# **MIT Portugal Program**

The MIT Portugal Program (MPP) is a strategic international partnership among Portuguese universities and research centers, 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 both by the Fundação para a Ciência e Tecnologia (FCT, the Portuguese Science and Technology Foundation) and by a number of industrial partners. The goal of MPP, launched by the Portuguese government in 2006 and renewed in 2013, is to strengthen the country's knowledge base and international competitiveness through strategic investments in people, knowledge, and innovative ideas.

MPP, which is led at MIT by Professors Bruce Tidor (program director) and Douglas Hart (co-director), is hosted by MIT's Institute for Data, Systems, and Society (IDSS). To date, the program has enrolled more than 1,100 students in Portugal, enabled the funding of 43 research projects. In addition, it has facilitated more than 2,000 research publications and conference contributions, supported more than 200 MPP students and more than 50 scholars at MIT, and involved 270 faculty in Portugal as well as 80 faculty and 30 researchers and staff at MIT. MIT faculty and research staff come from departments in all five of the Institute's schools. Broad institutional support and expertise have played a significant role in the success of the program. MPP has made significant contributions to increasing the visibility of MIT's international engagements by being widely recognized as a model for new types of global alliances—involving universities, industry, and governmental agencies—that focus on knowledge creation, innovation, and entrepreneurship to increase the international competitiveness of the sponsoring country. Furthermore, studies conducted under the auspices of MPP at MIT have focused on comparing the partnership architectures of such alliances 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 an effort aimed at internationalization of Portuguese universities in four interdisciplinary focus areas: bioengineering systems, engineering design and advanced manufacturing, sustainable energy systems, and transportation systems. The well-designed efforts and programs of this phase enabled Portuguese universities to overcome long-standing patterns of isolation and competition by encouraging inter-university cooperation through joint partnerships with MIT, subsequently facilitating a build-up of critical mass in priority-area research. The first phase led to the successful development of innovative curricula in the four focus areas across the Portuguese partner universities, including adaptation of best practices from MIT with input from Portuguese universities and stakeholders. The new doctoral and master's programs were offered to Portuguese and international students with the goal of training future technology innovation leaders. Furthermore, MPP strengthened innovation and entrepreneurship (I&E) 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 but now extended by 18 months at MIT), with a greatly reduced budget due to the aftereffects of the 2008 global economic downturn, MPP is concentrating on solidifying and extending the gains of the first phase, including support of a higher education ecosystem directly connected to technology development and innovation; promotion of a thriving relationship among graduate students, faculty, and industry experts through collaborative projects; and further development of trans-disciplinary innovation and entrepreneurship activities. An additional goal is to complete the transfer of the educational programs in innovation and the focus areas 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, with MIT participation now in the form of guest lecturers and presenters of supplementary material rather than Institute faculty serving as the main teaching staff. MIT now 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 successfully progressed the internationalization of Portuguese universities, resulting in an increasing number of international MPP students and graduates. To date, 4,324 student applications have been received, 3,595 for the PhD program and 729 for the master's program. Average acceptance rates are 24% and 35%, respectively, for the PhD and master's programs. International applicants average 52%. Since 2006, 1,108 PhD and master's students (cumulatively) have been enrolled at Portuguese partner universities; 492 of these students have graduated since the initiation of the program. More than 200 MPP students have visited MIT since 2006, benefiting from their exposure to new methodological approaches, cutting-edge research, and entrepreneurial ideas.

In the second phase, the average annual numbers of PhD candidate applications and PhD graduates have surpassed the accomplishments of the first phase. As the number of successful graduates has grown, MPP has started to build an alumni network, which represents an important asset with respect to the program's long-term societal and economic impact. Alumni have been involved in MPP through several social media platforms that have facilitated active alumni engagement. Moreover, the existence of an alumni network with updated contact information has enhanced the reliability and impact of our 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 and with the objective of developing innovative technologies leading to new products and services that can potentially advance Portugal's international competitiveness and innovative capacity. Test beds have been highly successful in attracting significant support from private and public institutions outside of 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; these projects were implemented first at MIT and subsequently in Portugal in 2017. MPP has so far funded 20 seed projects in the

program's second phase, with an additional 18 exploratory projects expected to receive FCT funding during 2017. The recent calls for seed and exploratory project proposals were aimed at attracting projects that explore new directions for a potential new version of the partnership beyond the second phase. Since 2006, MPP has supported a total of 43 research projects (including seeds and test beds) and other research activities, 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. The Industrial Advisory Committee, made up of corporate partners from MPP's research projects and other leaders in the Portuguese industrial ecosystem, advises the program and participates in a variety of program activities. 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 covering thematic areas such as transportation, health, and biotechnology have been organized. Two new MPP I&E invited faculty members, Professors Nuno Arantes-Oliveira and João Bigotte, originated the recent IIR efforts and have been their sustaining force; these professors have also enhanced MPP's educational I&E activities by establishing and implementing novel educational modules that advance cross-focusarea integration and links between graduate research and innovation.

The program has continued to inspire and foster entrepreneurial activities in Portugal by engaging the broader Portuguese startup ecosystem in addition to the more than 20 startups created by MPP students, graduates, and researchers. MPP's engagement and support have 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. IIRs, test beds, and I&E education are among the many measures implemented by MPP with the goal of achieving visible impact and significant cultural change in Portugal through the formation of an ecosystem that stimulates and facilitates exchange of knowledge and ideas, innovation, and the entrepreneurial mindset as well as 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, I&E activities, and strategic initiatives; since early 2016, MIT faculty, researchers, and staff have made more than 30 visits to Portugal.

Over the years, MPP has become a widely known success and a role model for multistakeholder alliances involving universities, industry, governmental agencies, and international partners with the goal of increasing international competitiveness by fostering skill and knowledge creation and exchange, leading to greater innovation, entrepreneurship, and societal impact. As noted above, the program, which was originally scheduled to end in December 2017, was recently extended for another 18 months at MIT (a no-cost extension to the end of June 2019) and, for the time being, an additional 12 months in Portugal (to the end of December 2018). This extension will allow 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.

# **Program Highlights**

#### **Education**

MPP offers a trans-disciplinary curriculum in seven graduate education programs (four PhD, three master's) across its four focus areas (bioengineering systems, engineering design and advanced manufacturing, sustainable energy systems, and transportation systems). The 2016 call for applications to MPP's graduate programs resulted in a total of 507 applicants. MPP's PhD programs attracted 458 applicants, with an average acceptance rate of 21%; international students from 36 nations accounted for 51% of the applications. The master's programs received 49 applications, with an average acceptance rate of 20% and international students from 24 nations accounting for 80% of the applications. Furthermore, 52 PhD and seven master's students graduated from MPP's programs in 2015–2016 (since 2006, a total of 492 MPP students have graduated). Since January 2016, 20 MPP students have been hosted at MIT, conducting thesis research with support from their MIT thesis co-advisor. The program has successfully engaged the growing MPP alumni community and conducted a survey among PhD and master's graduates that provided valuable information about their professional development and experiences. Over the past 18 months, MIT faculty also hosted six MPP scholars from Portugal (with a total of more than 50 scholar visits since the beginning of the program), further growing the already-strong ties among MPP faculty and fostering continued exchanges and collaborations in research, education, innovation, and entrepreneurship.

The four MPP doctoral programs were supported by a competitive funding scheme promoted by FCT until 2016. FCT support for the four programs secured 10 PhD studentships per focus area and year and covered annual tuition fees. Support for the competitive funding scheme ended in 2016, and the 2017–2018 call for student applications was opened without FCT support for scholarships; this led to a reduction in applications to the four PhD programs from 458 in 2016 to 265 in 2017.

#### 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 among Portuguese universities, MIT, and industry while complementing and strengthening educational programs and stimulating innovation and entrepreneurship. Since MPP's first phase, more than 40 research projects, selected through calls for proposals, have been funded in the program's focus areas, including test-bed and seed projects.

The research activities in MPP's second phase fall into two categories: test beds and seed and exploratory projects. Test beds 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, and other public or private bodies (e.g., hospitals and municipalities). The objective of these projects, which are a central component of second-phase research, is to develop innovative products and services with high export potential as a way to demonstrate internationally Portugal's competitiveness and innovative capacity and ultimately contribute to the growth of the Portuguese economy. To ensure that test-bed project teams have a critical mass in terms of team size, project duration, and budget, total funding of about €1 million was made available to each Portuguese university project team for

a duration of up to three years. The activities of participating MIT research teams were covered independently through designated funds. Non-academic institutions involved in test-bed activities do not receive funding. Current test-bed projects are as follows:

- SusCity (Sustainable Cities; led by John Fernandez and Christoph Reinhart)
- CardioStem (Stem Cell Engineering & Regenerative Medicine; led by Jeffrey Karp and Robert Langer)
- IAMAT (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, with a similar mechanism subsequently implemented in Portugal; this process led to a call for exploratory research proposals in 2017 that is expected to result in up to 18 projects funded by FCT. Since 2013, 20 seed projects have been identified and funded at MIT through three calls for proposals. The 2016–2017 calls resulted in 14 seed projects:

- Recycling System Architecture Enabling Economic Value Recovery in Portugal: Consumer Electronics Case Study (led by Elsa Olivetti)
- Sustainable Polyurethane-Like Materials for Engineering Plastics and Biomedicine (led by Bradley Olsen)
- Sustainability Urban Mobility: The Role of Autonomous and Connected Vehicles (led by Carolina Osorio)
- The Transport Properties of Targeted Therapeutics via Coarse-Grained Simulation (led by James Swan)
- Value of Solar Energy Systems with Storage in Portugal (led by Jessika Trancik)
- 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 ISS SPHERES 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)

In addition to test-bed and seed projects, a number of MIT faculty and researchers, including Robert Armstrong, Stan Finkelstein, Kristala Prather, and Chris Zegras, greatly supported MPP in research and other programmatic and functional areas.

# **Innovation and Entrepreneurship**

MPP's two "innovation professors," Nuno Arantes-Oliveira and João Bigotte (recruited by the program in 2015), have been successful 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 integration of I&E curricula across focus areas. Their efforts resulted in a 40% increase from 2016 to 2017 in student participation in the weeklong intensive course on innovation and entrepreneurship.

MPP has also intensified its engagement of Portuguese and international industry through area-specific International Industry Roundtables, which (as noted above) 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 relevance in the areas of sustainable economic and social development. The objective is to provide an environment that enables participants to bridge views and find common objectives between as well as within industry and academia. The six IIRs organized since the beginning of 2016 cover thematic areas including transportation, health, and biotechnology. Overall, nearly 300 participants from academia and industry have attended MPP's IIRs. Researchers and students have expanded their networks by interacting with representatives from industry and startups as well as venture capitalists.

In an effort to further stimulate and advance entrepreneurial activities in Portugal, MPP has continued to engage Portuguese startup companies through multiple channels, including the Building Global Innovators program, educational programs and workshops, and direct interactions with companies and innovation hubs. The program has also continued to offer access to the International Workshop on Innovating at MIT, which exposes MPP participants and representatives of Portuguese startups to handson seminars and exercises with the goal of advancing their entrepreneurial mindsets and enabling them to progress their ventures, projects, and ideas. Moreover, MPP has furthered engagement of Portuguese universities with industry through research collaborations and other activities.

# **MISTI Portugal Program**

The MIT International Science and Technology Initiatives (MISTI) program officially established its Portugal Program in August 2014. The first eight MIT students traveled to Portuguese companies, research institutes, and universities during the summer of 2015. MPP kick-started the MISTI Portugal Program with initial funding. Expenses were fully or partially covered by Portuguese companies for their visiting intern students. MISTI and MPP covered the costs for students who visited universities and research institutes. In the future, MISTI is considering a collaboration with the International Research

Opportunities Program (IROP) that might provide funds to undergraduate students who intern at research institutes or university labs in Portugal. Alicia Goldstein-Raun, managing director of the MISTI Spain and Portugal Programs, coordinated the application and placement process. Application procedures were defined in accordance with MISTI time lines and requirements. Priority was given to MPP-associated companies and institutes. Since 2016, 14 additional MIT students have traveled to Portugal to work at companies, research centers, and universities.

#### **Events and Outreach**

MPP actively promotes and participates in outreach and high-level network events as a strategy to engage society with science, technology, and innovation. During the past year, 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 are complemented by a strategy designed to raise public awareness of MPP and its impact on society. Internal communication efforts and those with the media emphasize 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 events are highlighted below (in reverse chronological order).

#### Ciência 2017 Conference

Ciência is a major science conference held annually to highlight achievement in science and technology in Portugal. The 2017 event took place in July at the Centro de Congressos de Lisboa and involved several MPP speakers. MPP PhD students presented posters and testbed project teams described their work. In addition, program representatives presented an overview of MPP's impact in the area of sustainable energy education in Portugal.

#### **New Technologies for Old Industries**

This roundtable provided a platform for discussing the role and possible impact of innovation in life science for Portugal's traditional economic sectors, including agriculture, aquaculture, energy, food, forestry, and textiles. Entrepreneurial success and cutting-edge innovation in the life sciences are often associated with health and medical technologies. However, new biotechnologies have had a significant impact in a range of other industries. MPP, in collaboration with the Mira Municipality and the University of Aveiro, organized this IIR to discuss challenges and opportunities related to these areas; the event attracted more than 70 people at the Mira Center near Aveiro, Portugal. In countries such as Portugal, bio-innovation and entrepreneurship in sectors that rely on existing natural resources (the sea, forests, and certain crops) or on long-standing industrial traditions (textiles and chemicals) are particularly relevant. This IIR brought together key players from the Portuguese and European research and innovation ecosystem for a multidisciplinary discussion about opportunities and challenges for entrepreneurs, scientists, and innovators in these fields. The roundtable allowed participants to discuss common objectives, share new technologies and ideas, and promote networking and potential collaborations. Speakers and participants included representatives from Portuguese companies and universities such as Oceano Fresco, RAIZ, CUF, Syngenta, P-BIO, Católica University, Minho and Aveiro University, MareLife, Devan Chemicals, and SilicoLife.

### **International Workshop on Innovating**

The MIT Portugal Program attracted more than 20 Portuguese entrepreneurs to the 2017 version of the International Workshop on Innovating. The event took place June 12–16 at MIT. During the intensive weeklong workshop, participants, including aspiring entrepreneurs (who were planning to start or in the process of starting their businesses) and young entrepreneurs (who already had started companies), were immersed in a residential, hands-on program. The 2017 event was supported by MPP and led by MIT and Portuguese faculty members including Christina Chase (MIT), Douglas Hart (MIT), João Bigotte (University of Coimbra), and Nuno Arantes-Oliveira (Technical Institute, University of Lisbon). Throughout the week, instructors and participants jointly transformed the classroom into a space for innovating and for combining theory and practice through interactive lectures, in-class exercises, and hands-on out-ofclassroom experiences. Participants also had the opportunity to learn from and interact with guest lecturers, experts from the MIT ecosystem, and successful entrepreneurs who shared their insights on critical skills for entrepreneurial success and spoke about their own entrepreneurial journeys. The 2017 workshop attracted aspiring and young entrepreneurs hailing from seven different nations and representing more than 20 emerging companies and new startups. A number of the participants were Portuguese nationals or residents, including current MPP students and alumni.

MPP has been connected to the establishment of more than 20 startups created by program students, alumni, researchers, and faculty, demonstrating the program's continued impact on the Portuguese ecosystem. The International Workshop on Innovating is one of the many annual initiatives supported by the MIT Portugal Program to strengthen Portugal's innovation ecosystem and jumpstart new entrepreneurial initiatives by providing participants an understanding of innovation with the strategic purpose of solving real-world problems.

#### **Future of the Automotive Industry**

The increasing growth of the automotive industry demands the development of groundbreaking solutions, innovative technologies, disruptive products and services, and novel business models. The purpose of this IIR, organized by MPP on May 15 at the University of Coimbra, was to convene industry and academia experts, including faculty, researchers, and students from MPP, to discuss challenges and opportunities related to design and technology in the automobile industry. The automotive industry has some of the largest industrial research and development (R&D) investors in the world. Typically, the annual investment in R&D surpasses €30 billion in Europe alone. In Portugal, the automobile industry is one of the most important sectors and is a top contributor to value creation and generation of jobs. It represents around 8% of the country's gross domestic product, accounts for 11% of the country's exports, and provides more than 30,000 direct jobs. This roundtable brought together more than 80 industry leaders, entrepreneurs, experts, researchers, and graduate students to discuss potential trends over the next decade, enabling participants to outline common objectives, share new technologies and ideas, network, and identify potential collaborations between academia and industry. Speakers and participants included representatives from MPP, emerging companies based in Portugal, the Fraunhofer Institute, Magnum Cap, AFIA, Brisa, Ceiia, TU Delft, Bosch, Caetano Bus, Uber, BMWi, and Ubiwhere.

### **New Paradigms in Health Care**

The increasing capacity of individuals to monitor and manage their health without medical attention entails new challenges that cannot be ignored. This was one of the main topics of an April 3 IIR held at the NOVA Medical School in Lisbon. More than 80 scientists, entrepreneurs, and leaders from the retail, telecommunications, and medical technology industries, along with MPP students, gathered to discuss challenges and opportunities in the health sector. Speakers included experts from MIT and the Fraunhofer Institute, Finnish investor Seppo Makinen, and representatives of innovative and emerging companies based in Portugal such as PLUX, Tonic App, SerFarma, Beepcare, Nutricritical, NIESM, MyNurse, SensingFuture, and Nuada. The event was supported by Healthcare City and P-BIO, Portugal's biotechnology industry organization. In addition to the roundtable speakers, the event was attended by decision makers from large business groups in areas related to health care, representatives of Portuguese and foreign venture capital firms, scientists, and doctors.

#### **Visitors**

Robert Sherman, US ambassador to Portugal, and Manuel Caldeira Cabral, Portugal's minister of economy, visited Boston in December 2016 to discuss transatlantic synergies in the biotechnology sector. They were joined by a first-class group of representatives from Portuguese biotech companies and investors in a visit co-organized by AICEP, Portugal Ventures, the US embassy in Portugal, and the Massachusetts Biotechnology Council with the participation of the MIT Portugal Program.

Manuel Heitor, Portuguese minister for science, technology, and higher education, visited MIT to strengthen scientific and technological cooperation with the United States and meet MPP faculty, researchers, and students. The visit was the minister's first stop on a five-day official trip to the United States with the objective of ensuring continuity of the scientific and technological cooperation that has marked the US-Portugal relationship in recent decades. At MIT, the minister was accompanied by Paulo Ferrão, president of FCT; António Cunha, president of the Portuguese Council of Rectors; José Velez Caroço, consul general of Portugal; and both MPP directors, Bruce Tidor (MIT) and Pedro Arezes (Portugal).

## **Building Global Innovators**

Ten ventures were selected from 211 registrations to take part in the 2016 version of the Building Global Innovators competition; nine of the ventures already had a prototype developed. From July 18 to 20, the selected teams participated in an intensive, immersive multidisciplinary acceleration boot camp in Lisbon. The teams were welcomed by Gonçalo Amorim (executive director of Building Global Innovators), Pedro Arezes (MPP director in Portugal), Emir Sirage (coordinator of FCT's Technology Office), and Walter Palma (director at Caixa Capital).

## **Measuring Program Impact**

In addition to monitoring the program's output (e.g., more than 2,000 research publications and conference contributions and close to 500 graduates), MPP has been investigating the overall impact of the program via qualitative as well as quantitative

methodologies. A particular focus of this research has been on methodologies and indicators of impact. Studies conducted within MPP have compared different international partnership architectures and analyzed the impact of the program on academic research in Portugal.

According to the results of recent research assessing the program's impact on Portugal's academic ecosystem, MPP researchers in Portugal have increased their publication output and broadened their research focus after joining the program. The findings also revealed a strengthening of inter-university ties among partner universities in Portugal. In addition to the analysis of MPP's impact on academia in Portugal, Professors Bigotte and Arantes-Oliveira have initiated a review of the program's impact on Portugal's entrepreneurial ecosystem by surveying program alumni.

## **Global Visibility and Recognition**

From its inception, MPP has strived to become a model international program in which innovative research and educational initiatives from around the globe combine to address some of today's greatest technical, economic, and social challenges. The program has been both the driver and the result of important ongoing reforms of the Portuguese higher education system. In an independent assessment, the Finnish National Academy recognized the program and its Portuguese sister collaborations as an excellent and commendable initiative, interesting to the entire European research area. The assessment labeled the program a "model of good practice" and applauded its many successes, including national collaborations, internationalization, and attention to quality. The academy found MPP to have a solid success record with regard to the goals of collaborative research projects: excellence in teaching and training and effective commercialization/entrepreneurship.

The overall visibility and recognition of the program were further enhanced by several studies analyzing MPP's architecture and output, as well as by efforts to develop and apply methodologies for measuring the program's impact. This work led to a string of publications that are expected to advance the study and design of international programs.

### **Potential Future Program**

MPP's second phase was originally scheduled to end on December 31, 2017. The MPP governing committee met in March 2017 and agreed to an extension of the program for an additional 18 months at MIT (at no cost, to the end of June 2019) and, for the meantime, an additional 12 months in Portugal (to the end of December 2018, with limited funding). This will allow the program to provide support for test-bed projects through the completion of their three-year terms as well as to support both existing and new small-scale research projects exploring areas with strategic potential for the Portuguese ecosystem and for an anticipated future version of the partnership. Moreover, the additional time will allow further discussion and finalization of plans for a continuation of the fruitful relationship between Portugal and MIT. Since the summer of 2016, representatives of the Portuguese partner universities, MIT, FCT, and the Portuguese government have had an increasing number of meetings to constructively discuss and assess ideas for a potential future phase of collaboration, including a one-day strategy summit with Minister Heitor, FCT president Ferrão, and Council of Rectors

president Cunha at MIT in November 2016 and a meeting involving a visiting delegation from MIT in Portugal in May 2017. These discussions have considered a proposed Atlantic international research center that includes the Azores Islands and the remainder of Portugal (and involves other potential international partners) and have explored topics such as land, sea, and atmospheric observation and data gathering as well as climate, energy, and data science.

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