy director of DARPA, provided his perspective on the need for revitalization of the country’s defense industrial base.

Angela Belcher moderated the first panel of faculty, which focused on advanced materials and nanotechnology in manufacturing. Gerbrand Ceder provided an overview of his “materials genome” project, and Charles Fine and research associate Richard Roth described their efforts to develop lightweight materials for transportation. Christine Ortiz discussed her efforts to produce biologically inspired materials, and Martin Culpepper described his work in nanomanufacturing and the need to develop a robust talent base in this emerging sector.

Charles Cooney moderated the second panel of faculty, which focused on technology advances for transforming production. Rodney Brooks spoke again about the need for advances in manufacturing robots to ensure they can empower workers to work smarter. Bernhardt Trout discussed his work at the Novartis–MIT Center for Continuous Manufacturing conducting fundamental research to ultimately transform pharmaceutical manufacturing. Sanjay Sarma explained the importance of logistics to the production process, and Timothy Gutowski emphasized the need to build sustainability practices into the production system from the outset.

The response to the White House RFI summarized the results of these roundtables, and focused on five areas that MIT believes are particularly ripe for encouragement and investment in order to address President Obama’s stated grand challenges: (1) energy technology; (2) the convergence of the life sciences with the physical sciences and engineering; (3) the merger of robotics, advanced computing, and artificial intelligence; (4) new materials; and (5) advanced manufacturing.

Links to MIT's response to the RFI, including detailed summaries of the roundtables, can be found at <http://web.mit.edu/dc/>. A response to a second White House RFI was also developed, concerning university commercialization, and is discussed in the section below. A video of the two roundtables can be found at <http://www.alum.mit.edu/news-views/alumni-news-features/alumni-news-archive/focus-innovation/>.

## ***Technology Transfer and Commercialization of University Research***

### *Challenge to the Bayh-Dole Act*

MIT has been involved in a significant national policy debate this year on improving university technology transfer and commercialization. Government interest in this issue was spurred by an article in the January–February 2010 issue of *Harvard Business Review* by two Ewing Marion Kauffman Foundation officials who argued that although university-based research is producing breakthrough technologies, these advances are not being commercialized. This commercialization issue reflects the long-standing “valley of death” problem faced by the US innovation pipeline in moving technology between research and late-stage development phases. The Kauffman authors placed a significant part of the blame for this difficulty on university technology transfer systems, and particularly on university technology licensing offices.

As a fix, they recommended a change in the approach of the Bayh-Dole Act that, in a major innovation reform passed in 1980, vested ownership of technologies produced by universities from federal research funding in the hands of the universities where the research was performed. Specifically, the authors proposed altering the Bayh-Dole Act to place ownership in the hands of the faculty researchers instead of their universities to “free up the market in technology licensing.” Universities responded that this could bring a halt to technology transfer since individual faculty were ill-equipped to navigate the torturous path to commercialization, an area where universities, though able to operate at a larger scale and assemble the requisite talent, were themselves still developing expertise. Another negative consequence of the proposal would be to reduce the growing stake that universities have, as a result of the Bayh-Dole Act, in stimulating their regional economies.

### *Office of Innovation and Entrepreneurship*

On September 24, 2009, Gary Locke, secretary of the Department of Commerce, announced the formation of a new Office of Innovation and Entrepreneurship to “unleash and maximize the economic potential of new ideas by removing barriers to entrepreneurship and the development of high-growth and innovation-based businesses.” The office will focus on the following areas:

- Encouraging entrepreneurs through education, training, and mentoring
- Improving access to capital
- Accelerating technology commercialization of federal R&D
- Strengthening interagency collaboration and coordination
- Providing data, research, and technical resources for entrepreneurs
- Exploring policy incentives to support entrepreneurs and investors

Not surprisingly, leaders of the new office expressed interest in the Kauffman proposal and began to focus on the technology transfer problem. On January 7, 2009, officials (including vice president for research and associate provost Claude Canizares) from the three universities praised in the Kauffman article for running outstanding technology transfer programs—MIT, the University of Wisconsin, and Stanford University—wrote to the director of this new commerce office critiquing the Kauffman proposal and urging the commerce department to reevaluate it.

### *Secretary of Commerce Forum*

On February 24, 2010, Secretary Locke held a forum titled “Catalyzing University Research for a Stronger Economy” about how to better use academic research to create new jobs and new products, and gave universities high marks for the quality of their research but a “needs improvement” for getting those findings into the marketplace. More than 50 leaders from academia, industry, and government (including Canizares) participated in the forum and discussed ways to improve the process, such as establishing more regional innovation centers to help universities develop their inventions and setting aside a portion of federal research grants to explicitly support commercialization of early-stage ideas.

Patrick Gallagher, director of NIST, said that it is not enough to just pay for research and pray that something good will happen down the road. With so many unemployed workers and competitor nations chasing the same high-growth industries as the US, he stressed that the commercialization of academic inventions must be as efficient and creative as we can make it. Dr. Gallagher was one of several senior Obama administration officials who took part in the half-day, closed-door event and later joined with several university leaders to brief reporters about it. He and the university participants also explained that the forum’s focus was not to push for more applied research aimed at short-term fixes, but rather for the kind of research that could create new industries.

The participants also noted that others besides universities bear responsibility for filling the voids in the “innovation ecosystem” that now make it hard to get academic inventions to the point where businesses or venture capital firms will invest in them. Industry needs to step up, too. Luis M. Proenza, president of the University of Akron, noted that, in some cases, this might mean confronting and readjusting concerns over conflicts of interest involving partnerships between industry and universities.

University participants argued there was not a need to change the rules or practices of the 1980 Bayh-Dole Act, which encourages universities to commercialize research developed with federal funds by giving them the right to own the profits from deals they might make. President Proenza and others said the law was flexible enough to allow for other commercialization paths.

But even as they defended the universities’ record in commercialization, the university leaders acknowledged that it could be improved. Lee T. Todd, Jr., president of the University of Kentucky and an MIT alumnus, noted that we are probably not maximizing the output. He reported that the University of Kentucky is now using a grant to pay two employees to work as “harvesters” of new invention ideas by scouring

university labs for ideas that might have commercial potential. President Todd and others said it was also important to develop new ways of measuring the effectiveness of commercialization, to include factors such as how many new jobs are created and how much investment those ideas draw. Organizations like the Association of University Technology Managers track metrics like patents awarded and licenses issued, but don't go so far as to try to assess job creation.

### *Regional Forums*

A series of regional forums followed the commerce secretary's Washington forum. On June 29, 2010, at the University of Massachusetts Boston, the Department of Commerce held a forum on how to best move ideas from lab to marketplace. MIT was represented at the forum by the director of the Technology Licensing Office (TLO) Lita Nelsen, Entrepreneurship Center director William Aulet, Rodney Brooks, and Deshpande Center for Technological Innovation executive director Leon Sandler. Government officials participating in the forum included David Kappos, under secretary of commerce for intellectual property and director of the US Patent and Trademark Office (USPTO); Patrick Gallagher, director of NIST; and Ginger Lew, senior counselor of the National Economic Council (NEC).

### *Congressional Hearings*

Two congressional committees picked up on the technology transfer issue. The House S&T Committee's Subcommittee on Research and Science Education held a hearing on June 10, 2010, to gather recommendations from witnesses from universities, industry, and the NSF to discuss best practices and policies for improving technology transfer. On June 29, 2010, the Joint Economic Committee held a hearing titled "Fueling Local Economies" to gather recommendations on best practices for fostering innovation and technology transfer—particularly through universities—to benefit regional economies. Witnesses from the Kauffman Foundation at both hearings echoed points from their January–February *Harvard Business Review* article and university witnesses countered.

### *White House Request for Information on Technology Transfer*

The Commerce Department and Congress were not the only entities at work on the issue of technology transfer. On March 25, 2010, White House Office of Science and Technology Policy (OSTP) director and presidential science advisor John Holdren and NEC director Lawrence Summers issued an RFI on commercialization of university research. Numerous universities, associations, and firms responded. On May 26, 2010, Susan Hockfield filed a 15-page detailed reply, making a series of policy recommendations and describing in detail MIT's own "innovation ecosystem." The filing discussed the institutional elements MIT has created in recent years to support technology commercialization, including the TLO, the Deshpande Center, the Entrepreneurship Center, the Venture Mentoring Service, MIT's innovation prizes, the Industrial Liaison Program, and cross-school/cross discipline initiatives in areas such as energy and the convergence of life, physical, and engineering sciences. It further suggested that these could serve as possible models for programs at universities nationwide. The report was widely circulated to policymakers in the Executive Branch and in Congress. The president's chief technology officer, Aneesh Chopra, later publically commented that on a scale of 1 to 100, MIT's filing scored a 150.

The link to the RFI on technology transfer can be found at: <http://web.mit.edu/dc/>.

In summary, significant progress was made this year in improving understanding of the university's role in technology transfer, with MIT playing a central role in the debate. This is an important sidetrack paralleling the overall innovation policy discussion with significant ramifications for universities. Next year promises to offer a series of policy recommendations from the administration and the House S&T Committee expects to be involved in these issues as well.

## **Energy**

MIT's innovation efforts in recent years have focused on the national need for a shift to new energy technologies. These efforts continued this year, led by MITEI.

As discussed in the science support section, the administration continued to follow through on pledges of increased support for energy research and the development of a "green economy," although it faced growing challenges due to concerns regarding the federal deficit. Although Congress did not fund the US president's proposed FY2010 clean energy technology fund of \$15 billion per year for 10 years in the context of climate legislation, the president's FY2010 and FY2011 budget requests continued the DOE OS on the doubling path outlined in the 2007 America COMPETES Act. These included increases for other new energy R&D programs as well, building on the \$5.5 billion in R&D investments in stimulus legislation.

### ***Department of Energy Initiatives***

The DOE's FY2009, FY2010, and FY2011 budget requests included several new front-end R&D energy initiatives, including ARPA-E, Energy Frontier Research Centers (EFRCs), and Energy Innovation Hubs. These new initiatives have met with varying success in the appropriations process and have prompted concerns about potential for overlap or duplicative efforts. The secretary of energy, Steven Chu, has made strong efforts this year to explain the differences among these three new programs, as well as justify funding for each. Overall, DOE this year made significant improvements in strengthening its R&D efforts and in filling gaps in its innovation system to move technology between basic and applied R&D stages.

### ***Advanced Research Projects Agency-Energy***

ARPA-E, which was created to fill the gap between DOE basic and applied research by accelerating new technologies, proved of particular interest to MIT researchers this year. ARPA-E was authorized in the 2007 America COMPETES Act and modeled on the DOD's DARPA to perform translational research. It received its first appropriations funding in ARRA and was effectively stood up in 2010. DOE imposed a 20% cost-share requirement on its first solicitation in June 2009, which limited the ability of universities to compete. After hearing concerns from the AAU, the APLU, MIT and other universities, DOE reduced the cost share to 10% for its second solicitation.

ARPA-E announced its first round of awards—\$151 million for 37 projects—in December. MIT received one lead award (\$6.9 million to professor Donald Sadoway

for work on new battery technologies) and several Massachusetts-based companies with MIT researcher affiliations also received awards. Summaries of the work of these firms are included below to suggest the dynamic flow of MIT research into actual technological advance.

- 1366 Technologies of Lexington received \$4 million to fund its direct-wafer solar photovoltaic cell production technology, which aims to cut the production costs of solar photovoltaics.
- Agrivida of Medford received \$4.6 million to develop advancements in cellulosic fuel crops that cut the cost of distilling cellulosic ethanol and other chemicals.
- FastCAP Systems of Cambridge received \$5.3 million to develop nanotechnology enhanced batteries with superior power density and longer lifespans.
- FloDesign Wind Turbine of Wilbraham received \$8.3 million to develop a high-efficiency wind turbine design.
- Sun Catalytix of Cambridge received \$4.1 million to develop a water-splitting technology for the ultimate production of solar fuels.

ARPA-E announced its second round of awards—\$106 million for 37 projects—in April. The awards were presented in the following categories: electrofuels, batteries for electrical energy storage in transportation (BEEST), and innovation materials and processes for advanced carbon capture technologies (IMPACCT). MIT received two awards in the electrofuels category (\$4.9 million), one lead award (\$4.9 million) and one partner award (\$3.2 million) in the BEEST category, and another award (\$1 million) in the IMPACCT category. The MIT researcher-originated company A123 was a partner in two awards (one with MIT) in the BEEST category.

Arun Majumdar, director of ARPA-E, visited MIT in December 2009 to meet with energy researchers and the winners of the initial round of ARPA-E funding. During this visit, Majumdar addressed a group of MIT Energy Club students and announced the creation of the ARPA-E fellows program. Majumdar also addressed an energy salon hosted by President Hockfield and MITEI that was attended by members of the local energy business cluster.

From March 1–3, 2010, ARPA-E hosted a three-day summit in Washington on energy innovation that included extensive MIT participation. More than a thousand participants attended on each of the three days. Initial ARPA-E award winners (including MIT and five MIT-affiliated firms) and award finalists exhibited their technologies to hundreds of energy and technology industry representatives. The program was packed with venture capital, energy industry, energy policy, and senior administration leaders, and was led by Secretary Chu and Dr. Majumdar. Lita Nelsen spoke on technology transfer best practices on March 1, professor Yet Ming Chiang spoke about technology game changers on March 3, and attendees enjoyed a video presentation by professor Daniel Nocera on his solar catalyst technology which was prominently featured on the ARPA-E/summit website. Professor Richard Lester participated in a meeting on March 2 with Secretary Chu and venture capital and technology leaders on accelerating energy innovations into markets.

### ***Energy Innovation Hubs***

The DOE FY2010 budget proposed \$280 billion for funding eight hubs, located at DOE national laboratories or at universities, to focus on various key fields of energy research and to incorporate basic and applied research. Despite concerns regarding overlap among ARPA-E, hubs, and EFRCs, Congress approved funding for three energy innovation hubs in FY2010: modeling and simulation for nuclear reactors, fuels from sunlight, and energy efficient buildings. MIT partnered with Oak Ridge National Laboratories in a successful bid for the nuclear hub. MIT also participated in a proposal for the fuels from sunlight hub that was led by the University of Colorado and the National Renewable Energy Laboratory. However, this hub was ultimately awarded to a California-based team.

MIT led a multi-state New England proposal for the energy efficient buildings hub and hopes to learn of its award in August. If awarded, this proposal would bring \$129 million over five years to the New England region. The New England Energy Regional Innovation Cluster (E-RIC) team includes more than 50 industry, academic, and state partners throughout the region. DOE is the main decision maker on the proposal, but the departments of labor, education, and commerce will also play a role in selecting the recipient. Whether selected or not, the team constitutes a promising effort to develop future projects in New England.

On June 27, 2010, MITEI director Ernest Moniz and Sarah Slaughter came to Washington to conduct a briefing and meetings on the E-RIC proposal. Representatives Edward Markey (D-MA) and Christopher Murphy (D-CT), and Senator Judd Gregg (R-NH) sponsored a congressional staff information brief on Capitol Hill on the E-RIC proposal. E-RIC team principals from MIT, the University of Massachusetts, the Massachusetts Clean Energy Center, and the Massachusetts governor's legislative director also met with Representatives Michael Capuano (D-MA) and Markey, and Senator Kerry's legislative director. All members were supportive of the proposal, and the DC Office worked with the E-RIC team to obtain New England-wide delegation letters of support for the proposal in both the House and the Senate as well as a letter signed by all New England governors.

The president's FY2011 request includes funding for one additional energy innovation hub on batteries and energy storage. MITEI is conducting preliminary efforts toward such a hub, and awaits news on whether or not the hub will be funded by Congress

### ***Energy Frontier Research Centers***

EFRCs, located in DOE's basic energy sciences program, were first requested in the president's FY2009 budget request. EFRCs focus on basic research in fundamental areas critical to energy science advancement. Congress provided \$100 million for the EFRCs in the FY2009 Omnibus appropriations and added additional \$277 million in funding in ARRA. The FY2011 DOE request includes \$40 million in funding for six to ten additional EFRCs. Forty-six EFRCs have been awarded to date. MIT has won two EFRC awards (one through ARRA and one through FY2009 funding) as lead institution, and MIT faculty participate in several more.

The FY2010 DOE request included two additional proposals for major programs of significant interest to universities that the DC Office and MIT faculty continue to support. Secretary Chu proposed \$115 million for RE-ENERGYSE, a program focused on energy education at all levels. MIT signed on to an AAU and APLU joint letter in support of this program (see letter of President Hockfield to energy under secretary Kristina Johnson on RE-ENERGYSE program, August 14, 2009) and President Hockfield provided ideas on this program to DOE officials at their request. This program was not funded in FY2010. A streamlined proposal for RE-ENERGYSE, with NSF as a partner, was included in the FY2011 request. This program has not been received well by Congress, which questions whether NSF or DOE should have the lead on science higher education, and we do not expect funding will be included in the final FY2011 appropriations bill. Meanwhile, however, a series of other less heralded but major energy education efforts are already being implemented at DOE through the Office of Energy Efficiency and Renewable Energy (EERE) using ARRA funds.

### ***Climate and Energy Legislation***

The 2009 American Clean Energy and Security Act, a combined energy and climate cap-and-trade bill (Waxman-Markey, H.R. 2454), passed the House on June 26, 2009. This legislation provided approximately \$1.5 billion (1.5% of cap and trade allocations) for R&D (1% for ARPA-E and 0.5% for applied development-focused innovation centers). Representative Rush Holt (D-NJ) protested the R&D level during floor debate in June 2009 and subsequently, on July 16, 2009, a group of 34 Nobel prizewinners wrote the US President that, “[t]he stable support this [Clean Energy Technology] Fund would provide is essential to pay for the R&D needed if the United States, as well as the developing world, are to achieve their goals in reducing greenhouse gases at an affordable cost.” (The Nobel prizewinners’ letter can be found at: [http://thebreakthrough.org/blog/2009/07/34\\_nobel\\_prize\\_winners\\_write\\_p.shtml](http://thebreakthrough.org/blog/2009/07/34_nobel_prize_winners_write_p.shtml).) The administration, however, remained reluctant to press for its funding as the Senate began consideration of climate legislation.

Since the passage of the Waxman-Markey legislation in the House, the Senate has considered several versions of climate and energy legislation. A summary of each of these bills is provided below (drawn from the Congressional Research Service summary “Comparison of Selected Senate Energy and Climate Change Proposals,” June 24, 2010).

S. 1462, the American Clean Energy Leadership Act (ACELA) of 2009, was introduced by Senator Bingaman and reported by the Senate Committee on Energy and Natural Resources on July 16, 2009 (S.Rept. 111-48). S. 1462 is a broad energy bill aimed at promoting the development of clean energy technologies, increasing energy efficiency, and promoting domestic energy resources. Incentives for new technology include a renewable energy standard (RES) for electric utilities. The bill does not directly address greenhouse gas emissions. Instead, provisions for a greenhouse gas cap-and-trade system were included in S. 1733, the Clean Energy Jobs and American Power Act, sponsored by Senators Kerry (D-MA) and Boxer (D-CA), and reported by the Senate Committee on Environment and Public Works on February 2, 2010.

S. 2877, the Carbon Limits and Energy for America's Renewal (CLEAR) Act, was introduced by Senators Cantwell and Collins on December 11, 2009 and has been referred to the Senate Committee on Finance. S. 2877 would establish a program to control only carbon dioxide (CO<sub>2</sub>) emissions (covering 80% of US greenhouse gas emissions), requiring fossil fuel producers (e.g., coal mines, gas wellheads) and importers to submit "carbon shares" for the CO<sub>2</sub> emissions related to the fossil fuels they produce or import. The president would limit (or cap) the quantity of carbon shares available for submission each year, and the Department of Treasury would distribute all of the carbon shares through monthly auctions.

S. 3464, the Practical Energy and Climate Plan Act of 2010, was introduced by Senators Lugar, Graham, and Murkowski on June 9, 2010 and has been referred to the Senate Committee on Finance. S. 3464 is a broad energy bill aimed at promoting the development of clean energy technologies, increasing energy efficiency, and promoting domestic energy resources. Instead of a renewable energy standard (RES) like that contained in S. 1462, S. 3464 contains a "Diverse Energy Standard" which would permit the use of a broad range of electric generation technologies including renewables, but also including nuclear energy and advanced coal generation with carbon capture and storage. Other provisions include building and vehicle efficiency standards and nuclear energy loan guarantees. The bill does not contain a mandatory scheme to limit greenhouse gas emissions.

A discussion draft of the leading Senate climate bill this year, the American Power Act (APA), was released in May by Senators Kerry and Joseph Lieberman (I-CT). The initial partnership on this bill included Senator Lindsay Graham (R-SC). However, Senator Graham withdrew his support for the bill amid concerns regarding when the bill would be considered. A comprehensive energy and climate change policy proposal, the APA draft would set greenhouse gas reduction goals similar to those in H.R. 2454 (the bill most comparable to the APA draft), which passed the House in June 2009. The APA employs a market-based cap-and-trade scheme for electric generators and industry with a separate price mechanism to cover emissions from transportation fuels. The draft proposal would allocate a significant amount of allowance value to energy consumers, low-income households, and the promotion of low-carbon energy technologies. In addition, the draft would provide incentives for the expansion of nuclear power, carbon capture and storage technology, and advanced vehicles. This legislation also allocated 2% of allowances to clean energy R&D for the years 2013–2021.

The DC Office has tracked each of these bills, and MIT and other university leaders have discussed the need for inclusion of a dedicated, sustained revenue source for energy funding to ensure that energy R&D doesn't "fall off a cliff" after the 2010 ARRA federal funding is spent down. While each of the bills included some provisions related to R&D, none reaches the scale of President Obama's \$15 billion a year proposed clean energy technology fund for climate legislation, or the \$16 billion a year for energy technology advocated in a major report this past summer by a group of leading business thinkers (including Bill Gates of Microsoft, Jeffrey Immelt of General Electric, Norman Augustine formerly of Lockheed Martin, and venture capitalist John Doerr).

As of June, the prospects for enacting a comprehensive energy and climate package in the Senate were dim because of the unlikelihood of obtaining the 60 votes to overcome a threatened filibuster, despite House passage. The Deepwater Horizon oil spill in the Gulf of Mexico brought additional attention to the need for a new energy strategy and several “energy/oil spill” legislative packages emerged throughout June. The White House hosted several policy sessions with key legislators to determine the path forward on energy and climate legislation, but no single option has emerged. Despite efforts from the utility sector, which in general would prefer the certainty of a legislative solution versus the uncertainty and limited technology funding of EPA regulatory action, the political appetite for a cap on carbon is limited. Political concerns, particularly in the face of mid-term elections, have especially dampened any efforts to put a price on carbon through legislation.

### ***Rollout of “The Future of Natural Gas” Report***

A team of MITEI researchers came to Washington on June 23–25, 2010, to roll out The Future of Natural Gas report. The team included Ernest Moniz, Melanie Kenderdine, Anthony Meggs, Henry “Jake” Jacoby, Daniel Cohn, and Francis O’Sullivan. Among those briefed by the team were House and Senate energy staffs; Senator Brown’s (R-MA) staff; the deputy secretary of energy and the under secretary for science; various members of the executive office, including staff members from OSTP, the Office of Management and Budget, and the Council on Environmental Quality, and the president’s climate advisor. The DC Office assisted in arranging these briefings. The official rollout took place to a full house at the National Press Club on June 25, 2010.

### ***Other Engagements with Energy Officials***

Throughout the year, Hockfield, Canizares, and other MIT officials met with DOE officials and congressional staff and members to discuss energy research and policy with a particular focus on sustained and predictable increases in energy R&D. The agendas for these meetings were informed through quarterly meetings with the DOE engagement group on campus.

On October 23, 2009, MIT hosted President Obama on campus. The president addressed the MIT community in Kresge Auditorium and focused his remarks on the need for a commitment to clean energy in the United States and the need for a Senate climate change bill that would place a price on carbon. In addition, he toured energy laboratories and was briefed by various faculty members engaged in energy research, including Angela Belcher, Paula Hammond, Marc Baldo, and Vladimir Bulovic. In addition to President Obama, Senator Kerry, Representative Capuano, and Massachusetts governor Deval Patrick came to campus for the event. President Obama was introduced by President Hockfield and Ernest Moniz.

The DC Office also arranged for DOE senior officials to visit campus in 2009–2010. As discussed above, Arun Majumdar visited in December 2009. Henry Kelly, principal deputy assistant secretary of DOE’s Energy Efficiency and Energy Reliability Directorate, visited in January 2010 and William Brinkman, director of OS, visited in May 2010. In addition, Senator Bingaman, chairman of the Senate Energy and Natural Resources Committee, gave the keynote speech at the MIT energy conference.

Energy innovation remains a priority policy arena for both MIT and the nation, and an area where MIT has been able to make major contributions in recent years to national needs. The DC Office this year continued to support MITEI in energy policy engagement with both Congress and the administration.

## **Life Science, Biomedical Research, and Convergence**

### ***Health Care Reform***

While discussions over health care reform raged in town hall meetings in August, efforts to pass a health care reform bill started in September with the Senate Finance Committee initially working on a bipartisan proposal. The Senate Finance Committee passed a version of this bill in October, and Senate majority leader Harry Reid brought the bill to the Senate floor for debate in late November. Goals of the bill included increasing access and quality of health care and lowering costs for both the government and consumers. While the House developed its own version of health care reform, it eventually adopted the Senate's version in a reconciliation legislative process. The House passed the Senate version of the bill as well as another bill with House additions to the Senate legislation. The president signed both bills into law in late March. The resulting legislation is referred to as the Patient Protection and Affordable Care Act (PPACA). In general, health care reform focused more on rearranging the financing system for health care delivery, with only very limited attention to life science innovation. However, two provisions related to innovation were of interest to MIT and other universities and are described below: the cures acceleration network, and comparative effectiveness research. Additional sections included in health care reform of interest to universities, but not related specifically to innovation, can be found in the higher education section below.

#### ***Cures Acceleration Network***

PPACA established the cures acceleration network at NIH to provide funding for translational research to bridge the gap between laboratory discoveries and lifesaving therapies in the form of medical products, drugs and devices, or biological products. This section created a board to advise and provide recommendations to the director of NIH and established three kinds of new awards: the cures acceleration partnership awards, grant awards, and flexible research awards. These new research funding opportunities would provide the director of NIH more flexible research authority to use other transactions to fund projects. The authorized funding level for the first year was set at \$500 million; however, that amount has yet to be appropriated.

#### ***Comparative Effectiveness Research***

PPACA established a non-profit institute called the Patient-Centered Outcomes Research Institute (PCORI), a board of governors to oversee the institute, and a trust fund to pay for the research. PCORI is authorized to set research priorities and a research agenda. PCORI is also authorized to conduct or support comparative effectiveness research, develop research methodologies, develop data resources, obtain and use data from the federal government, and establish advisory panels on research priorities, among other provisions. NIH is listed as a member of the board of governors and as a member of the methodology committee.

### ***National Institutes of Health Budget and New Directions***

NIH will face a “funding cliff” in FY2011 when the two-year allotment of \$10.4 billion in economic stimulus (ARRA) funding runs out. The president’s FY2011 budget calls for a \$1 billion (3.2%) increase for NIH, for a new total of \$32.2 billion. However, it is unclear whether Congress will have the political consensus to pass particular appropriations bills that will support these levels outside the expected continuing resolution that may continue into next year.

In April, NIH director Francis Collins testified before the House Appropriations Subcommittee, which is now considering the NIH budget. Dr. Collins argued that without some cushioning, this funding cliff could mean a serious drop in the success rates of grants. For instance, over the last 30 years NIH grant applications had about a 25%–30% funding award rate. More recently, however, that number has dropped to 20%. The coming funding cliff could mean that the funding rate for grants could drop to as low as 15% in FY2011. Dr. Collins also testified on similar issues at the Senate appropriations subcommittee in May. The full committee has not yet taken up the appropriation bill that includes the NIH budget.

### ***Changes at the National Institutes of Health***

In February, Dr. Collins outlined five areas of research he plans to prioritize in FY2011. These include supporting genomics and other high-throughput technologies, translating basic science into new and better treatments, reinvigorating the biomedical research community, using science to enable health care reform, and recognizing the of improved global health. Also, in March, President Obama named Harold Varmus, former director of the NIH in the 1990s and a Nobel-winning scientist, as the new director of the National Cancer Institute (NCI), effective July 2010.

### ***Convergence and Other Activities***

MIT’s faculty engagement group on life science issues, in coordination with MIT’s president and with support from the DC Office, has worked this past year to articulate a new policy framework that could be the basis for further life science research support. This rationale is also aimed at supporting increases for NIH funding, based on the concept that a new revolution in life science research is emerging from the convergence of physical, engineering, and life sciences.

### ***“A New Biology for the 21st Century” Report***

Engagement efforts continued with support for professor Phillip Sharp’s efforts as co-chair of a National Research Council (NRC) report on the future of the life sciences, *A New Biology for the 21st Century*, which articulates how life sciences and convergence can benefit four major societal challenges: energy, food, environment, and health. The report received extensive coverage in the science community when it was released in September. In October, Professor Sharp was invited to speak about the report at the President’s Council of Advisors on Science and Technology. In November 2009, Professor Sharp discussed the report again on the National Academies’ 25th anniversary as part of a forum for its life sciences board. The report continues to receive mention in follow-up forums.

Interest by the administration in the report and convergence was high. For example, on October 18, 2009, at a rollout for a major new USDA competitive research program at the National Institute of Food and Agriculture (NIFA), new NIFA director Roger Beachy specifically discussed the New Biology report. He quoted from the report and indicated that the findings regarding convergence research are in “stunning alignment” with the goals of the USDA. Others present, including USDA secretary Tom Vilsack, OSTP director John Holdren, and DOE under secretary Kristina Johnson, spoke in themes consistent with those raised in the report. There was considerable discussion about collaboration among federal agencies and departments around a convergence-type model.

### *Congressional/Executive Branch Staff Seminar*

This year MIT brought 35 senior congressional and executive branch staffers to campus for a three-day seminar to discuss the issue of convergence with leaders in emerging convergence research and fields. MIT speakers included Phillip Sharp, Robert Langer, Douglas Lauffenburger, Sangeeta Bhatia, Mriganka Sur, and Lita Nelsen. The forum on convergence was very well received.

### *White Paper on Convergence*

The DC Office worked with a team on campus to draft a white paper on convergence and will work with the MIT News Office to roll out the proposed report (still in working draft) as well as set up meetings in Congress and with key administration officials around it. The white paper will help capitalize on growing interest from the White House OSTP on convergence issues. This interest is obvious in two significant efforts so far. First, OSTP was a chief architect in the NIH and NSF pilot Bridging the Sciences grant program, established in April to allow funding support for cutting-edge, vision-driven research which is possible only through cross-disciplinary inquiry. Second, Thomas Kalil, deputy director for policy at OSTP, essentially extended an invitation for convergence ideas when he wrote in a June blog entry, “I believe there is strong case for replicating the CCC [Computing Community Consortium] model in other areas of research.... [O]ne could imagine analogues to the CCC in areas of research such as clean energy, nanoscale science and engineering, and the ‘interfaces’ of biology, the physical sciences, and engineering. They would undoubtedly strengthen the ability of the US to identify and support transformative research.” In addition, professor Robert Langer briefed the director and senior leaders at NIH on convergence-related research approaches during a special meeting for that purpose.

The DC Office will continue to support the convergence agenda of the NIH faculty engagement group and will support efforts by President Hockfield and research leaders at MIT to articulate this issue.

## **Defense Research and Development**

The engagement effort with the DOD began in 2007, led by co-chairs Rodney Brooks and Victor Zue, then co-directors of the Computer Science Artificial Intelligence Laboratory (CSAIL); Edwin Thomas, head of the Department of Materials Science and Engineering and founder of the Institute for Soldier Nanotechnologies; and Zachary Lemnios, then chief technology officer for Lincoln Laboratory (who in 2009 became director of defense

research and engineering at DOD). This group was joined by a group of approximately 10 faculty and Lincoln Laboratory researchers and convened by Claude Canizares.

For a decade, DOD has been at an historic strategic impasse, confronting asymmetric threats in two wars in the Mideast, while potential peer competitors emerge representing possible symmetric threats. This impasse has translated in the R&D field as a gap in a defense technology strategy. DOD operated through the closing years of the Cold War with the “technology offset” strategy developed by former secretaries of defense Harold Brown and William Perry, which merged into “network-centric” warfare theory of the connected battlefield of the 1990s, advocated by Secretary Perry. However, these approaches have had only limited relevance to the asymmetric conflicts in the Mideast. In addition, information technology (IT) researchers at CSAIL faced a significant decline in DOD research funding as DARPA pulled back from longer-term university IT research because of a focus on short-term warfare needs.

### ***Focus on Breakthrough Research***

Efforts this past year have included a strong outreach effort with the new DARPA leadership and OSTP to encourage a reemphasis in DARPA back to its historic focus on revolutionary technology development, and an increase in the DOD basic research portfolio. DARPA’s deputy director Ken Gabriel visited campus twice in 2010. Efforts by its leadership to refocus DARPA have been dramatic, with the DARPA FY2011 budget reflecting a major increase in its 6.1 basic research budget. DARPA’s FY2011 budget request is \$3.1 billion, a 3.7% increase, including a request for \$328.2 million for DARPA’s 6.1 basic research, a major increase compared to \$205.9 million in FY2010, and \$187.2 million in FY2009. Through this and other elements in its FY2011 budget request, DARPA has signaled a return to its breakthrough research model.

DARPA also created a new office to focus on potential transformative technologies. As part of that refocus (and at DARPA’s request), on March 24, 2010, MIT hosted the first of a new DARPA seminar series on possible biological science applications and models for cyber security defense. This topic was originally suggested to DARPA by Susan Hockfield. Co-chaired by professor Michael Yaffe and MIT Corporation member and former director of DDR&E Anita Jones, the conference at Endicott House, attended by 30 leading life science and computer science researchers from around the country, helped explore new breakthrough ideas.

### ***Defense Basic Research Funding***

Concerning overall defense basic research, after a long period of stagnation, defense secretary Robert Gates addressed this issue when he came to DOD, advocating a significant increase in basic research funding at the Pentagon in the FY2009 budget and calling for a total of a billion dollar increase over the following five years. His FY2009 proposed DOD budget was consistent with this position, calling for an increase in the overall basic research budget (defense research category 6.1) for FY2009. In FY2010, the Obama administration continued his initiative. Overall, DOD basic research across the services was again increased by the administration’s FY2011 budget to \$2.0 billion for defense 6.1 programs, a \$200.5 million increase over the FY2010 request. The DOD’s

applied research (6.2) FY2011 budget seeks \$4.48 billion, a \$229.2 million increase over the FY2010 request.

### ***Department of Defense Guidance on Basic Research Publication***

Responding to growing tendencies at DOD to limit publication of basic research, under secretary of defense Ashton Carter, acting on behalf of Secretary Gates, issued a memorandum to the military services and the defense agencies at the end of May reiterating that the publication of fundamental research results should remain unrestricted. The effort was staffed by DDR&E director of basic research Robin Staffin, who visited MIT this year for meetings with researchers. The DOD document reinforced guidance issued in 2008 by then under secretary John Young and reaffirms the commitment of Pentagon leaders to compliance with National Security Decision Directive (NSDD) 189. NSDD 189, first issued by the Reagan administration, states that to the maximum extent possible, results of university fundamental research are to remain unrestricted. Under Secretary Carter's memorandum expands upon this by stating, "DOD must not place restrictions on subcontracted unclassified research that has been scoped, negotiated, and determined to be fundamental research within the definition of NSDD 189." It adds, "Provisions shall be made to accommodate such subcontracts for fundamental research and to ensure DOD restrictions on the prime contract do not flow down to the performer(s) of such research." This memorandum represents an important step in resolving ongoing issues that university researchers have had with the defense department, including the issue of the inclusion of clauses in subcontracts from industry prime contractors to universities that unnecessarily restrict publication of DOD research results.

### ***Robotics Research and Development***

In addition, through CSAIL, MIT was engaged in an initiative on robotics research and development, supported by the MIT Washington Office. It involved working with several other leading universities and with the robotics industry to build support for an interagency robotics initiative (which included DOD, the major federal robotics R&D supporter) and for a new program to support R&D in this area. As a result, the White House OSTP began this year an ongoing interagency initiative to consider and promote such a program.

### **Space**

Throughout 2009 and 2010, MIT continued to expand its engagement efforts with NASA. The Bush administration's NASA leadership, in an effort to implement the new manned space effort through the Constellation program to return to the moon (yet without significant new funding), reduced NASA's support for science programs. As a result, NASA remained plagued with an expensive manned space mission that greatly exceeded the funding it receives. In FY2009, the economic stimulus legislation provided NASA with additional R&D funding, including additional funds for the science and aeronautics accounts, but not enough to meet its growing mission's funding demands.

### ***Augustine Committee and Report***

In May, the Obama administration chose former Lockheed chief executive officer Norman Augustine to chair a panel that would help define the next era of space exploration. In September 2009, the Augustine Committee, on which professor Edward Crawley served as a key member, issued a report laying out new options for the future of the exploration program at NASA. In addition to evaluating increased funding demands for, and program status of, exploration programs, the report clarified that the Constellation program would not be viable and recommended a new plan that would attain the goal of reaching Mars in a more feasible way. This plan, called the “flexible path” for NASA, meant altering the Constellation effort to land on the moon again and developing heavy-lift capabilities to go further—first to near-earth objects, like asteroids, and eventually to orbit Mars. In addition, the “flexible path” called for expansion and reinvigoration of the S&T programs. Augustine, accompanied by Crawley, presented the report to congressional committees, as well as at a forum on the MIT campus, soon after it was released.

### ***President’s Budget***

The president’s FY2011 budget request halts NASA’s Constellation program and essentially adopts the “flexible path” option identified by the Augustine Committee. It requires NASA to return to its role as an advanced technology agency and calls for \$6 billion of new funding in the next five years to support this shift. The Constellation project for a moon landing by 2020, which was already in an affordability crisis, would be cancelled, with funding shifted to the new technology and mission focus as well as an expansion of science programs, particularly of climate sciences. Commercial space and international collaboration would be expanded. This plan would open opportunities for universities expert in both engineering and science, such as MIT, to help NASA develop new technologies.

### ***Congressional Reauthorization and Appropriations***

Congress started holding hearings on the NASA reauthorization bill with two hearings in September—one in the House S&T Committee, the committee of authorizing jurisdiction in the House, and another in the Senate Commerce Committee, the committee of jurisdiction in the Senate. Both focused on the Augustine Committee recommendations. Professor Crawley served as a witness in the House committee hearing. Additional hearings were held in October—two by the House S&T Committee on the issues of commercial spaceflight and the necessity to fund technology development at NASA, and another two on the same subjects held in the Senate Commerce Committee.

In November, the Augustine report was publicly unveiled at the National Press Club and one more hearing was held by the House S&T Committee on global space capabilities. In December, the House S&T Committee held one more NASA hearing before adjourning. In that hearing, representatives first made the push for maintenance of the Constellation program. This hearing also resulted in an audit of NASA spending. No such efforts took place in the Senate before adjourning for December recess.

In February, the president released details of his FY2011 budget, which included the major changes to the NASA spaceflight program outlined above. Congress also held three hearings—two in the House S&T Committee, and another in the Senate Commerce Committee. The House hearings focused on how NASA handles funding and reflected the skepticism of members who requested investigations on the issue with calls to the NASA inspector general, the Government Accountability Office (GAO), and the Aerospace Safety Advisory Panel. In the second House hearing, members referred to the president’s budget plan for NASA as a “radical departure from past budgets” and started making reference to not only workforce issues, but also the ability of the administration and the agency to provide budget justification documents to the committee in a timely manner. The Senate Commerce Committee hearing outlined many of the same substantive issues as the House did, including the future of the manned spaceflight program and workforce concerns under the new plan.

By March, both the president and NASA responded to clear congressional uneasiness with the new direction. NASA administrator Charles Bolden asked for a “plan B” approach to the commercial crew section, while President Obama publicly defended the plan and scheduled a NASA summit he would attend for April 15. Both NASA’s deputy administrator Lori Garver and NASA’s newly named chief technologist Robert Braun gave public speeches in support of NASA’s new direction. The House S&T Committee held two more hearings in March. At both, a number of committee members and witnesses criticized the president’s plan as not viable and a threat to the future of manned spaceflights as well as to meaningful use of the international space station (ISS). Multiple committee members called for investigations as to whether NASA was improperly slowing the Constellation program in an effort to end it, without congressional authorization. The Senate did not hold hearings in March.

### ***MIT White Paper on the Flexible Path***

In April, in the midst of the above-described controversy, professors Edward Crawley and David Mindell released a new paper attempting to summarize the key issues around the administration’s proposed NASA proposals and the Augustine Committee proposals they were based on. Titled “United States Human Spaceflight: The FY2011 Budget and the Flexible Path—A Space Policy White Paper,” the report carefully set out the options, including funding and policy implications faced by NASA. The DC Office assisted in circulating and arranging a wide range of briefings to congressional committees and administration officials for the paper.

### ***President’s NASA Florida Summit***

On April 15, 2010, President Obama spoke at a NASA summit in Florida, supporting the plan but making some concessions on several key points. In order to counter the idea that the new plan would scrap all Constellation program advances and also waste ISS investment with no US-based vehicle to reach it after the retirement of the shuttle program, President Obama suggested using the Orion crew capsule as a rescue vehicle so that the US would not need to rely on foreign carriers to rescue our astronauts, if necessary, from the ISS. President Obama also addressed workforce issues, promising the development of 2,500 new jobs in Florida to replace those lost from the six-year-old plan to retire the shuttle program. President Obama also promised a \$40 million

job growth program, with a plan to be in place by August 15, 2010. While the House was quiet, the Senate Appropriations Committee held a hearing on the FY2011 NASA appropriation in late April. Similar grumblings about losing the Constellation program and workforce issues percolated at this hearing as well.

### ***NASA Administrator's Visit***

In May, Charles Bolden visited MIT to discuss the future of NASA with Susan Hockfield, Claude Canizares, and members of the Aeronautics and Astronautics faculty, as well as to announce a space grand education program led by MIT, in a visit put together by professor Jeffrey Hoffman. Meanwhile, during a Senate commerce committee hearing that month, noted former astronauts Neil Armstrong, Eugene Cernan, and James Lovell testified against the Obama plan and in support of Constellation. In addition, the Senate appropriations committee approved an amendment precluding NASA from ending the Constellation space program, and the House S&T committee held yet another hearing, in which administrator Bolden, when pressed, said that he would take funding from technology development to fund the president's proposed crew rescue vehicle.

### ***Continuing Congressional Consideration***

Throughout June, committees were publicly quiet while busy developing their own plans for NASA authorization. During this month, administrator Bolden, responding to a letter sent by Senator Kay Bailey Hutchinson (R-TX) on various issues, made the first public declaration that he would not continue investing in Constellation hardware, especially with NASA contractors, so as to avoid running afoul of federal anti-deficiency statutes.

The year has presented an important, potentially historical, transition for NASA, and legislative results this coming year will determine whether efforts to refocus the agency on its technology leadership mission will be implemented. In conjunction with faculty and President Hockfield, the MIT Washington Office will continue to support MIT efforts to bring MIT expertise to bear on these issues.

### ***Higher Education***

The Obama administration has implemented a major campaign titled Restore America's Leadership in Higher Education. The administration's goal is to restore the US lead in having the highest proportion of students graduating from college in the world. It intends to reach this goal through increasing access to higher education by "restructuring and dramatically expanding college financial aid, while making federal programs simpler, more reliable, and more efficient for students." The president's plan also envisions a strengthened role for community colleges to offer a broad range of traditional and non-traditional students with high-demand skills and education for emerging industries. This priority has already caused some friction among different sectors of the higher education community that will likely increase as the administration's efforts continue.

## ***Endowments and Costs***

Despite the administration's focus on increasing access and reducing educational costs, the economic crisis and ensuing declines in higher education state funding and endowments offered a continued reprieve from congressional criticism regarding growing student costs and the use of endowments to alleviate these costs. The release of the following reports in 2010, however, did bring back some attention to the issue. The DC Office continues to track inquiries and legislation regarding endowments.

- National Association of College and University Business Officers–Commonfund released the results of its annual endowment study in January 2010. The preliminary survey found that the rate of return on 504 endowments fell by 19% in FY2009. While this is the highest drop observed since the organization started tracking endowments in 1974, an interim study the group released in January 2009 based on the first five months of the fiscal year (July–November 2008) revealed a 22.3% drop at that point. So the current survey finds that the endowments benefited from a slight upturn in the months between November 2008 and the fiscal year's end in June.
- The GAO released a “factual review” of university endowments in February 2010. The review was based on a survey of 10 schools (Stanford University, University of Texas, University of Virginia, University of Kentucky, Berea College, Howard University, Smith College, Harvard University, St. Mary's University [San Antonio, TX], and University of Colorado). The report includes a general narrative about endowments as well as a 2-page appendix for each school.
- The Internal Revenue Service (IRS) continues to work on its colleges and universities compliance project, and released an early report in 2010. The report is based on the results of a survey of 400 colleges and universities asking about executive compensation practices, endowment management, and reporting of unrelated business income, among other topics. As a follow-up to this initial survey, the IRS is conducting further reviews at select institutions based on the responses received. The final report is due out in 2011.

## ***Financial Aid***

The DC Office tracked the comprehensive Student Aid and Fiscal Responsibility Act (SAFRA), which was considered simultaneously with the president's health care reform legislation (PPACA), as discussed in the health care reform section. SAFRA implemented President Obama's proposal to eliminate the bank-based component of the federal student loan program and move all colleges and universities to the federal direct loan program no later than July 1, 2010. Banking institutions active in indirect lending had strongly opposed this shift to direct lending. Although MIT had already long since implemented this transition to direct lending, the legislation was of interest due to provisions concerning financial aid.

Congress gave final approval to both the Senate-passed health care reform bill (H.R. 3590) and the budget reconciliation package (PPACA - H.R. 4872) in March, which contained changes to that measure as well as a major reform of student financial aid.

The student aid portion of the budget reconciliation measure ends government subsidies for private lenders and funnels new loans into the direct federal loan program. Because so many colleges and universities switched to direct lending after the House passed its student aid reform bill last year, the expected 10-year savings from the change dropped from \$87 billion to \$61 billion. This forced Democrats to cut back on their spending plans for the savings.

The measure also provided \$36 billion of the 10-year savings to the Pell Grant program to allow the maximum award to increase each year by inflation starting in 2013, and to reduce the FY2010 funding shortfall by \$13.5 billion, or about two-thirds. Another \$2.6 billion was allocated to Historically Black, Hispanic-serving, and Tribal colleges and universities, and \$2 billion was allocated to community college and career-training grants. Also, \$1.5 billion was allocated to expand the student loan income-based repayment program, capping new borrowers' payments at 10% of their net monthly incomes after adjustment for basic living costs, rather than the current 15%. In addition, \$750 million was allocated over five years to the existing College Access Challenge Grant Program. The bill also allocated \$10.3 billion for deficit reduction and \$9.1 billion to help cover health care costs in the package.

### *Health Care Reform*

PPACA - H.R. 3590, as passed, contains a number of provisions of concern to research universities. The overall bill is discussed in the above section on health care reform. Most of these issues, such as cuts in disproportionate share payments to hospitals for uncompensated care under Medicare and Medicaid, and the impact of increased Medicaid eligibility and costs on state funding for higher education, applied to public universities and those with medical schools.

One issue that remains of concern to MIT and the higher education community in general is language in the final bill that potentially affected the ability for colleges and universities to provide low quality, low-cost group health insurance plans for students and others. The higher education associations (e.g., AAU, APLU, and the American Council on Education [ACE]) communicated this concern to both houses of Congress and were assured that any changes in university health care insurance were inadvertent. A language fix did not, however, make it into the final bill. The higher education associations continue to work with congressional staff, who assure that the issue will be addressed through a technical amendment to the legislation. Administration health reform implementation officials have indicated their desire in the regulatory implementation process to avoid changes that would affect university health programs. The DC office will continue to track this issue in the 111th Congress.

### ***Department of Education Transparency and Accountability***

The Department of Education released a notice of proposed rulemaking (NPRM) on June 16, 2010, focused on academic program integrity. This NPRM was released amid rising congressional and administration concern regarding the for-profit education sector, whose enrollment numbers have increased dramatically and whose students take out significantly more financial aid and are more likely to default on loans than students at non-profit institutions. The NPRM addressed 14 issues in the following three broad

categories: (1) ensuring that only eligible students receive federal funds, (2) clarifying the courses that are eligible for federal aid and the amount of aid that is appropriate, and (3) protecting consumers from misleading or overly aggressive recruiting practices while clarifying state oversight responsibilities. Universities were concerned that the new regulations, while aimed at curbing abusive practices by for-profits, could inadvertently affect their academic offerings.

The higher education community, and particularly AAU member schools and others with successful financial aid/student outcomes track records, will continue to closely track this NPRM and related regulatory or legislative efforts that may arise. There is some concern that the Department of Education could take a “one size fits all” approach to the areas listed above that, as noted, may ultimately affect non-profit institutions such as MIT. The higher education associations provided comments on the above-mentioned NPRM and continue to keep their membership informed on potential areas of concern. The DC Office continues to track these issues and will arrange for meetings between MIT officials and the Department of Education leadership as appropriate.

### **Taxes**

Congress attempted several times over the past year to pass major tax legislation, driven by the expiration of the Bush administration’s tax cuts in 2010. On December 9, 2009, the House approved by a vote of 241 to 181 legislation (H.R. 4213) to extend a variety of tax provisions of interest to higher education scheduled to expire December 31, 2009, including the education tuition deduction, the individual retirement account charitable rollover, and the R&D tax credit. Disagreements between the House and Senate over funding offsets for the extenders, along with the Senate’s focus on health care legislation, resulted in no Senate consideration in 2009. The Senate proceeded to consider several versions of stand-alone “tax extender” legislation in 2010 and unsuccessfully attempted to add it to other legislative packages such as student aid reform, small business legislation, and jobs bills. Tax extender legislation may move before the end of the year and we anticipate that once passed, the tax extender legislation will be retroactive.

### **Labor Legislation**

Attempts by Congress to pass “card check” legislation, which would provide advantages to labor in unionization drives, were not successful during the past year. A potential provision in this legislation that could have been added to this legislation, and is of significant concern to private universities, would reverse a National Labor Relations Board (NLRB) precedent and allow unionization of graduate teaching assistants and possibly other employed students (research assistant/teaching assistant legislation). This legislation appears very unlikely in the 110th Congress.

Because of the legislative impasse, attention has now focused on the NLRB, where an initial case has been filed by the United Auto Workers on behalf of TAs and RAs at New York University. It is anticipated that after an NLRB decision on the case, it will undergo federal court appeals. The MIT Office of the General Counsel is tracking this issue.

## **Immigration**

Despite this being a priority of the Obama administration, partisan divides made passage of a comprehensive immigration package very unlikely this Congress. Senator Charles Schumer (D-NY), who was designated by his party to be the Senate lead on the immigration reform bill, worked with Senator Graham toward a bipartisan bill that would likely attract more Democrats and some Republicans, until Senator Graham moved away from that effort in April. Since then, efforts in immigration reform remain stalled. A provision that has received bipartisan support and is backed by industry and university leaders, including President Hockfield, to offer “green cards” to foreign-national graduates of US universities in STEM fields, has been tied up in this impasse.

One piece of immigration legislation that could stand a chance of moving on its own or as part of a larger bill this Congress is the Development, Relief, and Education for Alien Minors Act (the DREAM Act). This proposed legislation would provide certain undocumented alien students who graduate from US high schools, who are of good moral character, who arrived in the US as minors, and who have been in the country continuously for at least five years prior to the bill’s enactment, the opportunity to earn conditional permanent residency.

Various versions of the DREAM Act have been introduced in both the House and Senate over the past 10 years. In 2007, Senator Richard Durbin (D-IL) was unsuccessful in moving the bill as an amendment to the National Defense Authorization Act, based on a provision allowing for military service to serve as one of the criteria for conditional permanent residency.

The last version of the DREAM Act was introduced in both chambers of Congress in March 2009. Senator Durbin introduced the bill in the Senate (S.729) with 34 co-sponsors and Representative Howard Berman (D-CA) introduced the bill in the House (H.R. 1751) with 108 co-sponsors. The bills have since both stalled in committee, although they could move separately. The DC Office has worked with chancellor Philip Clay to keep him apprised of any movement of this legislation.

## **Patent Reform**

Congressional efforts on patent reform have been under way for years. However, these efforts gained traction in September, when the Senate Judiciary Committee signaled their intent to include patent reform on the committee’s fall agenda. Efforts continued through the end of the year. In January, USPTO director David Kappos and commerce department general counsel Cameron Kerry met on campus with various representatives at MIT, including Claude Canizares, Gregory Morgan, and Lita Nelsen, to discuss patent reform issues. By February, there was discussion of an agreement between Senate judiciary chairman Patrick Leahy (D-VT) and ranking member Jeff Sessions (R-AL) of a compromise patent reform bill that took into account comments from various advocacy groups, including universities and industry.

Major patent reform legislation has been pending for four years in Congress, featuring a divisive battle with large information technology firms contending against biotechnology firms and smaller entrepreneurial firms. While significant differences

remain between these two groups, in the past year biotechnology firms believed they resolved with Senate staff some of their major concerns about Senate damages provisions. The debate then shifted more to large companies versus small companies and inventors; the two sides have very different perspectives on this legislation, and universities that are actively engaged in patenting, through the Bayh-Dole Act, share many of the concerns of the latter group.

### ***Manager's Amendment***

Patent legislation from the House Judiciary Committee still contains significant problems from a university perspective, particularly regarding post-grant review provisions and damages. Senate legislation, which appears to be an acceptable compromise even to universities that lead in patenting efforts (such as MIT, the University of California system and the University of Wisconsin), passed out of the judiciary committee but has not yet moved to the Senate floor. The administration, under the leadership at the USPTO, supports the Senate legislation.

### ***Letter of Support***

The DC Office worked closely with campus experts to evaluate the Senate compromise manager's amendment. This group found it represented an acceptable compromise on patent reform. On March 23, 2010, MIT sent a letter of support for the Senate manager's amendment to the Massachusetts delegation with the caveat that while the bill was an acceptable compromise, MIT still has concerns as to whether or not the USPTO can deliver on the promises in the compromise. The DC Office distributed this letter widely.

### ***Developing MIT Citizen Scientists***

While MIT has a cadre of senior faculty who have played significant roles in Washington in national S&T policy, in the longer term it is important to broaden the MIT base of students and faculty attuned to how Washington works and who are ready to play a role over time in national science advocacy. This effort, begun at small scale in the spring of 2006 and expanded since then, aims to provide opportunities for faculty, undergraduate and graduate students to expand into this potential role. The DC Office has supported a series of program elements, discussed below, first undertaken in 2007 and expanded in subsequent years.

### ***Congressional/Executive Branch Science and Technology Policy Seminar***

For 16 years, MIT has annually taken on the task of organizing science seminars for senior congressional staff and, in recent years, executive branch staff working in S&T-related areas. The DC Office's Helen Haislmaier has assisted in organizing the program. In 2006, MIT's energy policy agenda was the subject of the spring seminar, and in 2007 advances in nanotechnology was the topic. Both years featured strong congressional and executive branch attendance. 2007 was the last year of funding by the Alfred P. Sloan Foundation, but in 2008 the Ewing Marion Kauffman Foundation provided funding for a seminar on regional innovation and a strong program was assembled. In 2009, the Kauffman Foundation funded a second year for a program on new technology initiatives for energy sustainability, which featured near record participation. This year, the Kauffman Foundation again provided support for the seminar, and the topic was

life science convergence. The seminar featured record attendance (35) and was chaired by Charles Stewart and supported by Claude Canizares and the DC Office, with strong involvement from Phillip Sharp and Charles Cooney in organizing the faculty speakers.

### **MIT Summer Interns Program**

MIT supports summer intern programs at government agencies and non-governmental organizations for MIT undergraduates, Technology and Policy Program (TPP) students, and student interns at the DOE. Over the past four years, an enhanced program was started to increase the exposure of MIT summer interns to senior science policymakers in Washington. In summer 2007, the program was expanded to include TPP students as well as undergraduates. In 2008, some 15 MIT interns at a new program at DOE were included as well. The 2010 program included meetings for interns with S&T leaders at major agencies and a mini-course on S&T public policy conducted by the director and assistant director of the DC Office.

### **Science and Technology Public Policy Boot Camp**

William Bonvillian of the DC Office, working with a committee of graduate students affiliated with the science policy initiative (SPI) student group, conducted again this year an intensive “boot camp” course, with 18 class hours over four days during the third week in January during IAP. This S&T policy boot camp program began in 2007 and has been offered five times thus far at MIT. The program includes a closing session with a panel of MIT faculty experienced with Washington who speak about their public policy experience. This year’s focus was on NASA policy. In addition, 15 of the students participating in the boot camp course came to Washington for a “Congressional Visits Day” organized by the leading national science and engineering groups to advocate research funding and support. Participating students attended briefings on agency R&D funding and pending congressional issues, and the DC office taught an evening class on congressional advocacy. The group then visited more than two dozen congressional offices, including the Massachusetts delegation.

Meanwhile, the student organizing committee, the science policy initiative (SPI), has expanded its membership, drawing on additional students who participated in the boot camp, and has begun a series of new programs at MIT. As noted, this group has been supporting the boot camp course, the Congressional Visits Day effort, and a series of luncheon discussion sessions with MIT faculty working in innovation and policy areas. This year, the SPI group began its own advocacy outreach effort with the Massachusetts delegation, encouraging the state’s new senator, Scott Brown (D-MA), to support the America COMPETES Act and science support.

### **“Tuesday” Innovation Group in Washington, DC**

The Tuesday innovation group, formed collaboratively by the MIT Washington Office and the Woodrow Wilson Center, has been holding a series of innovation policy presentations since 2006. The group’s concept is to provide a substantive policy foundation to the idea that there are connections between research/talent capability, technological innovation, and economic growth. Despite the development of the field of growth economics, there is still only limited awareness and discussion in Washington

of a framework for governmental innovation policies. Since Washington is the “bank” for much of R&D and science education funding for universities, the monthly sessions featuring talks and discussions with leading thinkers in these fields provide an opportunity for the Washington policy community to better understand the policy implications of innovation and the investments behind it. The innovation group has become a serious and ongoing discussion forum drawn from government, industry, and academic innovation policy thinkers in Washington. The monthly sessions regularly include approximately 20 group members who are building a common innovation policy outlook.

### **Summer Science Fellows in the Office**

Two students from MIT worked in summer 2010 (one served in 2009) as science fellows in the DC Office. The summer program has been running for the past five years. This summer, the students worked on analyzing and preparing papers on manufacturing R&D and technology programs in federal agencies and on research in convergence in the life, physical, and engineering sciences. They also helped the office follow congressional hearings and markups and executive branch policy developments. Aside from the summer fellows, the office regularly hosts one to two student interns from schools around the US, usually drawn from a policy program sponsored by American University. This practice continued again this year.

### **MIT Speakers Program**

Working closely with Paul Parravano, co-director of the Office of Government and Community Relations, and with a series of faculty, the DC Office has supported an expanded program of bringing policy leaders to speak at MIT. Those visiting this year included President Obama and Senator Jeff Bingaman. Other visitors included Senator Kay Hagen (D-NC), homeland security secretary Janet Napolitano, transportation secretary Ray LaHood, NASA administrator Charles Bolden, deputy DARPA director Ken Gabriel, Federal Communications Commission chairman Julius Genachowski, Representative Edward Markey (D-MA), National Institute of Mental Health director Thomas Insel, ARPA-E director Arun Majumdar, principal DOE deputy assistant secretary (EERE) Henry Kelly, USPTO director David Kappos, commerce department general counsel Cameron Kerry, and DOE OS director William Brinkman.

The Appendix provides a list of meetings by MIT administrators and faculty in Washington supported by the DC Office, faculty who testified in Washington, and senior government officials who visited MIT in the July 1, 2009, to June 30, 2010, reporting period.

### **Representing MIT in Advocacy Coalitions and Working Groups**

The DC Office engages on an ongoing basis in the activities of major Washington-based organizations and coalitions, particularly the higher education organizations that work in support of the federal investment in university research and education. These groups (listed below) provide support for a common R&D, education, and science agenda supported by MIT, and require ongoing participation in frequent meetings and working sessions.

The DC Office has provided leadership this year on key committees in AAU, APLU, and the science coalition on energy legislation, science policy, higher education, and medical research, as well as AAU's joint business-university task force on American innovation.

Ad Hoc Group for Medical Research  
Ad Hoc Tax Group  
American Council on Education  
Association of American Universities and its Council on Federal Relations  
Association of Public and Land-grant Universities and its Council on Governmental Affairs  
Coalition for National Science Funding  
Coalition for National Security Research  
Coalition for Plasma Science  
Council on Competitiveness  
Council on Governmental Relations  
Council of Graduate Schools  
Energy Sciences Coalition  
Fusion Energy Sciences Day  
National Association of Independent Colleges and Universities  
New England Council  
Science Coalition  
Science, Engineering, and Technology Working Group  
Space Grant Day  
STEM Education Coalition  
Task Force on American Innovation (industry-university-science association working group on science R&D funding)

**William Bonvillian**  
**Abby Benson**  
**Amanda Arnold**  
**Helen Haislmaier**  
**Michelle Ashitomi**

## APPENDIX

## Summary of MIT engagements in Washington, DC, and congressional/ executive branch visits to MIT

### FACULTY/STAFF MEETINGS IN WASHINGTON, DC

MIT Faculty/Staff	Date	Topic	Participants
Claude Canizares	7/9/09	Federal support for university research, education programs	Kevin Hurst, assistant director, Energy Research and Development (R&D), White House Office of Science and Technology Policy (OSTP); Steve Fetter, assistant director-at-large, OSTP; Thomas Kalil, deputy director for policy, OSTP; Steven Koonin, under secretary for science, Department of Energy (DOE); Kristina Johnson, under secretary of energy, DOE
Daniel Nocera	7/16/09	Energy storage	Talk organized by Institute of Electrical and Electronic Engineers-USA, American Society of Mechanical Engineers, <i>Discover</i> magazine, and National Science Foundation
Susan Hockfield	7/22/09	Energy policy, R&D policy	John Holdren, director, OSTP; Lisa Jackson, administrator, Environmental Protection Agency; Rep. Edward Markey (D-MA); Senator Thomas Harkin (D-IA)
Robert Redwine (w/ American Physical Society)	8/3/09	Appropriations	House and Senate appropriations staff
Claude Canizares	9/16/09	DOE R&D Advanced Research Projects Agency–Energy (ARPA–E), university-federal government relations and energy initiatives	Steve Isakowitz, chief financial officer, DOE; Shane Kosinski, deputy director for operations, ARPA-E; Thomas Kalil, deputy director for policy, OSTP  (w/ Arthur Bienenstock, and Tobin Smith and Patrick White/Association of American Universities)
Phillip Sharp	9/17/09	A New Biology for the 21st Century report	Diana Farrell, National Economic Council
Susan Hockfield	9/24/09	Defense Advanced Research Projects Agency (DARPA)	Regina Dugan, director, DARPA
Susan Hockfield	9/29/09	Innovation policy initiatives	Speakers on energy panel, Council on Competitiveness: Senator Mark Warner (D-VA); Thomas Kalil, deputy director for policy, OSTP; John Podesta, former presidential advisor; Laura Tyson, former chair, Council of Economic Advisors/Berkeley; Dr. Neil Lane, Rice University, former presidential science advisor

MIT Faculty/Staff	Date	Topic	Participants
Susan Hockfield	10/22/09	Innovation policy initiatives	Peter Orszag, director, Office of Management and Budget (OMB); Dennis Hightower, deputy secretary, Department of Commerce; Senator Mark Warner (D-VA); Rep. Rush Holt (D-NJ)
Phillip Sharp	10/26/09	A New Biology for the 21st Century report	National Academy report briefing
John Deutch and Paul Joskow	11/18/09	Nuclear energy	Senator John Kerry (D-MA)
Howard Herzog	11/18/09	Carbon capture and sequestration technologies	Congressional Research Service information briefing
Lita Nelsen	12/2–4/09	Intellectual property issues	Key congressional and commerce department staff
Susan Hockfield	1/30/10	Director's new agenda for National Institutes of Health (NIH)	Francis Collins, director, NIH (at conference in Switzerland)
Susan Hockfield	2/3/10	Energy R&D, America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act (America COMPETES Act)	Robert Simon, staff director, Senate Committee on Environment and Natural Resources; Aneesh Chopra, chief technology officer, OSTP; Catherine Zoi, assistant secretary for energy, Office of Energy Efficiency and Renewable Energy (EERE); Rep. Bart Gordon (D-TN)
Claude Canizares	2/17/10	Export controls, manufacturing, appropriations, innovation	Edmund Rice, House Committee on Foreign Affairs; Esther Lee, Department of Commerce; Chan Lieu and Ann Zulloosky, Senate Committee on Commerce, Science and Transportation; Patrick Gallagher, Director, National Institute of Standards and Technology; Paul Shawcross, chief, Science and Space Branch, OMB, and staff; Richard Obermann, director, House Subcommittee on Space and Aeronautics
Claude Canizares	2/23/10	Technology transfer	Participated in forum Catalyzing University Research for a Stronger Economy, sponsored by Gary Locke, secretary of commerce
Raji Patel and Helen Halaris	3/3/10	National Aeronautics and Space Administration (NASA) space grant program	Staff of Rep. Michael Capuano (D-MA) and Senator John Kerry (D-MA) offices
Rick Temkin	3/18/10	Funding for and recent developments in fusion energy science	Massachusetts delegation and energy, science, and appropriations committee staffers

MIT Faculty/Staff	Date	Topic	Participants
Edward Crawley	4/7/10	NASA budget and policy	Senate Committee on Commerce, Science, and Transportation staff; House Appropriations Subcommittee on Commerce-Justice-Science staff; Rep. Frank Wolf (R-VA) staff; Jim Kohlenberger, chief of staff, OSTP; Robert Braun, chief technologist, NASA
Claude Canizares	5/13/10	DOE's budget, Department of Defense (DOD) R&D policies, and NASA plans	Steve Isakowitz, chief financial officer, DOE; Robin Staffin, director of basic research, Office of Secretary of Defense; Richard Obermann, director, House Subcommittee on Space and Aeronautics
Susan Hockfield	5/20/10	Innovation, America COMPETES Act, energy R&D	Robert Atkinson, president, Information Technology & Innovation Foundation; Senator Scott Brown (R-MA); Senator Jay Rockefeller (D-WV); Carl Weiman, associate director of science nominee, OSTP; Senator Lamar Alexander's (R-TN) staff
Ernest Moniz and other MIT Energy Initiative (MITEI) researchers	6/23/10	The Future of Natural Gas report	Presentation to congressional staff hosted by Senate and House energy committees, and meetings with White House and DOE senior officials

#### CONGRESSIONAL/EXECUTIVE BRANCH VISITS TO MIT

Government Official	Date	Topic	Meeting/Participants
President Barack Obama	10/23/09	Addressed meeting in Kresge Auditorium	MIT researchers and administration officials; address to group of students and faculty; visited energy labs
Ken Gabriel, deputy director, DARPA	10/23/09	Possible new research directions for the DOD's DARPA program, and discussed "idea summit"	Computer Science Artificial Intelligence Laboratory; Research Laboratory of Electronics; Biology, Brain and Cognitive Science faculty
Rep. Edward Markey (D-MA) and Julius Genachowski, chairman, Federal Communications Commission	11/30/09	Smart Grid and how broadband can help the nation achieve energy and environmental goals	House energy and commerce field hearing
Thomas Insel, director, National Institute of Mental Health	12/2/09	Autism and brain disorders	Spoke at Simons Initiative on Autism and the Brain colloquium; met with President Hockfield, VP Canizares, dean Subra Suresh, and MIT life science researchers
Arun Majumdar, director, ARPA-E	12/8/09	Introduced a new two-year graduate fellowship at ARPA-E; discussed ARPA-E's plans for a new round of focused energy competitive grants	MITEI leadership, MIT energy researchers, student Energy Club members

<b>Government Official</b>	<b>Date</b>	<b>Topic</b>	<b>Meeting/Participants</b>
Henry Kelly, principal deputy assistant secretary, DOE EERE	1/22/10	Expanding the role of universities in EERE's applied programs; discussed energy building standards and building efficiency	MITEI leaders Ernest Moniz and Robert Armstrong; VP Canizares; energy researchers Donald Sadoway, Angela Belcher, Alex Mitsos, and Mark Baldo; Department of Urban Studies and Planning faculty Philip Thompson, Leon Glicksman, and Robert Stoner
David Kappos, director, US Patent and Trademark Office; Cameron Kerry, general counsel, Department of Commerce	1/29/10	Patent reform issues	VP Canizares, VP and general counsel Gregory Morgan, and Technology Licensing Office director Lita Nelsen
Senator Jeff Bingaman (D-NM), chair, Senate Committee on Energy and Natural Resources	3/6/10		Gave keynote speech at the MIT Energy Conference; met with MITEI researchers
Janet Napolitano, secretary of homeland security	4/16/10	Department of Homeland Security (DHS)/university R&D relations; education	President Hockfield
Janet Napolitano, secretary of homeland security	4/16/10	Developing homeland security interests in higher education	Attended a roundtable discussion at MIT with local colleges and university presidents on educating the next generation of homeland security professionals
Raymond LaHood, secretary of transportation	5/3/10	Distracted driving	Spoke to students and faculty on distracted driving
William Brinkman, director, DOE Office of Science	5/4/10	Energy R&D	Ernest Moniz, Marc Baldo, Angela Belcher, Marc Kasner, VP Canizares
Senator Kay Hagan (D-NC)	5/10/10	MIT's role; R&D	President Hockfield; MITEI meeting; spoke at Sloan School of Management
Charles Bolden, administrator, NASA	5/12/10	Meetings on NASA policy; addressed students and faculty on NASA programs and R&D funding	President Hockfield, VP Canizares, Professor Jeff Hoffman, Aero-Astro faculty

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**FACULTY HEARING TESTIMONY**


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<b>MIT Faculty/Staff</b>	<b>Date</b>	<b>Topic</b>	<b>Committee</b>
Edward Crawley	9/15/09	Options and issues for NASA's human spaceflight program: Review of US Human Spaceflight Plans Committee report	House Committee on Science and Technology (S&T)
Denny Ellerman	9/21/09	Greenhouse gas emission allowances	Senate Committee on Energy and Natural Resources
Cindy Williams	10/27/09	Developing research priorities at DHS S&T Directorate	House Committee on S&T Subcommittee on Technology and Innovation
Cindy Williams	2/23/10	DOD budget/war cost	Senate Budget Committee
Kurt Zenz House	4/20/10	Carbon capture and sequestration	Senate Committee on Energy and Natural Resources