

MIT Portugal

The [MIT Portugal Program \(MPP\)](#) is a strategic international partnership between Portuguese universities and research institutions, MIT, and the Portuguese government. The program has built interactions and collaborations with a collection of industrial partners that contribute in multiple ways. Program funding is provided by the Fundação para a Ciência e Tecnologia (the Portuguese Science and Technology Foundation [FCT]) and by a number of industrial partners. Launched by the Portuguese government in 2006, renewed in 2013, and ending in 2019, MPP's goal is to strengthen Portugal's knowledge base and international competitiveness through strategic investments in research, education, innovative ideas, and entrepreneurial training and activities.

The MIT Portugal Partnership 2030 (MPP2030) is a new strategic partnership between MIT and the Portuguese government, funded by FCT. Launched in June 2018 and expected to continue until 2030, its goal is to strengthen Portugal's knowledge base and international competitiveness through strategic investments in research, people, and ideas in areas of global relevance and with significant societal impact. Within the scope of the new partnership, MPP2030 focuses on fostering research between MIT and Portuguese universities, research institutes, laboratories, companies, and other entities in four areas: climate science and climate change; Earth systems: oceans to near space; digital transformation in manufacturing; and sustainable cities.

MPP2030 was launched in June 2018. This report offers a summary of MPP activities, plus a brief introduction to MPP2030 and descriptions of selected MPP2030 activities and events.

Summary: MIT Portugal Program

MIT's Institute for Data, Systems, and Society hosts MPP, which is led at MIT by Professor Bruce Tidor, program director, and Professor Douglas Hart, co-director. As of June 2018, the program had enrolled more than 1,100 graduate students in Portugal, enabled the funding of more than 70 research projects, facilitated more than 2,000 research publications and conference contributions, supported more than 200 visiting MPP students and more than 50 visiting scholars at MIT, and involved 270 faculty in Portugal as well as 80 faculty and 30 researchers and staff at MIT. Participating MIT faculty and research and teaching staff come from departments in all five schools at MIT. Broad institutional support and expertise have played a significant role in the success of the program.

MPP has made substantial contributions to increasing the visibility of MIT's international engagements. It has been widely recognized as a model for new types of international alliances, involving universities, industry, and governmental agencies, that focus on knowledge creation, innovation, and entrepreneurship to increase international competitiveness. Studies conducted under the auspices of MPP at MIT have focused on comparing international partnership architectures and on developing and applying methodologies for measuring MPP's impact. The resulting publications have boosted MIT's visibility in the field of designing, implementing, and measuring the impact of international multi-stakeholder alliances that link academia, industry, and government agencies.

During its first phase (2006–2013), MPP launched its internationalization of Portuguese universities in four interdisciplinary areas: bioengineering systems, engineering design and advanced manufacturing, sustainable energy systems, and transportation systems. This phase enabled Portuguese universities to overcome long-standing patterns of isolation and competition by encouraging inter-university cooperation through joint partnerships with MIT, facilitating a build-up of critical mass in research in priority areas. The first phase accomplished the successful development of innovative curricula in the four focus areas across the Portuguese partner universities. That development involved adapting best practices from MIT with input from Portuguese universities and stakeholders (adaptation is key in moving models that thrive in one environment to a new culture and context). The new doctoral and master’s programs were offered to Portuguese and international students with the goal of training future technology innovation leaders. Further, MPP strengthened innovation and entrepreneurship at Portuguese universities through a variety of efforts and activities—from venture competitions to entrepreneurial education—and contributed to significant higher education reforms in Portugal.

In its second phase (originally 2013–2017, extended to June 2019 at MIT), with a greatly reduced budget because of the 2008 global economic downturn, MPP concentrated on solidifying and extending the gains of the first phase. These efforts included the support of a higher education ecosystem directly connected to technology development and innovation; the promotion of a thriving relationship among graduate students, faculty, and industry experts through collaborative projects; and further development of transdisciplinary innovation and entrepreneurship activities. An additional goal includes completing the transfer of the educational programs to increase their sustainability and make them independent of further MIT input.

MPP has been successful in making teaching activities within the program self-sufficient. MIT’s participation is now in the form of supplying guest lecturers and presenters of supplementary material rather than the main teaching staff. MIT focuses its educational input on hosting and co-supervising graduate students at MIT, providing students with a rich experience in the MIT ecosystem. In addition, MPP has advanced the internationalization of Portuguese universities, resulting in an increasing number of international MPP students and graduates.

- To date, more than 4,300 student applications have been received for MPP’s PhD and master’s degree programs.
- The average acceptance rate is 24% for the doctoral program and 35% for the master’s degree program.
- International applicants average 51% of applicants.
- More than 1,100 doctoral and master’s degree students were enrolled cumulatively at Portuguese partner universities since 2006. More than 490 students have graduated since the start of MPP.
- More than 250 MPP students and scholars have visited MIT since 2006, benefiting from the exposure to new methodological approaches, cutting-edge research, and entrepreneurial ideas.

Average annual numbers of PhD candidate applications and PhD graduates were greater in the second than in the first program phase. As the number of successful graduates has grown, MPP has started to build an alumni network, which represents an important asset for facilitating the long-term societal and economic impact of MPP. Alumni have been involved in MPP through several social media platforms that have facilitated active alumni engagement. More, the existence of an alumni network with updated contact information has enhanced the reliability and impact of the post-graduation surveys.

The second phase has also seen further improvement of the innovation ecosystem, with enhanced development and fostering of integrated test-bed research activities in joint university–industry partnerships. Test-bed projects are designed as partnerships that include universities, public institutions, Portuguese and international industry, and other private organizations. These highly collaborative and integrated research projects are strongly supported by funding from FCT and contributions from private sector test-bed collaborators for a duration of up to three years. The objective is to develop innovative technologies leading to new products and services, with the potential to advance Portugal’s international competitiveness and innovative capacity. Testbeds have been highly successful in attracting significant support from private and public institutions outside MPP, exceeding 30% of total project funding. The large-scale test-bed projects are being complemented by exploratory and seed projects, fostered by MPP and FCT through smaller grants that were implemented first at MIT and later in Portugal in 2017. The second program phase has funded 36 seed projects at MIT and 20 exploratory projects in Portugal. The recent calls for seed and exploratory project proposals were aimed at attracting projects that explore potential directions for a possible new version of the partnership beyond the second phase, contributing to the design and development of the new MIT Portugal Partnership 2030 (MPP2030). Since 2006, MPP has supported more than 70 research projects, including seed and exploratory projects, test-bed activities, and other research efforts, contributing to the generation of more than 2,000 scientific papers, books, book chapters, and contributions to international conferences.

MPP engages with industry through a variety of mechanisms—for example, through the Industrial Advisory Committee, which is made up of corporate partners from MPP’s research projects and other leaders in the Portuguese industrial ecosystem. International industry roundtables (IIRs) connect MPP faculty, researchers, and students with Portuguese and international industry to foster the development of strong relationships and networks in the context of exploring new technologies and models for deploying them. Since the beginning of 2016, six new IIRs were organized, covering thematic areas including transportation, health, and biotechnology. Two new MPP innovation and entrepreneurship invited faculty members, Professor Nuno Arantes-Oliveira and Professor João Bigotte, originated the recent IIR efforts and have been their sustaining force. They have also enhanced MPP’s educational innovation and entrepreneurship activities by establishing and implementing novel educational modules that advance cross-focus-area integration and links between graduate research and innovation.

The program continued to inspire and foster entrepreneurial activities in Portugal by engaging the broader Portuguese start-up ecosystem. Over the years, MPP has facilitated the formation of more than 80 start-ups in Portugal through different channels, a testimony of the strong commitment of the program to innovation and entrepreneurship in Portugal. MPP’s entrepreneurial engagement and support included

the Building Global Innovators program, educational programs and workshops (e.g., the International Workshop on Innovating at MIT), and direct interactions with companies and innovation hubs. Testbeds, IIRs, innovation and entrepreneurship education, and the Industrial Advisory Committee are among the many measures implemented by MPP. The program's goal in these efforts has been to achieve visible impact and significant cultural change in Portugal by forming a wider community—an ecosystem that stimulates and facilitates the exchange of knowledge and ideas, innovation, and the entrepreneurial mindset. MPP has supported collaboration among Portuguese universities, research institutions, MIT, MPP alumni, researchers, industry, innovators, and entrepreneurs. MIT faculty and researchers have continued to make critical contributions to strengthening the MPP ecosystem, including research projects, innovation and entrepreneurship activities, and strategic initiatives, with more than 30 visits of 15 faculty, researchers, and staff from MIT to Portugal since 2016.

Over the years, MPP has become a widely known success. It is also a role model for multi-stakeholder alliances, involving universities, industry, governmental agencies, and international partners. The goal is to increase international competitiveness by fostering skill and knowledge creation and, by exchange, lead to greater innovation, entrepreneurship, and societal impact. The program, which was originally scheduled to end in December 2017, was granted an 18-month extension at MIT (to the end of June 2019) and a comparable extension in Portugal. The extension allowed MPP to support existing research projects for their full terms, host additional visiting students, and discuss and agree on plans for a continued partnership beyond the second phase.

Summary: MIT Portugal Partnership 2030

MPP2030, led at MIT by Professor Dava Newman, the Apollo Program Professor of Astronautics and a Harvard-MIT Health, Sciences and Technology faculty member, is a novel partnership that was launched in June 2018 and is expected to continue until the end of 2030. The new partnership will primarily focus on large-scale flagship research projects and small-scale seed projects in areas that are essential and timely for MIT. These areas are data-science-driven climate science and climate change; Earth systems: oceans to near space; digital design and manufacturing; and sustainable cities. MPP2030 will also arrange the exchange of researchers (faculty and students) involved in collaborative projects funded by MPP2030. In addition, MPP2030 facilitates and continues the success in innovation, entrepreneurship, and leadership best practices that have become a hallmark of the MIT Portugal Partnership. MPP2030 was launched in early June during the MIT visit of Portuguese Prime Minister António Costa and Minister of Science, Technology, and Higher Education Manuel Heitor. This was followed by a research interchange meeting involving MIT and Portuguese faculty to set the strategic direction for this new major international partnership.

Highlights

Education

MPP offers transdisciplinary education curricula in seven graduate education programs (four doctoral programs and three master's degree programs) across four areas: bioengineering systems, engineering design and advanced manufacturing, sustainable energy systems, and transportation systems.

As of June 2018, more than 4,300 student applications had been received, including more than 3,500 applications for MPP's doctoral program and more than 700 for its master's degree programs. The representation of international applicants is 51%. The average acceptance rate is 24% for the doctoral program and 35% for the master's programs. More than 1,100 PhD and master's degree students have been enrolled cumulatively at Portuguese partner universities since 2006, and more than 490 students have graduated since the start of MPP.

Since 2017, more than 20 MPP students and scholars have been hosted at MIT. Visiting MPP students conducted part of their thesis research with support from their MIT thesis co-advisor. There have been more than 200 student visits since 2006. MIT faculty has also hosted visiting MPP scholars to further strengthen existing collaboration and strong ties among MPP faculty, fostering continued exchange and collaboration in research, education, innovation, and entrepreneurship. There have been more than 50 scholar visits since 2006. MPP has also successfully engaged the growing MPP alumni community and conducted surveys among MPP doctoral and master's degree graduates that provided valuable information about their professional development and experiences.

Research

Research has been one of the cornerstones of MPP. From the start, the program has promoted research projects in MPP's focus areas with the goal of fostering collaborations between Portuguese universities, MIT, and industry, while complementing and strengthening educational programs and stimulating innovation and entrepreneurship. Since MPP's first phase, more than 70 research projects, selected through calls for proposals, have been funded in the program's focus areas, including test-bed activities and seed projects.

The research activities in the second phase of MPP fall into two categories: testbeds and seed and exploratory projects. Testbeds are designed to integrate research topics across focus areas in a holistic fashion with a view toward piloting and scalability for maximum impact. They involve multidisciplinary teams from Portuguese universities, MIT, industry, or other public or private bodies (e.g., hospitals and municipalities). These projects have the objective of developing innovative products and services with high export potential as a way of demonstrating internationally Portugal's competitiveness and innovative capacity, and ultimately of contributing to the growth of the Portuguese economy. To ensure that test-bed project teams have a critical mass in terms of team size, duration, and budget, total funding of about €1,000,000 was made available to each test-bed project team at Portuguese universities for a project duration of up to three years. The activities of participating MIT research teams were covered independently through designated funds. Non-academic institutions that are involved in test-bed activities do not receive funding.

Testbed Projects

- Sustainable Cities (led by John Fernandez and Christoph Reinhart)
- Stem Cell Engineering and Regenerative Medicine (led by Jeffrey Karp and Robert Langer)
- Introduction of Advanced Materials Technologies (led by Brian Wardle)

Seed and exploratory projects are designed to foster novel, high-potential research ideas with small grants of up to €100,000 for the entire funding period (typically one year). These projects were first introduced at MIT. A similar mechanism was subsequently implemented in Portugal, leading to a call for exploratory research project proposals in 2017 that resulted in 20 projects funded by FCT. Since 2013, 36 seed projects have been funded at MIT through four calls for proposals; the 2017 and 2018 calls resulted in nine and 16 seed projects, respectively.

MIT Seed Projects 2017

- Characterizing Air Pollution Influences in the Azores (led by Colette Heald)
- Mapping Portugal's Ocean Resources with Multiple Autonomous Vehicles (led by John Leonard)
- Computation of Multiphase Flows of Particle Laden Complex Fluids (led by Gareth McKinley)
- Research Collaboration on International Space Station's Synchronized Position Hold, Engage, and Reorient Experimental Satellite Facility (led by David W. Miller)
- An Earth Operating Platform (led by Dava Newman)
- Harmonizing Global Approaches to Data and Modeling of Materials and Energy Flows with a Focus on the Portuguese Economy (led by Elsa Olivetti)
- Algorithms to Enable a More Sustainable, Efficient, Reliable, and Robust Allocation and Use of Urban Road Space (led by Carolina Osorio)
- Self-assembly, Rheology, and Macroscopic Flow of Colloidal Fibers (led by James Swan)
- Evaluating the Value of Storage in the Portuguese Electricity Market (led by Jessika Trancik)

MIT Seed Projects 2018

- Rapid, Interactive Robotic Additive Manufacturing of Advanced Materials (led by John A. Hart and Stefanie Mueller)
- Air Pollution Monitoring in the Azores: An Analysis of Past Measurements (led by Colette Heald)
- AUTOSES: Design of Autonomy-enabled Transportation Systems with Safety Guarantees: Efficiency and Sustainability Tradeoffs (led by Sertac Karaman)
- Robust Mapping of Ocean Resources Using Lower-cost Autonomous Underwater Vehicles (led by John Leonard)
- Engineering Design for Future Space Missions through ISS Facility (led by David Miller)
- Creating a Cognitive Earth Platform: From Oceans to Air to Space (led by Dava Newman and Douglas Hart)
- Data Mining for Urban Mining: Toward Improved Use of Industrial Byproducts (led by Elsa Olivetti)

- From Big Data to Smooth Mobility: Exploiting High-Resolution Urban Mobility Data to Design the Next Generation of Urban Mobility Decision Making Tools (led by Carolina Osorio)
- Evaluating the Costs and Value of Renewable Energy Combined with Demand-Side Management, Transmission Expansion, and Energy Storage (led by Jessika Trancik)
- Shaping Tomorrow's Great Innovators (led by Douglas Hart)
- Advanced Manufacturing Applications of Shear-Thickening Colloidal Suspensions (led by Gareth McKinley)
- Self-Assembly of Magnetoplasmonic Nanostructures (led by Caroline Ross)
- "Structuration" in Confined Flows of Colloids (led by James Swan)
- Engineering Biosensors for Human Cell Type and State Diagnosis Using Synthetic Digital Computation (led by Tim Lu)
- Directed Evolution of Protein Materials for 3D Bioprinter Inks (led by Bradley Olsen)
- Rational and Evolutionary Design of Transcription Factors as Biosensors (led by Kristala Prather)

In addition to test-bed and seed projects, a number of MIT faculty and researchers greatly supported MPP in research and other programmatic and functional areas. This was especially true of, for example, Robert Armstrong, Stan Finkelstein, and Chris Zegras.

Innovation and Entrepreneurship

The two so-called innovation professors, Nuno Arantes-Oliveira and João Bigotte, who were recruited in Portugal by the program in 2015, have succeeded in further strengthening MPP's innovation and entrepreneurship activities and ensuring the program's sustainability. Both professors have been central in the establishment and implementation of novel educational modules that advance the cross-focus-area integration of the innovation and entrepreneurship curricula. Their efforts resulted in a 40% increase in student participation in the week-long intensive course on innovation and entrepreneurship in 2017, compared with 2016. MPP has also intensified its engagement of Portuguese and international industry through area-specific IIRs. These are designed to connect MPP faculty, researchers, and students with leaders from industry and public organizations, including policymakers, with the goal of fostering exchange and the development of strong relationships and networks. IIRs aim to offer a platform and convening space for facilitating open discussions of cutting-edge science and technology trends in a particular field of research while also considering the relevance for sustainable economic and social development. The objective is to provide an environment that enables participants to bridge views and find common objectives between industry and academia, as well as within industry and academia.

Multiple IIRs have been organized, covering thematic areas including transportation, health, and biotechnology. Overall, nearly 300 participants from academia and industry have attended MPP's IIRs. Researchers and students expanded their networks by interacting with representatives from industry and from start-ups, with venture capitalists, and with business angels (who reciprocally expanded their networks). In

an effort to advance entrepreneurial activities in Portugal, MPP continued to engage Portuguese start-up companies through multiple channels, including the Building Global Innovators program, educational programs and workshops, and direct interactions with companies and innovation hubs. The program also continued to offer access to the International Workshop on Innovating at MIT in 2018. That workshop exposed MPP participants and representatives of Portuguese start-ups to hands-on seminars and exercises to advance their entrepreneurial mindset and enable them to further their ventures, projects, and ideas. More, MPP has continued and supported the engagement of Portuguese universities with industry through research collaborations and other activities, for example, the Industrial Advisory Committee.

Science and Technology Initiatives Portugal Program

The MIT International Science and Technology Initiatives Program (MISTI) officially established its Portugal program in August 2014. The first eight MIT students went to Portuguese companies, research institutes, and universities during the summer of 2015. MPP kick-started the MISTI Portugal Program with initial funding. Expenses for the visiting student interns were fully or partially covered by Portuguese companies. MISTI and MPP covered the cost for students who visited universities and research institutes. In the future, MISTI is considering a collaboration with the International Research Opportunities Program that might provide funds to undergraduate students who intern at research institutes or university laboratories in Portugal. Alicia Goldstein-Raun, MISTI's Spain and Portugal managing director, coordinated the application and placement process and relationships with hosts. Priority was given to MPP-associated companies and institutes. Since 2017, nine additional MIT students—bringing the total number of students since 2015 to 24—have traveled to Portugal to work at companies, research centers, and universities.

Selected Events

MPP has actively promoted and participated in outreach and high-level network events as a strategy to engage society with science, technology, and innovation. Throughout 2017 and the first half of 2018, MPP organized and participated in workshops, conferences, science fairs, career days, and high-visibility events directed at entrepreneurs, prospective students, industry, government, and other stakeholders. MPP's outreach activities were complemented by a strategy to raise public awareness of MPP and its impact on society. Internal communication efforts and those involving the media emphasized the development of novel scientific insights, the translation of science and research into new technologies, mechanisms for interacting and collaborating with industry, and the program's alumni network. Selected MPP and MPP2030 events are highlighted below, in reverse chronological order.

MIT Portugal Research Interchange Meeting at MIT, June 2018

Following the MIT visit of Prime Minister António Costa, faculty from MIT and Portugal who have been involved in MIT Portugal presented research conducted within the scope of MPP. They also discussed the research focus and goals of MPP2030. The meeting was chaired by Professor Dava Newman, who leads MPP2030 at MIT, and Professor Pedro Arezes, who heads MPP2030 in Portugal.

International Workshop on Innovating at MIT, June 2018

In June 2018, MIT's 2018 International Workshop on Innovating attracted more than 30 entrepreneurs from Portuguese and other European universities. The workshop is a residential, hands-on program, supported by MPP and co-organized by MIT and MPP faculty members. It is focused on exposing participants to critical elements that lead to an understanding of innovation and the mastering of entrepreneurial challenges that are central for translating innovation into solutions for real-world problems and demands. The workshop is primarily designed for aspiring entrepreneurs who are planning to start entrepreneurial activities in the near future and entrepreneurs who have started or are in the process of starting their business. Instructors and participants from 10 different nations, representing novel entrepreneurial ideas as well as emerging companies and start-ups, jointly transformed the classroom into a space of collaborative exchange and translational innovation. They combined entrepreneurial theory and practice through interactive seminars, hands-on exercises, and guest lectures by entrepreneurs and visionaries who have successfully brought ideas to market. More than 20 participants were from Portugal and MPP, including current MPP students and alumni. Thiago Sobral Marques da Silva, an MPP PhD student in transportations systems, was one of the participants. He commented that "[The workshop] was a great opportunity for me to learn and practice tools for developing and pitching my business idea. It was highly valuable to have a team of instructors and speakers who have actual hands-on experience in translating research and ideas into innovation and start-ups. I found the workshop to be of great value for those who wish to start a company as well as for those who plan to stay in academia and foster partnerships with companies." The International Workshop on Innovating is one of the many annual activities supported by MPP to strengthen Portugal's innovation ecosystem and jump-start new entrepreneurial initiatives. Over the years, MPP has been inspiring, stimulating, and facilitating the formation of more than 80 start-ups in Portugal through different channels, a testimony of the strong commitment of the program to innovation and entrepreneurship in Portugal.

Prime Minister António Costa of Portugal Visit to MIT, June 2018

Prime Minister António Costa of Portugal heralded the importance of science and innovation in a visit to the Institute in June, just days after his country formally renewed the MPP agreement. "The future arrives quicker than expected," said Costa, in remarks to a filled lecture hall in MIT's Stata Center, adding, "There is no better way to prepare our modern society and economy for the unexpected path of innovation and technological development than to invest in the education of younger generations." Costa's visit came about 10 days after the official launch of MPP2030, a joint endeavor to push forward scientific research and innovation while creating collaborations between industry and academia. MIT Provost Martin A. Schmidt, speaking just before Costa, said Institute leaders were "pleased and thrilled" to have seen "MIT Portugal develop across a range of programs and projects in research, education, and innovation." Costa also had a one-on-one meeting with MIT President L. Rafael Reif, who told the Portuguese leader that it was a "tremendous honor" to meet him. "There is much to admire about your country," he said. "MIT Portugal has had a huge impact on our scientific system and universities," Costa continued. Professor Dava Newman praised Portugal in her speech for having "the vision to invest in their science and engineering workforce."

Costa was accompanied by a delegation of Portuguese officials, including Manuel Heitor, the Portuguese minister for science, technology, and higher education. “MIT Portugal is about the future,” said Heitor, an engineering professor by trade who has written extensively about science and technology policy and who also spoke at the event. Heitor added, “We want to address new challenges.” The Portuguese leaders also toured workspaces at MIT, including an extended stop at the Robot Locomotion Group led by Russ Tedrake, the Toyota Professor of Electrical Engineering and Computer Science, Aeronautics and Astronautics, and Mechanical Engineering at MIT. Costa and Heitor also talked to a group of about a dozen Portuguese graduate students currently at the Institute as part of the MIT Portugal Program. The students discussed their fields of study, which included clean energy, civil engineering, management, and medical research. “These people are leaders—who represent our own ambition,” said Heitor, referring to the students. At one point, Costa also asked the students, “What can we do to improve the program?” In response, Luiz Lisboa de Silva Cardoso, a graduate student in mechanical engineering, quipped, “Keep going.” Costa affirmed his desire to do so in his talk, concluding, “We are proud to have MIT as our partner because, we believe, with MIT, the sky is not the limit.”

NewSpace Atlantic Summit, Lisbon, Portugal, May 2018

The first NewSpace Atlantic Summit was hosted and organized by the FCT in collaboration with Ciência Viva—the Portuguese National Agency for Scientific and Technological Culture—and the Space Frontier Foundation. The event was aimed at promoting the development and application of space technologies, with a particular focus on the Atlantic region. The summit took place against the backdrop of the latest Portuguese national strategy for space, Portugal Space 2030. Topics included infrastructures for space and Earth observation, the implementation of the Atlantic International Research Centre, a new generation of launch facilities, Earth observation applications, and small satellites. Professor Newman was one of the keynote speakers and panelists of the opening session “Portugal Space 2030 and the Atlantic,” which focused on space as an enabler of an Atlantic research, innovation, and growth strategy for Portugal.

Minister Heitor at MIT, February 2018

Minister Manuel Heitor visited MIT not only in June 2018 but also on February 27, with the goal of defining the final terms of the new agreement between the Portuguese government and MIT. This new agreement will extend the MIT Portugal Program until 2030. During this visit, Professor Heitor was received by Professor Maria Zuber, MIT’s vice president for research, and Professor Richard Lester, associate provost for international activities. The visit also included a meeting with principal investigators of MPP research projects and a lunch meeting with visiting MPP students.

Seminars for Visiting MPP Students at MIT, December 2017

Since the first phase of MPP, the program has hosted more than 200 MPP student visits at MIT. Visiting students conduct part of their doctoral thesis research at MIT in the research groups of their MIT thesis co-advisors, leading to scientific breakthroughs and co-publication of scientific papers. Students stay at MIT for from four to 12 months to benefit from immersion in the MIT ecosystem. Visits are described as extremely positive and highly influential, with students achieving strong gains in new methodological approaches, scientific knowledge in areas of interest, and entrepreneurial ideas. In

addition to the countless events and seminars available to MPP students at MIT, the MIT MPP office has been offering MPP-specific group events and seminars to stimulate the exchange of experiences and ideas among MPP students and faculty members and to expose students to relevant research, innovation, and entrepreneurship in areas of interest. Recent events included an MPP student group meeting in September 2017, with students presenting and discussing their research with fellow students and MPP faculty. In October 2017, Professor Douglas Hart offered a seminar on The Entrepreneurial Journey.

Portuguese Delegation Led by Minister Heitor Visits MIT, October 2017

On October 17 and 18, a Portuguese delegation led by Minister Manuel Heitor visited MIT, to discuss and plan the development of a new partnership between Portugal and MIT. The delegation included the president of the FCT, Paulo Ferrão, and António Cunha, who represented the Conselho de Reitores das Universidades Portuguesas (Council of Rectors of Portuguese Universities). This visit was part of a series of discussions between Portuguese stakeholders and US universities that have been involved in Portugal's international science and education partnerships (MIT, Carnegie Mellon University, and the University of Texas at Austin). The goal of these discussions was to define a new and more ambitious framework for these international partnerships.

MIT Portugal at the Ciência 2017 Conference, Lisbon, Portugal, July 2017

Ciência 2017 is a major science conference that is held annually to highlight achievements in science and technology in Portugal. The 2017 event took place from July 3 to July 7 at the Centro de Congressos de Lisboa and involved several MPP speakers. The program was also represented at the event by posters from MPP PhD students and presentations by test-bed research projects. In addition, MPP presented an overview of the program's impact on higher education in sustainable energy in Portugal.

MIT Delegation in Portugal: Future of MIT Portugal Partnership, July 2017

Representatives of the Portuguese partner universities, MIT, FCT, and the Portuguese government held a number of meetings to discuss and assess ideas for a potential future phase of collaboration within the scope of MPP. In May 2017, following previous meetings at MIT, MIT Portugal (in collaboration with the Portuguese minister for science, technology, and higher education, the FCT, and the Council of Rectors), hosted a delegation from MIT to further advance the discussions regarding the vision, lines of action, and affiliated initiatives that could be developed in the future. The MIT delegation was headed by Richard Lester, associate provost at MIT, where he oversees the international activities of the Institute. Richard Lester was accompanied by Dava Newman, David Miller, Jerome Hunsaker Professor of Aeronautics and Astronautics, and Professor Douglas Hart. More than 50 faculty members and company representatives participated in this two-day event.

Measuring the Impact of the Program

In addition to monitoring the program's output (e.g., research publications, conference contributions, graduates), MPP has been investigating the overall impact of the program, applying qualitative and quantitative methodologies. One focus of this research has been methodologies and indicators of impact. Research conducted within MPP has compared

different international partnership architectures and also analyzed the impact of the program on academic research in Portugal. Results of this research on the program's impact on Portugal's academic ecosystem were recently published – MPP researchers in Portugal have shown an increased publication output with higher impact, and a broadening of their research focus, after joining the program. The study also described a strengthening of inter-university ties among partner universities in Portugal. In addition to the analysis of MPP's impact on academia in Portugal, Professor Bigotte and Professor Arantes-Oliveira have started to review the impact of MPP on the entrepreneurial ecosystem in Portugal by involving program alumni in an impact survey.

Global Visibility and Recognition

From its inception, the MIT Portugal Program has striven to become a model international program that combines innovative research and educational programs from around the globe to address some of today's greatest technical, economic, and social challenges. The program has been both a driver and a result of important ongoing reforms of the Portuguese higher education system. In an independent assessment, the Finnish National Academy recognized the MIT Portugal Program and its Portuguese sister collaborations as an excellent and commendable initiative, interesting to the whole European research community. The assessment called the program a "model of good practice" and applauded the program's many successes, including national collaboration, internationalization, and attention to quality. The academy found the MIT Portugal Program to have a very solid success record with regard to its three goals of collaborative research projects, excellence in teaching and training, and effective commercialization and entrepreneurship.

The overall visibility and recognition of the program were further enhanced by several studies analyzing the program's architecture and output, as well as by efforts to develop and apply methodologies for measuring the program's impact. More publications that advance the study and design of international programs can be expected.

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