MIT Washington Office

The Massachusetts Institute of Technology Washington, DC, Office was established within the Office of the President in 1991. The office reports to MIT's president and works closely with the vice president for research. The staff during the 2011–2012 academic year included William Bonvillian, director; Abby Benson, assistant director (through February 2012); Philip Lippel, assistant director (starting April 2012); Amanda Arnold, senior policy advisor; Helen Haislmaier, program coordinator; and Lisa Miller, office representative.

The mission of the Washington Office is to support the science advocacy activities of MIT's president and other senior officials and faculty in Washington, DC, and to support MIT's historic role as one of the nation's premier research universities, providing leadership on national science and technology issues. The Washington Office contributes to a steady flow of information and ideas between MIT and Washington institutions, including executive branch offices, departments, and agencies; Congress; and university, industry, and science organizations. The appendix to this report provides an overview of MIT engagement this year between Washington, DC, officials and MIT administration, faculty, and staff.

Highlights

Below is a summary of the major efforts undertaken by the Washington Office from July 1, 2011, through June 30, 2012.

Congress and the Obama Administration: Research and Development Support and Innovation Policy

MIT's efforts with the Obama Administration and Congress in this past year focused on two parallel and related efforts: sustaining federal research and development (R&D) support, and supporting MIT initiatives in innovation policy.

Federal Research and Development Support

A congressional focus on federal spending in 2011, led by conservatives in the Republican-controlled House of Representatives, resulted in a round of deficit controls that became law in August 2011 as the Budget Control Act. The federal budget deficit reached an annual level of more than $1 trillion a year and the total federal debt exploded from $8 trillion in 2006 to $14 trillion in 2011, driven by the "Great Recession" and compounded by growth in medical entitlement spending caused by the aging of the "baby boom" generation. After expanding for the previous four years, federal support of R&D began to level off in FY2012.

A policy called sequestration was at the heart of the Budget Control Act. If implemented, that policy would mandate significant cuts in both domestic and defense discretionary spending, including R&D, starting in 2013. The MIT Washington Office worked with

other universities and with industry to make the case that innovation-based growth is key to resolving US fiscal challenges and that cutting support for R&D would therefore be counterproductive.

Because of fiscal pressure, as noted, after four years of federal R&D increases (including increased funding at MIT), science appropriations stabilized this year. Considering the fiscal circumstances, this was a significant accomplishment.

Innovation Policy

In addition to its efforts on overall federal R&D support, MIT worked on three cross-disciplinary innovation initiatives aimed at critical areas where MIT science and technology policy efforts can make a contribution to meeting national needs. These efforts underscore the role of science and technology in meeting major national challenges.

MIT's work in this area emphasized a new initiative around manufacturing innovation; an expanded effort around convergence (a new R&D model that integrates physical and engineering sciences with life science); and a continuation of MIT's Energy Initiative (MITEI). The MIT Washington Office provided extensive support for each of these efforts.

Regarding manufacturing, in 2011 President Obama named MIT president Susan Hockfield as co-chair of an initiative called the Advanced Manufacturing Partnership (AMP), along with Andrew Liveris, chief executive officer (CEO) of Dow Chemical. AMP was a partnership among universities, industry, and major federal R&D agencies to work on restoring US manufacturing leadership. President Hockfield and the AMP technical co-lead, MIT professor and associate provost Martin Schmidt, supported by the Washington Office, worked all year on a major study on advanced manufacturing that was released in 2012 (described in more detail below). A major MIT study, Production in the Innovation Economy (PIE), continued this year; the study is led by a cross-disciplinary group of 18 MIT faculty members and supported by the Washington Office. Major conferences on advanced manufacturing were held at MIT on November 28, 2011, and on May 28–29, 2012, and there was also a series of PIE speaker forums. Sessions with agency leaders and policymakers continued throughout the year on these issues. Further details are provided below.

Regarding convergence (the merger of life, engineering, and physical sciences research to create new advances in health research), the MIT faculty group that issued a major white paper in 2011 on implementing this interdisciplinary approach continued to press the National Institutes of Health (NIH) for support. Briefings for congressional staff and meetings with interested constituencies continued this year, along with work on a possible National Academy of Sciences workshop on convergence. An article on convergence by MIT professors Phillip Sharp and Robert Langer appeared in *Science* (29 July 2011: 527). Efforts in this area are discussed in more detail below.

Regarding energy, December 2011 saw the release of a major MIT policy study, *The Future of the Electric Grid,* with rollout events in Washington, DC, that the Washington Office helped coordinate. The office also helped highlight the work of researchers at MIT involved in Department of Energy (DOE) research initiatives, including the Advanced Research Projects Agency–Energy (ARPA–E), Energy Frontier Research Centers (EFRCs), and Energy Innovation Hubs.

"Citizen Scientists" at MIT

The MIT Washington Office continued its efforts to support MIT student-oriented programs, including the annual Independent Activities Period "boot camp" course on science and technology policy for MIT students; the annual Congressional Visits Day for science funding advocacy for MIT students; the MIT summer intern program; and invitations for policymakers to come to MIT for meetings and speaking opportunities. The office worked closely with the Science Policy Initiative (SPI) student group on a possible science and technology policy certificate program and on the group's "Stand for Science" effort to get a petition signed by more than 10,000 graduate students in 50 states to reverse sequestration cuts to R&D funding. Although foundation support for MIT's annual congressional and executive branch staff seminar program ended last year, planning began this year to revive this program, with a focus on security policy issues, in spring 2013. These efforts are discussed in detail below.

Connecting with the Policy Agenda in Washington, DC

Innovation and Research

Science Research and Development Support

After many months of brinksmanship, with Tea Party members of Congress threatening to send the federal government into financial default by blocking federal borrowing authority, President Obama and the Republican congressional leadership reached an agreement at the end of July 2011 on legislation that would raise the debt limit before the projected August 2, 2011, default deadline, and pave the way for significant spending cuts. This agreement temporarily resolved months of contentious debate on the federal debt limit. Both the House and Senate on August 1 approved the measure, known as the Budget Control Act.

The compromise plan authorized the president to raise the debt ceiling by $400 billion to avoid default and enacted 10-year spending caps for discretionary defense and non-defense spending. Discretionary spending is the portion of the federal budget from which research funding, both non-defense and defense, is drawn. Spending caps were set forth in the agreement. They are to generate $1 trillion in deficit reduction over 10 years by means that include a $7 billion cut from current levels in FY2012 funding and a $3 billion cut from current levels in FY2013 funding. The president would then be authorized to raise the debt ceiling by another $500 billion; Congress could vote to disapprove this second debt ceiling increase, but the president could veto such a disapproval resolution. This second debt limit increase would carry the government through the end of FY2013 (and past the November election); in effect, it allows an increase in the debt ceiling by $900 billion.

The next stage of deficit reduction involved congressional procedure. The legislation called for a 12-member, bipartisan, joint House–Senate committee—a so-called supercommittee—to identify $1.2 trillion to $1.5 trillion in further deficit reductions over a decade. These further reductions could be drawn from entitlements and tax reforms as well as from discretionary spending. The committee was required to make recommendations by November 23, 2011, but when that deadline came, it had failed to reach agreement due to continuing divisions between the parties. When the supercommittee failed to reach agreement, an enforcement mechanism, the so-called sequestration, triggered $1.2 trillion in automatic spending reductions—split 50/50 between domestic and defense discretionary spending—beginning on January 2, 2013. This enforcement mechanism protected certain core elements for both major parties: entitlement programs supported by the Democratic Party would be immune, and, for the Republican Party, no tax increases would be required.

The entire $1.2 trillion cut would fall on discretionary programs, which are less than 40% of the total federal budget, including R&D. In FY2013, the Congressional Budget Office has projected, domestic discretionary spending will be cut by approximately 8% and defense discretionary spending by some 10% under sequestration, with cuts and stagnation continuing until 2023, when the $1.2 trillion cut level will be reached. Although sequestration is now law, the effects of the sequestration mechanism on the defense industries have created pressure on both Republicans and Democrats to come to an agreement to undo them.

Major cutbacks in R&D affect the innovation system and the ability of the nation to grow; stronger growth substantially reduces the fiscal pressure the government faces. The R&D cuts that are called for under sequestration appear to be especially counterproductive given the nation's fiscal circumstances, because education funding would be similarly curtailed. As shown in the table below, however, the agreement on the Budget Control Act enabled FY2012 appropriations bills to be enacted. Although R&D did not see the increases of the three prior years, total R&D funding essentially held constant.

In February 2012, President Obama issued his FY2013 budget request. This request proposed freezing domestic discretionary spending but maintained stable funding for research and development overall, with increases in particular priority areas, which were in line with the Obama Administration's science policy priorities (see table below).

However, despite the enacted budget agreement between the parties for FY2013 funding levels (through the Budget Control Act), House Budget Committee chairman Representative Paul Ryan (R-Wisconsin) voided the agreement and announced additional, significantly deeper cuts in discretionary spending—an additional $19 billion. The House Budget Committee and the House approved these deeper cuts, which were adopted by the 12 House appropriations subcommittees.

The House budget resolution proposed to reduce discretionary spending dramatically. Many are concerned about the potential effects of these cuts on federal R&D, especially in light of the looming across-the-board cuts required by sequestration. The American

Association for the Advancement of Science (AAAS) undertook an analysis of the effects and found that the impacts of the House budget on the federal research enterprise would be substantial, especially when coupled with sequestration. If adopted, the House budget could reduce total baseline spending in key budget accounts by 15% below the president's budget request, amounting to a 3% cut in total R&D from FY2012 and a 5% cut in non-defense R&D on top of the sequestration cuts in FY2013. Factoring in these additional cuts, the House budget could mean reductions in total R&D funding of up to 12% below the current fiscal year, with non-defense R&D receiving a disproportionate share of the cuts. Over the next decade, the House budget, if adopted, could reduce nondefense R&D by up to 27%, or $161 billion, below the president's request. The House budget illustrates the growing pressure R&D funding faces.

Meanwhile, the appropriations committees have been reporting bills out of committee in both the House and the Senate. Results have been generally favorable for R&D in both House and Senate, with overall R&D funding close to or at FY2012 levels. However, these levels must be considered theoretical unless the issues raised by sequestration (and the Ryan House budget) are favorably resolved, because major cuts would be imposed on these proposed FY2013 levels and the cuts would continue for a decade. It appears clear that a series of major financial questions will be pushed off until after the 2012 presidential election, including passage of all 12 appropriations bills, extension of the debt ceiling, resolution of the sequestration cuts, and either continuation or discontinuation of the Bush-era tax cuts [which have reduced the overall tax level to a 30-year low of 14% of gross domestic product (GDP) compared with the 18% of GDP that held for the past half-century]. All these issues will be forced into a post-election "lame duck" session of Congress in November and December. It is hard to see how a politically divided Congress will be able to work its way through these massive fiscal issues. This will be a pivotal problem for many policy areas, particularly the country's innovation capacity.

The MIT Washington Office was involved throughout the year in efforts, along with interested industry groups and universities, to persuade Congress and other policymakers of the links between R&D, innovation, scientific advances, and economic growth. Although major challenges for federal R&D lie ahead, the stable funding for FY2012 for R&D was an important and positive result.

Summary of Federal Research and Development Funding, in Millions of Dollars, FY2011–FY2013

Appropriations Subcommittee and Program	FY2011 Enacted	FY2012 Enacted	FY2013 Presidential request	FY2013 House action	FY2013 Senate action
Commerce-Justice-Science				**PH**	**CA**
National Science Foundation	6,860	7,033	7,373	7,330	7,273
National Aeronautics and Space Administration (NASA), Science Mission Directorate	4,945	5,090	4,911	5,095	5,021

NASA, Aeronautics Research Directorate	535	570	552	570	552
NASA, Space Technology		575	609	632	651
NASA, Space Grant Program	46	59	24	24	40
National Oceanographic and Atmospheric Administration Ocean and Atmospheric Research (NOAA)	427	384.7	413.8	404.9 (Sea Grant 57.1)	414.6 (Sea Grant 62)
National Institute of Standards and Technology (NIST)	532	555	655	631	634
NIST, Manufacturing Extension Program	128.7	128.4	128	128	128
Defense				**CA**	
Department of Defense Basic Research (6.1)	1,947	2,112	2,117	2,117	
DOD Applied Research (6.2)	4,453	4,739	4,478	4,563	
DOD, Defense Advanced Research Projects Agency	2,835	2,816	2,817	2,827	
Energy and Water Development				**PH**	**CA**
Department of Energy (DOE), Office of Science	4,897	4,874	4,992	4,824	4,909
DOE, Office of Science, Energy Frontier Research Centers	100	100	120	100	100
DOE, Advanced Research Projects Agency for Energy	180	275	350	200	312
DOE, Cross-Agency Energy Innovation Hubs	72.9 *	112.9 ***	141.5 **	(no new hub)	20m (new hub)
DOE Office of Energy Efficiency and Renewable Energy	1,893	2,091	2,303	1,819	1,980
Labor-Health and Human Services-Education					
National Institutes of Health	30,688	31,640	30,702		30,723
Homeland Security				**CA**	**CA**
Department of Homeland Security Science & Technology Directorate	760	617	813	806	813

Source: Association of Public and Land-Grant Universities; AAAS

** For three hubs*
*** For five hubs*
**** For six hubs*

CA - Committee Approved, PH - Passed House

MIT Innovation Policy Initiatives

MIT focused again this year on three major national innovation policy efforts: advanced manufacturing; convergence of the life, engineering, and physical sciences; and energy technology. The MIT Washington Office provided extensive support for each of these efforts.

Advanced Manufacturing

MIT's study efforts in advanced manufacturing emerged from faculty-led forums that President Hockfield hosted on campus in March 2010. Subsequently, given the challenges the nation is facing in this area, a major MIT manufacturing study was initiated by President Hockfield, the "Production in the Innovation Economy," co-chaired by Institute Professor Phillip Sharp and professor Suzanne Berger, with professor Olivier de Weck as the study's executive director, and including a total of 18 faculty members. These faculty members come from diverse backgrounds ranging from engineering and science to economics, political science, and computing. The PIE study has now been fully funded from foundations and other resources.

Meanwhile, President Hockfield, in part because of MIT's growing leadership in manufacturing policy issues, was asked by President Obama in June 2011 to become co-chair, along with Andrew Liveris (CEO of Dow Chemical), of a new presidential initiative, the Advanced Manufacturing Partnership between universities, industry and major federal R&D agencies. That initiative, designed to develop actionable proposals to restore US manufacturing leadership, was announced by President Obama, joined by President Hockfield and Andrew Liveris, and other university, industry and agency leaders, at Carnegie Mellon University in Pittsburg on June 24, 2011.

The Washington Office provided support throughout the year to the AMP project as well as to the PIE study. AMP held a series of four major regional workshops around the country, including one at MIT on November 28, 2011, which was attended by more than 400 participants from the New England and northeast regions. Massachusetts Governor Deval Patrick introduced the MIT event along with President Hockfield; speakers included senior federal agency officials [from the National Institute of Standards and Technology, the National Science Foundation (NSF), Defense Advanced Research Projects Agency (DARPA), DOE, leading regional manufacturers, and manufacturing innovators. This spring, the Washington Office arranged for commerce secretary John Bryson to speak at the MIT Leaders for Global Organization conference on advanced manufacturing on May 28–29, 2012; the conference also included discussions with representatives from leading national companies and MIT researchers working on advanced manufacturing technologies, a summary from MIT faculty of PIE research efforts, and comments and an introduction by President Hockfield. In addition, PIE held several policy forums, including a major event on September 15, 2011 featuring the President's manufacturing "czar" Ron Bloom, where leading MIT faculty joined Bloom and President Hockfield in discussing manufacturing challenges.

The Washington Office supported President Hockfield and Martin Schmidt, in meetings of the AMP Steering Committee and staff, as well as Hockfield's discussions with policymakers on manufacturing, and it assisted in the research and work on the AMP report. The office produced two summary reports of recent studies on manufacturing

and a survey of federal R&D on advanced manufacturing. The AMP report was released by the President's Council of Advisors on Science and Technology on July 17, 2017, with 16 recommendations, including for R&D on 11 advanced manufacturing fields, for manufacturing testbeds and implementation infrastructure, and for education and training for technical workers and engineers in advanced manufacturing skills. These efforts brought MIT leadership to a growing national effort to address structural innovation problems in the manufacturing sector.

Energy Technology

Interest in energy issues remains high in Washington, although budget austerity measures reduced the appetite for major legislative initiatives. Intensifying partisanship has made discussions of energy and climate increasingly divisive. The Obama Administration continued to press for expanded clean and renewable energy R&D efforts, while many Republicans in Congress pushed to cut these same programs. The high-profile failure of several innovative energy companies holding government-backed loans became a hot-button issue despite an independent commission's finding that the overall default rate in the DOE loan guarantee portfolio was well within anticipated parameters. (The loan program is intended to foster high-reward research that is inherently too risky to be funded solely by private capital.) Many renewable energy advocates blamed these failures on Chinese manipulation of the clean-energy market. This view was supported by preliminary findings by the Department of Commerce, which imposed "dumping" tariffs on Chinese producers of silicon solar cells in May 2012. Overall, increased availability of domestically produced natural gas began to alter the economics of the energy industry, although environmental concerns raised by the hydraulic fracturing processes used to produce most of this gas developed into another source of contention.

In this highly charged atmosphere, the Washington Office continued to advocate for both foundational and translational energy R&D while bringing research results and policy ideas from campus to the attention of key officials in the Obama Administration, Congress, and major policy organizations.

Funding for energy R&D faced real challenges in the 2012 appropriations process. The president's overall FY2013 request for DOE research represents a slight increase over the 2012 enacted levels, but is below the 2012 request. Included in the request are $350 million for the Advanced Research Projects Agency–Energy, a 27.3% increase, along with a 10.1% increase (to $2.3 billion) for the Office of Energy Efficiency and Renewable Energy (EERE). Funding for the Office of Science would increase 2.4% overall to $5.0 billion, with increases for basic energy sciences, international fusion research, and advanced scientific computing, but also with significant offsetting cuts to other programs that are important to MIT—notably the domestic fusion program and both nuclear and high-energy physics research. House and Senate actions to date would reduce the increased requests, most significantly in the cases of ARPA–E and EERE, but would largely restore the above-mentioned cuts within the Office of Science. The Washington Office worked with the Massachusetts delegation and congressional staff to highlight

the importance of strong support for all DOE research programs, and to highlight opportunities for connecting energy R&D and broader advanced manufacturing and innovation initiatives.

Changes in key personnel also affected the energy community in Washington. In February, Senator Jeff Bingaman (D-NM) announced that he would not seek reelection in November. A long-time member and chair of the Energy and Natural Resources Committee, Senator Bingaman has been a champion of legislation to encourage the development of clean energy sources, and especially of energy R&D. Henry Kelly, who had been acting assistant secretary for energy efficiency and renewable energy, became principal assistant director for environment and energy at the White House Office of Science and Technology Policy. David Danielson PhD '08 was confirmed by the Senate as assistant secretary for EERE on March 29. Danielson moved to EERE from ARPA–E, where he was one of the first program managers. While at MIT, he founded the MIT Energy Club and co-founded the MIT Energy Conference. ARPA–E founding director Arun Majumdar left DOE in June 2012, with deputy director Eric Toone assuming the role of acting director. Until shortly before his departure, Majumdar had served concurrently as acting undersecretary of energy. In that role he was replaced by David Sandalow, previously assistant secretary for policy and international affairs.

Energy Legislation

With an increasingly partisan Congress hardening their positions on energy and climate issues, prospects for comprehensive energy legislation remained dim this year. In May, Senator Bingaman introduced the Clean Energy Standard Act of 2012 (S.2146), a new approach to the electrical sector that may set the stage for future discussions. In contrast to previous congressional efforts to stimulate generation of electric power from renewable sources directly, this bill attempts to place a range of clean-energy options on roughly equal footing with renewables. Utilities could select from solar, wind, natural gas, hydropower, nuclear power, and qualified biomass or waste-to-energy–powered generating sources to meet mandatory clean-energy quotas, or they could enhance new conventional power plants with other innovative technologies.

Groundwork was also laid for new legislation on nuclear waste disposal. In October 2011, two House subcommittees held a joint hearing on the preliminary recommendations of the Blue Ribbon Commission on America's Nuclear Future. The final commission report was delivered to secretary of energy Steven Chu in January 2012, and two additional House hearings and a Senate hearing were held in early February. The energy and water development bill approved by the Senate Appropriations Committee in April included provisions to begin creating intermediate storage facilities that would consolidate the waste from multiple reactors, as had been recommended by the commission. The corresponding House bill instead attempted to revive the contentious plans for a permanent nuclear waste repository at Yucca Mountain in Nevada that had been terminated in 2010.

Engagement on Major Energy Initiatives

Throughout the year, President Hockfield and vice president for research Claude Canizares, supported by the MIT Washington Office, met with DOE officials, congressional staff, and members of Congress to discuss energy research and policy. The agendas for these meetings, informed through quarterly meetings on campus with the DOE Engagement Group, included continued support of major DOE research initiatives such as ARPA–E, the Energy Frontier Research Centers, and the Energy Innovation Hubs, along with a focus on the need for sustained and predictable increases in energy R&D. They also emphasized opportunities to bridge basic research supported by DOE's Office of Science with advanced manufacturing initiatives and development or early deployment programs sponsored by other DOE offices or other federal agencies.

Department of Energy Quadrennial Technology Review

The inaugural DOE Quadrennial Technology Review (QTR) was released on September 27, 2011. This first department-wide R&D portfolio assessment defines overall goals for energy innovation and presents roadmaps in key technology areas. MIT provided formal input to the QTR (developed with the assistance of the Washington Office) through comments submitted by Claude Canizares and Ernest Moniz, professor of physics and director of MITEI. MIT graduate students and Washington Office staff also participated in the July 2011 capstone workshop that shaped final community input to the review.

Advanced Research Projects Agency–Energy

On February 2, 2012, President Hockfield joined Bill Gates of Microsoft, Fred Smith of FedEx, and former President Clinton as a keynote speaker at the third ARPA–E Summit. President Hockfield noted that dramatic changes had altered energy economics in the past five years and discussed the value that university–industry–government partnerships can bring in an innovation environment where competitive costs must become central at an early stage. She discussed the MITEI model and recent work on energy financing models by professors Richard Lester and Andrew Low. Some 3,000 scientists and policymakers attended what has become one of the largest annual energy events. The MIT Energy Club participated in a special student-only summit session.

Energy Innovation Hubs

Innovation Hubs remain a centerpiece of Secretary Chu's research program. In spring 2012, DOE called for proposals for two new Energy Innovation Hubs. Professor Don Sadoway, John F. Elliott professor of materials chemistry, led a team responding to the solicitation for the Batteries and Energy Storage Hub, which closed on May 31. The Synergy Consortium for Energy Storage (which also includes research partners from Harvard University, the National Renewable Energy Laboratory in Golden, Co, and the Idaho National Laboratory, as well as several small MIT-affiliated companies) is seeking to bring the five-year, $120 million hub project to Cambridge under the auspices of MITEI. The team is one of five that received invitations to present their proposals to DOE in July 2012. MITEI researchers, led by professor Joel Clark of the Department of Materials Science and Engineering, also began assembling a team to compete for the Energy Innovation Hub for Critical Materials Research, for which proposals are due in August 2012.

Energy Frontier Research Centers

DOE established 46 EFRCs in FY2009, 30 through regular appropriations and 16 through the American Recovery and Reinvestment Act. Focusing on fundamental research critical to advancing energy science, the centers are funded for a five-year period through the Office of Science's Basic Energy Sciences program (BES). MIT is the lead institution for two EFRCs, and MIT faculty members and student researchers participate in several more. For FY2012, the BES budget includes $100 million for follow-on support to the existing EFRCs. The FY2013 request would increase funding to $120 million. The additional funding is intended to accelerate transition of BES-funded scientific discoveries into prototype clean-energy technologies in coordination with the Office of Energy Efficiency and Renewable Energy. The Washington Office has been a strong advocate of such coordination.

Fusion

In an effort to meet the exploding costs of the International Thermonuclear Experimental Reactor (ITER), the international fusion project in France in which the US is a partner, the Obama Administration FY2013 budget for fusion energy sciences increased ITER funding to $150 million from $100 million and correspondingly cut domestic fusion funding by $48 million, from $296 million in FY2012 to $248 million. To achieve this, one proposal was to close MIT's Alcator C-Mod facility, with corresponding staff layoffs. Princeton's fusion facility was also proposed for major employment reductions, and systematic cuts were proposed for other university fusion research. Because ITER costs will continue to grow, further domestic cuts can be expected in the future unless this course is reversed this year. Arguing that the cutbacks to the domestic fusion program would jeopardize US fusion efforts and its fusion talent base, as well as US ability to achieve gains from ITER fusion research, the roughly 40 universities that participate in fusion research strongly opposed the sacrifice of domestic fusion to fund international fusion, arguing that both needed a basic level of support.

On March 1, 2012, professor Miklos Porkolab, director of the Plasma Science and Fusion Center, and Earl Marmar, director of the Alcator C-Mod facility, met with Representative John Olver (D-MA) of the House Energy Appropriations Subcommittee and Representative Ed Markey (D-MA), a senior member of the House Energy Committee, to discuss this problem. They also met with the offices of Massachusetts Senators Kerry and Brown, Representatives Lynch and Capuano, and staff from both the House Energy Appropriations Subcommittee and the House Science Committee. They joined a group of fusion researchers for a meeting with Representative Rodney Freylinghuysen (R-NJ), chairman of the House Energy Appropriations Subcommittee, who pledged to support domestic fusion. On May 17, joined by Claude Canizares, Professor Porkolab and Director Marmar met with DOE Office of Science Director Bill Brinkman and with senior Office of Management and Budget (OMB) officials about the fusion program. On June 14, 2012, a group of 14 MIT fusion graduate students organized meetings with 26 congressional offices, including many in the Massachusetts delegation, and spoke to five Senators, calling for restoration of funding for the domestic fusion program. The MIT Washington Office assisted with all of these meetings, as well as with a series of letters on the issue and background materials.

In addition, Representatives Mike Capuano and Jay Inslee visited the Alcator C-Mod facility on March 9, 2012, and Senator Kerry toured the facility on March 19, 2012. The House of Representatives, in its FY2013 energy appropriations bill, fully restored the $48 million domestic fusion program cut proposed by the Obama Administration, as well as supporting the increased international ITER program; the Senate supported the Obama Administration's budget levels for both domestic and international programs. A final outcome awaits resolution of the FY2013 appropriations.

Other Interactions

On July 14, 2011, the Energy and Water Development Subcommittee of the Senate Committee on Appropriations heard testimony on the safety and economics of light-water small modular nuclear reactors. Ernest Moniz cited barriers to private-sector development of new nuclear technology, including the lack of a carbon price signal, regulatory uncertainty, and lack of licensing experience at the Nuclear Regulatory Commission. He responded to the subcommittee's safety fears in the wake of the Fukushima disaster, pointing out that it had not been a cascading event, but a series of independent failures caused by a tsunami triggered by a magnitude 9 earthquake. On July 19, Congress again called on Dr. Moniz, this time to summarize the findings of the "MIT Future of Natural Gas" study before the Senate Committee on Natural Resources.

On October 14, 2011, assistant professor Tonio Buonassisi and graduate student Doug Powell met with staff from the House Science, House Natural Resources, and Senate Energy committees to discuss their research on solar technology challenges and related production issues. They also held discussions with energy experts at the Center for Strategic and International Studies, the National Resources Defense Council, and the Information Technology and Innovation Foundation. Professor Buonassisi spoke on the economics of photovoltaic solar energy and the role of innovation in driving down costs in the photovoltaic sector at the Information Technology and Innovation Foundation's Energy Innovation Conference in November.

On November 15, 2011, Professor Moniz testified before the Senate Energy and Natural Resources Committee regarding two pieces of research-related legislation. S.1807 would amend the Federal Nonnuclear Energy Research and Development Act of 1974 to better coordinate energy research, development, and demonstration programs. S.1703 would amend the Department of Energy Organization Act to require quadrennial energy reviews (QERs). Dr. Moniz discussed the energy technology report of the President's Council of Advisors on Science and Technology, outlining the need for improved DOE analytical capabilities to properly execute QERs, which he supported. He also advocated for increased funding for research, development, and demonstration, and for an expansion of social science research at DOE.

On November 30, 2011, Secretary Chu delivered an address to the MIT community titled "Wining the Clean Energy Race." He set the stage for a discussion of current DOE initiatives to develop leadership in clean-energy technology with remarks on the history of innovation. The presentation was sponsored by MITEI and the MIT Energy Club. Secretary Chu also participated in a faculty roundtable and an MIT Sloan School of Management class on energy ventures during his visit.

The Washington Office helped coordinate the December 5, 2011, rollout for the "MIT Future of the Electric Grid," the fifth in a series of MITEI-sponsored interdisciplinary studies of the US energy future, at the National Press Club. Faculty and Washington Office staff also briefed leaders from Congress and the Obama Administration, and key staff members, on the report.

Senator Jeff Bingaman (D-NM), then-chair of the Senate Energy and Natural Resources Committee, and staff members (including staff director Bob Simon, PhD '82) visited MIT in January to discuss energy innovations with researchers. In addition to meeting with President Hockfield and with MITEI leadership, Senator Bingaman visited Gang Chen's nanoengineering laboratory, Angela Belcher's biomolecular materials group, and Tonio Buonassisi's photovoltaics research laboratory.

On February 9, 2012, professor Lester presented a report on energy innovation strategy at the Bipartisan Policy Center. He was joined by co-author David Hart of George Mason University and by Elizabeth Reynolds, director of MIT's Industrial Performance Center. He also briefed Senate Energy Committee and House Science Committee staff as well as officials at DOE and the White House Office of Science and Technology Policy.

On March 19, 2012, Senator John Kerry visited MIT's Plasma Science and Fusion Center and inspected the Alcator C-Mod experimental tokamak facility. He was hosted by Miklos Porkolab, associate director Martin Greenwald, and Earl Marmar.

MIT's Joint Program on the Science and Policy of Global Change held a forum on the "2012 Energy and Climate Outlook" in Arlington, VA, from March 28–30. Deputy director Katherine Sullivan of the National Oceanographic and Atmospheric Administration (NOAA) delivered the keynote address to attendees from industry, nongovernmental organizations (NGOs), government agencies, and research programs around the world. MIT presenters included joint program co-chairs Ron Prinn and John Reilly, and professors Henry "Jake" Jacoby, Denny Ellerman, and Kenneth Strzepek.

Secretary Chu announced a new national program intended to spur clean-energy innovation in remarks at a forum at MIT on March 30, 2012. The new energy innovator program allows startup companies to license patented energy technology from national laboratories through a simplified, low-cost process. Cass Sunstein, director of the White House Office of Information and Regulatory Affairs, also participated in the forum, speaking about the role that sensible, streamlined regulatory processes can play in encouraging innovation.

Two MIT-centered teams traveled to Washington in June 2012 for the first annual DOE National Clean Energy Business Plan Competition. The national program is modeled in part on the five-year-old MIT Clean Energy Prize, which now serves as one of six regional feeder competitions to the national event. The MIT Washington Office provided support to these events.

Convergence and Changing the Biomedical Ecosystem

Spreading the Word on Convergence

The MIT Washington Office continued to build on the 2009 National Academies report, The New Biology for the 21st Century, and the 2011 MIT white paper, The Third Revolution: The Convergence of Life Sciences, Physical Sciences, and Engineering to advance the convergence approach—the new research model that integrates engineering, physical and life sciences—in Washington.

MIT held a workshop on September 30, 2011, on campus to discuss the innovation organization model for convergence. The meeting was chaired by Phillip Sharp and professor Keith Yamamoto of the University of California, San Francisco. Susan Hockfield offered opening remarks. Attendees included a broad array of MIT faculty, including Robert Langer, Sangeeta Bhatia, and Arup Chakraborty. Additional thought leaders present included Denny Auisello (Harvard professor, chief of medicine at Massachusetts General Hospital, and chief scientific officer of Partners Healthcare) and federal agency leaders, including Belinda Seto, deputy director at the National Institute of Biomedical Imaging and Bioengineering (NIBIB). Fran Sharples, staff director of the Board on Life Sciences of the National Academy of Sciences, and MIT Washington Office staff members William Bonvillian and Amanda Arnold also attended and used this meeting as a basis to develop an agenda for a formal and larger National Academies workshop effort.

This year, three additional forums emerged to promote the convergence approach. In November 2011, FasterCures held a panel at its international conference in New York City titled, "Convergence: The Death of Disciplinary Science?" Panelists included MIT professor Paula Hammond; Thomas Kalil, deputy director for policy, White House Office of Science and Technology Policy; and George Poste, chief scientist, Complex Adaptive Systems Initiative, Arizona State University.

Professor Sharp presented a keynote address, "The Third Revolution: Convergence of the Physical, Engineering, and Life Sciences" at the NIBIB 10th Anniversary Scientific Symposium that took place on June 22, 2012, on the NIH campus.

Planning and development efforts directed toward the convergence approach include an evolving set of meetings that will take place starting June 2012 and continuing through next year. This set of meetings, "Transforming Tools of Emerging and Converging Technologies," is funded by NSF. Robert Langer, Robert Urban, and Amanda Arnold from MIT are participating in this effort and will help complete the resulting workshop report. Still under way is the development of a series of meetings on convergence being planned by the National Academies of Science with support and leadership from president Ralph Cicerone.

The MIT Washington Office continues to provide meaningful support for the convergence agenda in tandem with MIT's NIH faculty engagement group and the MIT administration.

Food and Drug Administration Engagement and "Big Data" for Health Care Delivery

As part of the ongoing convergence effort, the MIT Washington Office is engaged with the Food and Drug Administration (FDA) and related organizations and industry groups. The office has further developed working relationships with key FDA officials, including Margaret "Peggy" Hamburg, FDA commissioner; Janet Woodcock, director of the Center for Drug Evaluation and Research; Vicki Seyfert-Margolis, senior science advisor; and Erik Perakslis, chief technology officer. In addition, the MIT Washington Office has facilitated MIT working relationships with leaders at top trade groups, including PhRMA and the Biotechnology Industry Organization.

Over the past year, and in concert with the Office of the Vice President for Research, the MIT Washington office developed an FDA Coordination Group on campus that includes faculty from an array of disciplines, such as computer science and political science. This group helps to inform further engagement with FDA.

In addition to discussion about important legislation, such as the passage of this year's FDA authorization bill (the FDA Safety and Innovation Act), the FDA Coordination Group worked toward the signing in April 2012 of an FDA–MIT memorandum of understanding. This memorandum outlines collaboration and potential public private partnerships around sharing and the use of FDA data. A useful tool to ensure greater interaction on FDA data, the memorandum of understanding is also a key component of MIT's effort to persuade PhRMA trade group members and others in industry to start working toward patient-centered use of "big data" to further such initiatives as personalized medicine.

This FDA effort, developed and supported with campus officials, faculty, and the MIT Washington Office, has provided a potential platform for the "bigdata@CSAIL" initiative announced in May. Together, FDA and MIT are working to enhance the impact of "big data" efforts at MIT on the current policy discussion of personalized medicine and patient health. Concurrently the MIT Washington Office continues to work with MIT's Center for Biomedical Innovation to develop a core effort to integrate health care-delivery–related programs across MIT, including those at CSAIL and the Sloan School of Management.

Biomanufacturing: A New Life Science Convergence Approach

As Washington embraces the manufacturing effort through the Advanced Manufacturing Partnership and begins to focus on a patient-centered, personalized medical approach, biomanufacturing is emerging as a new field of interest in the life sciences sector. The MIT Washington Office is working with faculty to discuss federal program opportunities as well as keep faculty informed about how the federal government and the life sciences community are engaging in the current discussion. The MIT Washington Office is now discussing these issues with the MIT Industrial Performance Center, the Center for Biomedical Innovation's Biomanufacturing Research Program, and Sloan School faculty.

National Institutes of Health: Restructuring and the Budget Context

In December 2011, NIH launched the National Center for Advancing Translational Science (NCATS) as part of a larger restructuring process that saw the dissolution of the National Center for Research Resources. The mission of NCATS is "to advance the discipline of translational science and catalyze the development and testing of novel diagnostics and therapeutics across a wide range of human disease and conditions." As part of this restructuring, NCATS manages the Clinical and Translational Science Awards process once housed at the National Center for Research Resources. MIT engages in the awards program via the Harvard Catalyst Project.

NCATS's first major initiative, unveiled in May, was a program to support researchers who are using biomarker-based studies and other approaches to repurpose compounds owned by three of the world's largest drug developers. The MIT Washington Office is monitoring NCATS's activities since its mission holds additional opportunity for convergence-style funding at NIH. NCATS has yet to name a permanent director. In addition to NIH restructuring, the deficit reduction conversation permeating Congress and the Obama Administration is affecting federal agencies and, in turn, university research. The MIT Washington Office has worked on several issues this year in relation to the federal budget situation.

One such development is the lower salary cap for NIH grantees. The consolidated appropriations bill, signed into law on December 23, 2011, lowered the salary limit on NIH grants from Executive Level I ($199,700) to Executive Level II ($179,700). In effect, NIH is intervening to set research salary limits and increase university indirect costs. This change became effective on NIH grant awards that had an initial issue date on, or after, December 23, 2011. The MIT Washington Office worked with a large group of associations, including the Association of Public and Land-Grant Universities (APLU) and Association of American Universities (AAU), to oppose this change. This group was able to hold the cap at Executive Level II, averting a deeper cut to the suggested Executive Level III ($165,200). The MIT Washington Office continues to work with the APLU, AAU, and related associations concerning further reductions on the cap.

Emerging issues relate to an NIH effort to buttress the average success rate of NIH grants as well as to lower the age of the average first grant awardee during flat budget times. Without a formal comment process, the Obama Administration's budget for NIH included various additional new grant-funding mechanisms to curtail NIH costs, which were echoed in NIH's budget documents.

These mechanisms include reducing non-competing grants by one percent from the fiscal year 2012 level, negotiating the budgets of competing grants to avoid growth in the average award size, and eliminating inflationary increases during out-years for competing and non-competing awards. In addition, NIH launched a pilot program in May for additional scrutiny and review of awards to any principal investigator with existing grants of $1.5 million or more in total costs. In July 2012, Representative Ed Markey and Representative Brian Bilbray (R-CA) sent a letter to NIH director Francis Collins to inquire about this pilot program, expressing concern that NIH may be cutting research support for its most promising investigators. Questions asked in the letter

included whether this program honors the tradition of the gold-standard peer review process at NIH; how the particular threshold of $1.5 million was identified; whether this will affect team-based science; and how the grantee community was consulted prior to the creation of the pilot program.

The MIT Washington Office, in concert with the Office of the Vice President for Research and the Office of Sponsored Programs, worked to gain a better understanding of how these funding mechanisms will impact campus researchers. The Washington Office is also working with groups in Washington to urge NIH to move away from such review policies, which could water down grant quality, while also urging Congress to fund NIH-supported research.

Defense Research and Development

Defence Advanced Research Projects Agency: Focus on Breakthrough Research

This past year saw a continuation of ongoing outreach efforts with DARPA leadership that have continued to signal a return to DARPA's historic breakthrough research model with strengthened university support. MIT was particularly engaged this year with DARPA on advanced manufacturing, where DARPA has been building a major research effort and working as an active agency participant in the Advanced Manufacturing Partnership. DARPA director Regina Dugan and deputy director Ken Gabriel visited MIT and spoke on DARPA's advanced manufacturing initiatives on November 29, 2011, as part of the MIT Political Science Distinguished Speaker series. In addition, Gabriel spoke at and participated in MIT's Regional Manufacturing Workshop that was part of the AMP effort.

Defense Research Funding

Former secretary of defense Robert Gates was a strong advocate for basic research funding at the Pentagon; he was succeeded by Leon Panetta. In FY2012, Congress funded defense basic research at $2.1 billion, which was an increase from $1.9 billion in FY2011. The Obama Administration budget proposed a basic research level of $2.1 billion for FY2013. Congress funded applied research at $4.6 billion in FY2012, a slight decline from FY2011. The Obama Administration budget called for applied research funding of $4.7 billion in FY2013. As of the end of MIT's fiscal year, neither the House nor the Senate had passed defense appropriations bills, but both appeared to be on track to approve stable R&D funding unless sequestration cuts are implemented.

Space

NASA: Deep Cuts

In February, President Obama announced his budget, which provided $17.7 billion to NASA, a decrease of 0.3%, or $59 million below the 2012 enacted level. Under the request, spending on robotic Mars exploration would drop from $587 million this year to $361 million next year, a 38.5% reduction. As a result, the cooperative projects with European scientists that would have sent two probes to the red planet—one was to analyze gases in its atmosphere; the other, a rover, to search the planet's surface for signs

of life—would be cancelled. NASA's broader Science Mission Directorate budget, which includes planetary exploration, astronomy, and earth environment monitoring, would also be cut next year. Instead of the $5.07 billion it received this year, the directorate would receive $4.911 billion next year.

The MIT Washington Office worked closely with AAU and other associations to alert congressional leaders to the fact that the planetary science program, in which the Mars funding is included, is a key component of NASA's plan and should be adequately funded. As things stand, the appropriations bills for NASA for FY2013 in both the House and Senate have restored planetary science program funding and retained much of the Mars efforts. Funding for continuing priorities, such as the James Webb Space Telescope and the Space Technology Program, has also been maintained.

The MIT Washington Office continued this year to support MIT efforts to bring the university's expertise to bear on these budget prioritization issues and on other emerging issues within the NASA portfolio.

Key NASA Initiatives

The Space Technology Program (STP) continues to be a high-priority program for the MIT Washington Office. Due to efforts over the past two years, and to the protracted FY2013 budget process, the focus this year was to engage campus faculty in the details of the evolving plan for the program and to advocate for the inclusion of the space technology program at an appropriate level in the budget.

For example, the MIT Washington Office facilitated a conference call for Mason Peck, head of STP, to meet with the members of the NASA Engagement Group on campus in May. The conversation revolved around new competitive funding opportunities. The MIT Washington Office helped improve access and communication between NASA agency technology officials and the MIT NASA Engagement Group.

MIT Washington Office staff met with relevant Commerce–Justice–Science appropriations committee staff members in both the House and Senate in March to reinforce support for at least level funding for STP. Claude Canizares met with Mason Peck, NASA's chief technology officer, in July in an effort to better understand the state of the program within NASA and plans for expanding the program. Although the program is currently funded at about $650 million, a minimum effective level of funding is likely closer to $750 million. As discussion about the FY2013 budget again heats up and the pending question of sequestration is discussed, MIT is working with the network of university STP supporters developed over the past two years to advocate for a minimum level of effective funding.

Problematic NASA Regulations

Congress included language in the Continuing Appropriations Act of 2012, passed in November, that outlawed the use of any NASA funds "to develop, design, plan, promulgate, implement, or execute a bilateral policy, program, order, or contract of any kind to participate, collaborate, or coordinate bilaterally in any way with China or any Chinese-owned company." In January, NASA promulgated regulations to this effect.

The grant information circular (GIC) on this issue unfortunately was written broadly and could be understood to include university research.

Working closely with MIT's Office of Sponsored Programs, Amanda Arnold, the leader on this issue for the Washington Office and the NASA Task Force leader for AAU, coordinated with multiple groups in Washington, including AAU and the Council on Government Relations, to address these concerns and, most important, to ensure that the NASA GIC would not have any impact on the federal research exemption (FRE) provided within the regulations controlling international traffic in arms. NASA officials repeated that the FRE would not be affected by the GIC; however, that point was not made explicitly in the "Frequently Asked Questions" document released in June. The MIT Washington Office has worked with coalition partners to ensure that the China exception does not negatively impact university research.

Support for NASA Faculty Initiatives

As part of the ongoing effort to support faculty in Washington, the MIT Washington Office worked to develop the Moon Knowledge Acquired by middle-school students (MoonKAM) event in Washington, DC, on June 1. This event, spearheaded by MIT faculty member Maria Zuber and Sally Ride (the first woman astronaut) of Sally Ride Science, exhibited the research of students who are currently using the moon camera on the GRAIL space mission and also featured speakers including Maria Zuber, Sally Ride (by satellite), White House science advisor John Holdren; and NASA deputy director Lori Garver. The MIT Washington Office will continue to serve as a resource for MIT faculty seeking assistance for efforts in Washington.

Transportation

On July 6, 2012, President Obama signed a $105 billion surface transportation bill into law, bringing to an end a three-year battle over highway and transit spending. The Moving Ahead for Progress in the 21st Century Act (MAP-21 or H.R.4348), generally called the transportation reauthorization bill, passed by a vote of 373–52 in the House of Representatives and 74–19 in the Senate. The bill identifies and sets funding guidelines for federal highway, transit, and highway safety programs through the end of fiscal year 2014, allowing states to plan and undertake major transportation improvements. A key component of this legislation is the section on university transportation centers (UTC). The MIT Washington Office worked with a large coalition organized by the Association of Public and Land-Grant Universities and MIT UTC director Joseph Coughlin to preserve support for these centers. The bill maintains the five national centers, 10 regional centers, and 20 Tier 1 centers.

Homeland Security

The Washington Office helped to coordinate an advocacy effort with its industry, scientific society, and university partners in support of the Department of Homeland Security (DHS) Science and Technology (S&T) directorate, which faced significant funding cuts from Congress in the FY2012 House bill. DHS S&T was funded at $857 million in FY2010 and at $760 million in FY2011; Congress cut this to $617 million in FY2012. However, this trend appears to have been reversed in FY2013.

The Obama Administration budget for DHS S&T for FY2013 was $813 million; the House Appropriations Committee funding level was $806 million and the Senate Appropriations Committee's proposed funding was $813 million. The bill had not passed Congress by the end of MIT's fiscal year, and could, of course, be altered by sequestration cuts.

National Science Foundation

The Washington Office engaged with NSF program managers and administrators throughout the year with regard to the agency's involvement in ongoing federal manufacturing and innovation initiatives, the new materials genome initiative, and developing efforts in the areas of "big data" and convergence.

NSF supports efforts at MIT in computer science, cellular systems, and materials engineering as well as individual and small-group research across all its directorates. The Caltech/MIT Advanced Laser Interferometer Gravitational Wave Observatory project is funded through NSF's major research equipment and facilities construction program. MIT advocated for strong overall FY2012 and FY2013 NSF budgets and against attempts by certain House Republicans to politicize the NSF research program by curtailing funding for certain areas of research. In July 2011, MIT joined more than 140 institutions in sending a letter to House Appropriations Committee leadership in support of continued funding for the NSF Directorate for Social, Behavioral, and Economic Sciences. Similar efforts were necessary in June 2012 after Representative Jeff Flake successfully introduced an amendment to the House 2013 NSF appropriation bill that would prohibit all funding for political science and eliminate an important climate change education program. A group of 121 organizations and universities, including AAU and APLU, urged Senators to reject "legislative attempts to micromanage NSF and undermine the merit review process by singling out specific programs for elimination as recently occurred in the House." The letter urges Senators "to protect the integrity of the scientific enterprise by ensuring that the NSF and its independent scientific panels determine where the best scientific opportunities are and how to absorb any potential reductions to its budget."

In July 2011, NSF started the Innovation Corps program, a public–private partnership designed to help translate scientific and engineering discoveries into commercial technologies, products, and processes that benefit society. This effort to connect NSF-funded scientific research with the national innovation ecosystem is modeled in part on MIT's Venture Mentoring Service and the Deshpande Center for Technological Innovation. It is funded in part by the Deshpande Foundation and the Kaufmann Foundation. The agency plans to expand the program significantly in future years, developing a network of regional innovation support hubs.

Professor Gerbrand Ceder presented a lecture at NSF in November 2011 on his Materials Genome Project, which combines computational, theoretical, and experimental materials research to rapidly screen potential new materials with desirable properties. He also met with NSF program leaders and director Subra Suresh. Dr. Ceder's work served as a major inspiration for the new multiagency Materials Genome Initiative, and he spoke at the May 14, 2012, White House kickoff event for the initiative.

Higher Education

As the Obama Administration's "Restore America's Leadership in Higher Education" campaign neared the end of its third year, concerns grew that rising college costs threaten its progress. The perception that higher education is becoming less affordable for students and their families has become widespread, with many policymakers questioning how the US can again have the world's highest proportion of college graduates when many potential students believe that college is beyond their means. In the case of public universities, lower funding from state governments has increased both the burden on families and students' reliance on federal grants or loans. Some private institutions, including MIT, remains able to provide substantial need-based aid, but this group is shrinking.

With the economy the top issue on most Washington agendas, higher education advocates in Congress and the Obama Administration have focused on job creation; matching education and training programs with workforce needs; tuition costs and student debt; and immigration options for highly educated workers. The desire to increase both attendance and degree-completion rates fueled policy discussions regarding the cost, accountability, and efficacy of various higher education models: traditional four-year public and private not-for-profit universities; community colleges; and the for-profit universities that have been increasingly aggressive in competing for students and federal financial aid dollars.

The MIT Washington Office has worked closely on these issues with fellow members of major higher education associations. The office has been engaged in efforts by the AAU, APLU, and others to accurately portray the cost of higher education while also documenting its substantial and enduring value, and to discuss the causes of, and potential solutions to, the affordability crisis clearly and effectively.

The Washington Office has also worked to ensure that any proposed legislative or regulatory fixes to the problems facing the higher education community do not infringe on universities' ability to determine core features of curricula and programs or to experiment with innovative teaching methods. The office worked with MIT's provost and the general counsel to ensure that new efforts for online, distance education at MIT (*MITx* and edX) have the freedom to explore various operating models while exploring strategies for expanding the Institute's offerings and impacts.

Education Regulatory Issues

New program integrity regulations intended to increase the transparency and accountability of certain US Department of Education programs went into effect on July 1, 2011. Most of these regulations affect eligibility for federal student aid programs authorized under Title IV of the Higher Education Act. The higher education community continues to be concerned about three of the regulations, dealing with state authorization, the definition of a credit hour, and gainful employment.

The first of these provisions requires schools to be authorized by each state from which students participate in distance learning. This rule will affect MIT's future planning for *MITx* and edX, should they transition to a for-credit model. In the interest of promoting transferability, the second provision federalizes the basic concept of credit hour. Universities object that this limits their flexibility to design curricula and the flexibility that accrediting organizations need to evaluate curricula fairly. The third provision requires the Department of Education to use the collective repayment history of an institution's graduates to determine the institution's eligibility to participate in federal student grant and loan programs. Graduates' ability to make loan payments is taken to be a proxy for their success in finding gainful employment. The higher education associations continued to advocate for a re-examination of these three provisions.

In recognition of the potential benefits of distance learning and the difficulties in obtaining multiple authorizations, the Department of Education announced that it would not take any enforcement actions related to distance education activities undertaken before July 1, 2014, provided that the institution made a good-faith effort to identify and obtain needed authorizations. The Washington Office worked with AAU, APLU, the American Council on Education, and the National Association of Independent Colleges and Universities to track transparency and program integrity activities in Congress and at the Department of Education and to advocate for flexible monitoring approaches that preserve the universities control of core educational activities and maintain their ability to innovate.

In May, the associate director for science of the White House Office of Science and Technology Policy (OSTP) moved to require certain mandatory reforms to science undergraduate teaching for university recipients of federal research funding. This was based on a new National Academy of Sciences study of best practices, and was well meant but nonetheless set a problematic precedent: the federal government had never before dictated curriculum and course content. MIT joined a group of universities in opposing this regulatory effort. Subsequently OSTP quietly pulled it back.

On March 16, 2012, the Department of Health and Human Services issued final rules establishing requirements for student health plans under the Affordable Care Act. However, the department noted that under current law these rules cannot be applied to self-funded plans, such as MIT's student health plans. The Washington Office is working with the general counsel's office and higher education associations to resolve this issue before the January 1, 2014, phase-in of individual coverage requirements.

Financial Aid

The Washington Office tracked administration and congressional actions affecting financial aid throughout the year. The Pell Grant program and Stafford Loan programs, the major sources of federal aid to undergraduate students, were both contentious issues. Attempts by the conservative-controlled House to reduce the maximum Pell Grant size were ultimately defeated in the FY2012 budget agreement reached in December 2011. The interest rate subsidy for Stafford Loans was set to expire at the end of June, with the rate doubling from 3.4% to 6.8%. Republicans and Democrats each offered plans to extend the subsidy, but disagreed as to how to pay for the extension. Agreement to extend the 3.4% rate for one year was finally reached on June 29, 2012 (the extension was combined with a major transportation bill). The Obama Administration continued to press for more extensive, permanent reforms of the financial aid system.

Graduate Student Unionization

In June 2012, the National Labor Relations Board (NLRB) granted the United Autoworker Union's request to review a decision made a year earlier that had dismissed a petition by New York University graduate students to form a union. The NLRB invited briefs from interested parties on four questions, including whether the Board should modify or overrule its 2004 decision in Brown University, which held that graduate student teaching assistants are not employees. The American Council on Education is preparing a brief on behalf of the higher education associations. The Washington Office is monitoring this issue in coordination with the MIT General Counsel's Office.

Immigration

MIT continues to support immigration reforms that would provide foreign students earning advanced degrees in science, technology, engineering, or mathematics (STEM) fields a path to citizenship. The higher-education associations and many industry groups also support such reforms, arguing that the present system not only deprives us of talented scientists and engineers but also exports the know-how and experience they gained here. The Washington Office works with the Chancellor's Office and the international student offices to track legislation and regulatory actions relevant to the MIT community.

Two bipartisan bills were offered in the Senate in May and June, the Sustaining Our Most Advanced Researchers and Technology (SMART) Jobs Act and the Startup 2.0 Act, but neither has progressed to date. These bills, and related legislation that the higher education associations have been discussing with House members, would create new visa categories and citizenship paths for recent graduates with PhDs from reputable US programs. In some versions, master's degree recipients in selected fields would also be eligible. Minimum levels of funded research would be required to ensure program quality at the degree-granting institution.

Congressional action remained stalled on the so-called DREAM Act. This legislation would offer many undocumented aliens who came to the US as children an opportunity to earn conditional permanent residency. The Obama Administration announced

in June 2012 that it would take executive action to achieve similar goals. President Obama ordered DHS to cease the initiation of deportation proceedings against young undocumented immigrants who met certain basic criteria and who will now be allowed to attend college or apply for work permits legally. An estimated 800 thousand to 1.3 million youths were expected to be eligible for the program beginning August 15, 2012.

Higher Education Tax, Finance, Charitable Giving

A group of seven higher education associations, including APLU and AAU, submitted testimony for the record to the Senate Finance Committee for its October 18, 2011, hearing on Tax Reform Options: Incentives for Charitable Giving. The group urged the committee to proceed very cautiously in making changes to the current federal charitable income tax deduction, which helps generate needed private support for colleges and universities.

Senator Charles Schumer (D-NY) introduced legislation on June 6, 2012, that would consolidate and permanently reauthorize several higher education tax benefits, including the American opportunity tax credit (AOTC) and the lifetime learning credit. The six presidentially based higher education associations endorsed the measure, the AOTC Permanence and Consolidation Act (S. 3267).

Patent Reform

Passage of the America Invents Act

On September 16, 2011, President Obama signed the America Invents Act at Thomas Jefferson High School for Science and Technology in Alexandria, VA, where he highlighted university efforts to promote technology commercialization and regional economic development. Since that time, the US Patent and Trademark Office (USPTO) has been busy implementing the American Invents Act by issuing final rules after significant public comment.

Enhancing the US Patent and Trademark Office's Physical Footprint

The USPTO announced plans to open four satellite offices to enhance recruitment of talented patent officers and to bring the patent process closer to the participants for appeals and general process questions. New satellite offices are located in Denver, CO; Dallas, TX; San Jose, CA; and Detroit, MI. The USPTO's primary office will remain in Alexandria, VA.

Next Legislative Steps on Patents

Congress is currently debating whether to undertake a technical amendments bill to the American Invents Act. There is disagreement over whether those amendments should be truly "technical" in nature or be substantive and reopen issues that were debated during the passage of the Act. The three areas of potential amendment include the grace period, prior user rights, and post-grant review estoppel. The MIT Washington Office has been working with other universities to ensure that the technical amendments are indeed technical and not substantive changes to the legislation.

Developing MIT Citizen Scientists

This effort, which began on a small scale in spring 2006 and has expanded significantly since then, aims to take advantage of MIT resources to provide opportunities for graduate and undergraduate students to serve as "citizen scientists."

Science and Technology Public Policy "Boot Camp"

William Bonvillian, director of the MIT Washington Office, working with a committee of graduate students affiliated with the Science Policy Initiative (SPI) student group, again conducted an intensive "boot camp" course in public policy, with 18 class hours over four days during Independent Activities Period. This S&T Policy Boot Camp program began in 2007 and has been offered as an intensive short course seven times. The program included a closing session with a panel of MIT faculty experienced with Washington and speaking about their public policy experience. This year's focus was on MIT's role on advanced manufacturing and included Martin Schmidt, Olivier de Weck, and Tonio Buonassisi, moderated by Claude Canizares.

In a related effort, the MIT Washington Office worked with Science Policy Initiative grad students in supporting a new science and technology policy certificate program of courses at MIT, which has been preliminarily approved by an interdisciplinary faculty committee.

Congressional Visits Day

Some 20 of the students participating in the "boot camp" course came to Washington for Congressional Visits Day (April 25, 2012), organized by leading national science and engineering groups to advocate research funding and support. Participating MIT students attended briefings on agency R&D funding and pending congressional issues that were organized by participating science societies and held at AAAS; the Washington Office held a morning class on congressional advocacy for the MIT group, who then visited about 40 congressional offices, including those of the Massachusetts delegation.

Stand for Science

The MIT Washington Office again this year supported an SPI effort to petition Congress to overturn the application of sequestration cuts to R&D programs. The group organized a major national effort among graduate students and obtained more than 10,000 online signatures for their petition, making and circulating an advocacy YouTube video that explained the funding difficulties that science faces. They presented the petitions online to congressional offices and presented them in person on March 27, 2012, to a series of congressional offices, including directly to Representative Fattah (D-PA), Representative Capuano (D-MA), and Senator Brown (R-MA).

Agency Visits Days

From October 25–27, 2011, a group of 10 MIT graduate students from SPI visited a series of R&D organizations, including DARPA, NSF, the Department of Agriculture, and the National Academies to learn about how these agencies work and to explore possible career opportunities. The MIT Washington Office helped organize this program.

Program for MIT Summer Interns

MIT supports summer intern programs at government agencies and NGOs for MIT undergraduates, Technology and Policy Program students, and student interns at the DOE. Over the past five years, an enhanced program was started and led by the MIT Washington Office to increase the exposure of MIT summer interns to senior science policymakers in Washington. The 2011 and 2012 programs included meetings for interns with science and technology leaders at major agencies, including such leaders as NSF director Subra Suresh and National Academy of Engineering president Charles Vest, and a seminar session on science and technology public policy conducted by the director at MIT's DC Office. Helen Haislmaier, program coordinator in the Washington Office, coordinated these events.

Science Fellows in the Washington Office

As a part of the program for MIT summer interns, two students from MIT worked in the summer of 2011 and in the summer of 2012 as science fellows in the MIT Washington Office. This program has been running for the past six summers. In summer 2011 the MIT students worked on analyzing and preparing papers on manufacturing R&D, progress on NASA's decadal missions, and NSF merit reviews.

MIT's Washington Office continues the tradition of semester-long fellowships with students from American University's Government Semester Program. Coordinated by Amanda Arnold, these students benefit from the mentoring of the MIT Washington Office staff. This year-round program enhances MIT's engagement with science policy by training a new generation and it expands the capability of the MIT Washington Office to track ongoing research initiatives and events around the capital.

MIT Alumni Association Policy Advocacy Initiative

The Washington Office engaged with the MIT Alumni Association in an effort to educate alumni about, and have them participate in, policy advocacy. The goal is to educate interested MIT alumni on a range of R&D and education policy issues and enable them to reach out to federal, state, and local legislators and other policymakers. An initial event that included a webinar and supporting materials was held around the R&D sequestration cuts in summer 2012. Abby Benson and Amanda Arnold of the Washington Office led this engagement with the MIT Alumni Association working group.

Policy Leaders at MIT Program

Working with MIT faculty and administrators, the MIT Washington Office has supported an expanded program of bringing policy leaders to meetings and speaking events at MIT. Those coming to MIT this year included John Bryson, Pat Gallagher (under secretary of commerce) of NIST, Jeff Bingaman, John Kerry, Peggy Hamburg, Henry Kelly, Lisa Porter (director of the Intelligence Advanced Research Projects Activity), Ron Bloom, Regina Dugan, and Ken Gabriel.

The appendix provides a detailed list of meetings involving MIT administrators and faculty in Washington that were supported by the Washington Office, of MIT faculty who testified in Washington, and of senior government officials who visited MIT in the July 2011 through June 2012 period.

Representing MIT in Advocacy Coalitions and Working Groups

The Washington Office is constantly engaged in the activities of major Washington-based organizations and coalitions, particularly the higher education organizations that work to support federal investment in university research and education. The office also provides leadership on key committees of the AAU, APLU, the Science Coalition, and United for Medical Research.

The groups listed below provide support for a common R&D, education, and science agenda that is supported by MIT and that requires ongoing participation by the Washington Office on behalf of MIT's interests.

- Association of American Universities and its Council on Federal Relations
- Association of Public and Land-Grant Universities, and its Council on Government Affairs
- Coalition for Plasma Science
- Fusion Energy Sciences Day
- New England Council
- Research! America
- The Ad Hoc Group for Medical Research
- The Ad Hoc Tax Group
- The American Council on Education
- The Council on Competitiveness
- The Council on Government Relations
- The Council of Graduate Schools
- The Coalition for National Science Funding
- The Coalition for National Security Research
- The Energy Sciences Coalition
- The National Association of Independent Colleges and Universities
- The National Association of State Universities and Land-Grant Colleges, and its Council on Governmental Affairs
- The Personalized Medicine Coalition
- The Science Coalition
- The Science, Engineering and Technology Working Group
- Space Grant Day

- The STEM Education Coalition
- Task Force on American Innovation (the industry-university-science association working group on science R&D funding)
- United for Medical Research

APPENDIX

Faculty/Administrator Meetings in Washington, DC

MIT Faculty/Staff	Date	Topic	Meeting
Robert Redwine	7/11/11	Federal support for nuclear physics	Senate Energy and Natural Resources Committee, Senate Commerce Committee, Senate Appropriations Committee, House Science, Space and Technology Committee
Martin Schmidt	7/27/11	AMP technical committee working session	Industry, White House, and OSTP staff and federal R&D agencies
Catherine Tucker	9/15/11	Internet Privacy: The Impact and Burden of European Union Regulation	House Energy and Commerce Committee, Subcommittee on Commerce, Manufacturing and Trade
Susan Hockfield	10/5/11	Policy areas of mutual interest to research universities and the business community; advancing innovation/spur collaboration	Business Roundtable and Harvard's Drew Gilpin Faust with a small group of university leaders and leading industry CEO's
Claude Canizares	10/11/11–12/11/11	DOE fusion R&D program Obama Administration's RFI on "Building a 21st-century Bioeconomy" Regulatory science research related to FDA and drug and device evaluation	William Brinkman, director, DOE's Office of Science Michael Stebbins, OSTP assistant director Mary Maxon, OSTP assistant director David Wheadon and Sasha Haverfield, vice presidents at Pharma
Tonio Buonassisi (and Doug Powell)	10/14/11	Upcoming solar technology challenges and related industry production issues	House Natural Resources Committee; Senate Energy Committee; energy experts at the Center for Strategic and International Studies, the National Resources Defense Council,; and the Information Technology and Innovation Foundation
Ten graduate students from MIT's Science Policy Initiative	10/25/11–27/11/11	Science policy visits to R&D agencies to review programs and organization as well as career options	Departments of Energy, State, and Agriculture; the NSF, OMB, OSTP, and NAS

Faculty/Administrator Meetings in Washington, DC (continued)

MIT Faculty/Staff	Date	Topic	Meeting
Claude Canizares	11/3/11	Briefings and discussions of MIT's Skolkovo collaboration	Dr. William Colglazier, S&T advisor to the secretary of state); Andrew Reynolds, senior science advisor; Raymond Arnaudo, senior scientist, and Eric Bone, senior scientist and policy advisor John Phillips, legislative director for Senator Kerry Ann Zulcovsky, majority professional staff member, Senate Commerce Committee Bob Simon (staff director) and Sam Fowler (chief counsel), Senate Committee on Energy and Natural Resources Ed Feddeman, majority professional staff, House Science Committee, Space Subcommittee
Gerbrand Ceder	11/7/11	Large-Scale Computational Materials Design: The Materials Genome Program at MIT	NSF program leaders and NSF director Subra Suresh
Tonio Buonassissi	11/17/11	Future of the photovoltaic sector and role of innovation in driving down costs; panel on "Clean Energy: Crises, Cost Curves, and Capabilities"	ITIF Energy Innovation Conference
Claude Canizares	1/18/12	FDA research issues NCET2—Summit focusing on promoting innovation, entrepreneurship, startup generation, and job creation	Janet Woodcock, director, Center for Drug Evaluation and Research at FDA; Vicki Seyfert-Margolis, senior advisor on science innovation and policy for FDA commissioner's office AAU and APLU university leaders and investors
Elizabeth Reynolds	2/22/12	Manufacturing policy	Forum at Brookings Institute
Anthony Sharon	2/23/12	Briefings on the proposed major modernization and upgrade to Lincoln Laboratories for microelectronic integration and rapid prototyping	Senior staff from the Massachusetts congressional delegation and from the House and Senate Armed Services committees
Susan Hockfield	2/29/12	Third Annual ARPA–E Summit	Arun Majumdar, director of ARPA–E and national leaders, including Bill Gates of Microsoft, Fred Smith of FedEx, former President Clinton, Ursula Burns of Xerox, and Lee Scott of Walmart

Faculty/Administrator Meetings in Washington, DC (continued)

MIT Faculty/Staff	Date	Topic	Meeting
Miklos Porkolab, Earl Marmar and Zach Hartwig	3/1/12	"Fusion Day" discussion of impact of FY2013 budget	Representative Olver (House Appropriations Committee); Representative Markey (House Energy Committee); staff from the offices of Senator Brown and Senator Kerry; staff from the offices of Representative Lynch and Representative Capuano; and staff of the House Science Committee and Senate Appropriations Committee Energy Subcommittee. As part of a group of fusion program leaders, they also met with Representative Freylinghuysen (chair of the House Energy Appropriations Subcommittee) and representative Rush Holt
Raji Patel	2/29/12	Space grant/FY2013 funding	Nick Christiansen (Senator Brown) Christina Tsafoulias (Representative Capuano) Anne Nelson (Representative Olver)
Susan Hockfield	3/7/12	AMP Steering Committee meeting to review proposals to spur advanced manufacturing	Co-chaired meeting with Dow Chemical CEO Andrew Liveris. Also attending: MIT associate provost Martin Schmidt; CEOs from Proctor & Gamble, Northrup Grumman, and Caterpillar; university presidents from Carnegie Mellon and Michigan; senior officials from three other leading research universities. John Holdren, John Bryson, Gene Sperling, and Karen Mills attended from the Obama Administration, as did and senior officials from NSF, DOD, DOE, NIST, and OSTP
Susan Hockfield	3/22/12	Advanced manufacturing R&D initiatives Future of fusion funding in FY2013 and the ITER international program	Senior officials from DARPA, NSF, and DOE's EERE Representative Ed Markey
MIT graduate students	3/27/12	"Stand With Science" petition to protect science funding in the face of sequestration threats	Staff and members from the offices of Representatives Michael Capuano, Chaka Fattah, and John Lewis, and Senators Scott Brown, Lamar Alexander, and Jerry Moran
Ron Prinn and John Reilly, Jake Jacoby, Denny Ellerman, and Ken Strzepek	3/28/12–3/30/12	Annual forum on the "2012 Energy & Climate Outlook"	Katherine Sullivan, deputy director of NOAA, gave the keynote address

Faculty/Administrator Meetings in Washington, DC (continued)

MIT Faculty/Staff	Date	Topic	Meeting
MIT graduate student group of 25 (SPI)	4/25/12	Annual Congressional Visits Day to advocate for adequate funding for science and R&D agencies	48 congressional offices; Senators Whitehouse (D-RI) and Begich (D-AK); several House members, including Representative Ed Markey
Claude Canizres, Miklos Porkolab, and Earl Marmar	5/17/12	Key role of Alcator C-Mod in ongoing fusion science advances	Senior OMB staff William Brinkman, director of the Office of Science at DOE
Suzanne Berger, Peter Diamond, and David Autor	5/18/12	Presidential briefing on jobs, employment, and manufacturing issues	President Obama
Gerbrand Ceder and Krystyn Van Vliet	5/14/12–5/15/12	Launch of workshop on the materials genome initiative	White House
Maria Zuber	6/1/12	MoonKAM program	Event with Sally Ride (via Skype); John Holdren; NASA deputy administrator Lori Garver; and astronaut and former football player Mervin Kelly
14 MIT Fusion graduate science students	6/14/12	Express concern over threatened funding cuts for fusion sciences	Met with 26 Senate and House offices, including Senators McCaskill, Blount, Hutchinson, Whitehouse, and Cornyn
Philip Sharp	6/22/12	Lecture on "The Third Revolution: Convergence of the Physical, Engineering & Life Sciences"	10th anniversary celebration for the National Institute of Biomedical Imaging and Bioengineering
Claude Canizares	6/27/12	Indirect costs & NIH Potential opportunities for industry and academic engagement on issues related to "big data," drug development, and health care delivery ITAR issues regarding foreign students conducting research at American universities	AAU PhRMA officials David Wheadon, Sascha Haverfield, Salvatore Alesci, and Patricia Brady IEEE panel at a Senate briefing

Federal/Executive Branch Officials—Visits to MIT

Government Official	Date	Topic	Meeting
Ron Bloom (recently stepped down as senior counselor to the president for manufacturing)	9/15/11	Rebuilding the American economy— advanced manufacturing	First of MIT Political Science Department's Distinguished Speaker Series; sponsored by MIT's Production in the Innovation Economy study.

Federal/Executive Branch Officials—Visits to MIT (continued)

Government Official	Date	Topic	Meeting
Lisa Porter (IARPA director) and six of IARPA's directors and program managers	10/20/11	Discussion of IARPA R&D needs and plans	John Joannopoulos and faculty group from the Institute for Soldier Nanotechnologies, Yoel Fink, Jesus del Alamo, Anant Agarwal, and Claude Canizares
Under secretary Patrick Gallagher (NIST), Marc Stanley (NIST), David Danielson (DOE ARPA–E), and Henry Kelly (DOE EERE)	11/28/11	AMP Regional Manufacturing Workshop and following meetings on advanced manufacturing R&D	Sanjay Sarma, Gerbrand Ceder, Stacy Springs, J. Christopher Love, Anthony Sinskey, Kripa Varanasi, Olivier de Weck, Elizabeth Reynolds, Philip Sharp, Claude Canizares, Martin Schmidt
Participating in workshop but not following meetings: DARPA deputy director Ken Gabriel			
Regina Dugan and Ken Gabriel	11/29/11	DARPA efforts on advanced manufacturing	Talk and discussion in the MIT Political Science Distinguished Speaker series, co-sponsored by MIT PIE, on advanced manufacturing
Senator Bingaman; Bob Simon, staff director of the Senate Committee on Energy and Natural Resources; two members of his staff	1/18/12	Innovative energy-related research under way on campus	Visited the laboratories of Gang Chen, Angela Belcher, and Tonio Buonassissi
Gina McCarthy, assistant administrator for the Office of Air and Radiation at the Environmental Protection Agency	1/27/12	Energy and the environment	Roundtable discussion with MIT's Joint Program on the Science and Policy of Global Change; moderated by John Reilly
Representative Jay Inslee, Representative Michael Capuano, and Massachusetts governor Deval Patrick	3/9/12	Tour of Alcator C-Mod and discussions about Obama Administration plans to cut US fusion programs	Miklos Porkolab, Earl Marmar, and other Plasma Science and Fusion Center researchers
Senator John Kerry	3/19/12	Plasma Science Fusion Center and Alcator C-Mod	Miklos Porkolab, Earl Marmar, Martin Greenwald, Alice White, Dennis White, and Ron Parker
Secretary of Commerce John Bryson	5/9/12	Future of manufacturing	Leaders for Global Operations annual conference; meeting with MIT president Hockfield

Federal/Executive Branch Officials—Visits to MIT (continued)

Government Official	Date	Topic	Meeting
FDA commissioner Margaret "Peggy" Hamburg	6/26/12	Implications for FDA of the convergence approach to medical research being pioneered at MIT Possible application of MIT's work on "big data" FDA needs in nurturing personalized medicine and speeding drug development	Philip Sharp Daniela Rus Gigi Hirsh

Faculty Testimony in Washington, DC

MIT Faculty/Staff			Committee
Ernest Moniz	7/14/11	Small modular nuclear reactors	Senate Appropriations Committee Energy and Water Subcommittee
Ernest Moniz	7/19/11	The future of natural gas	Senate Committee on Energy and Natural Resources
Maria Zuber	9/22/11	NASA Human Spaceflight Past, Present, and Future: Where Do We Go From Here?	House Committee on Science, Space and Technology
Ernest Moniz	11/15/11	Support of QTR/QER as framework to provide staying power to guide development of a national energy policy	Senate Energy and Natural Resources Full Committee on the DOE QER
Taylor Fravel	3/28/12	Investigating the China Threat—Military and Economic Aggression	House Foreign Affairs Committee