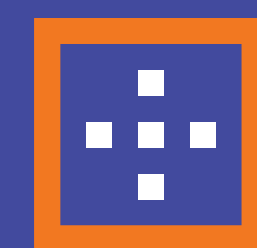
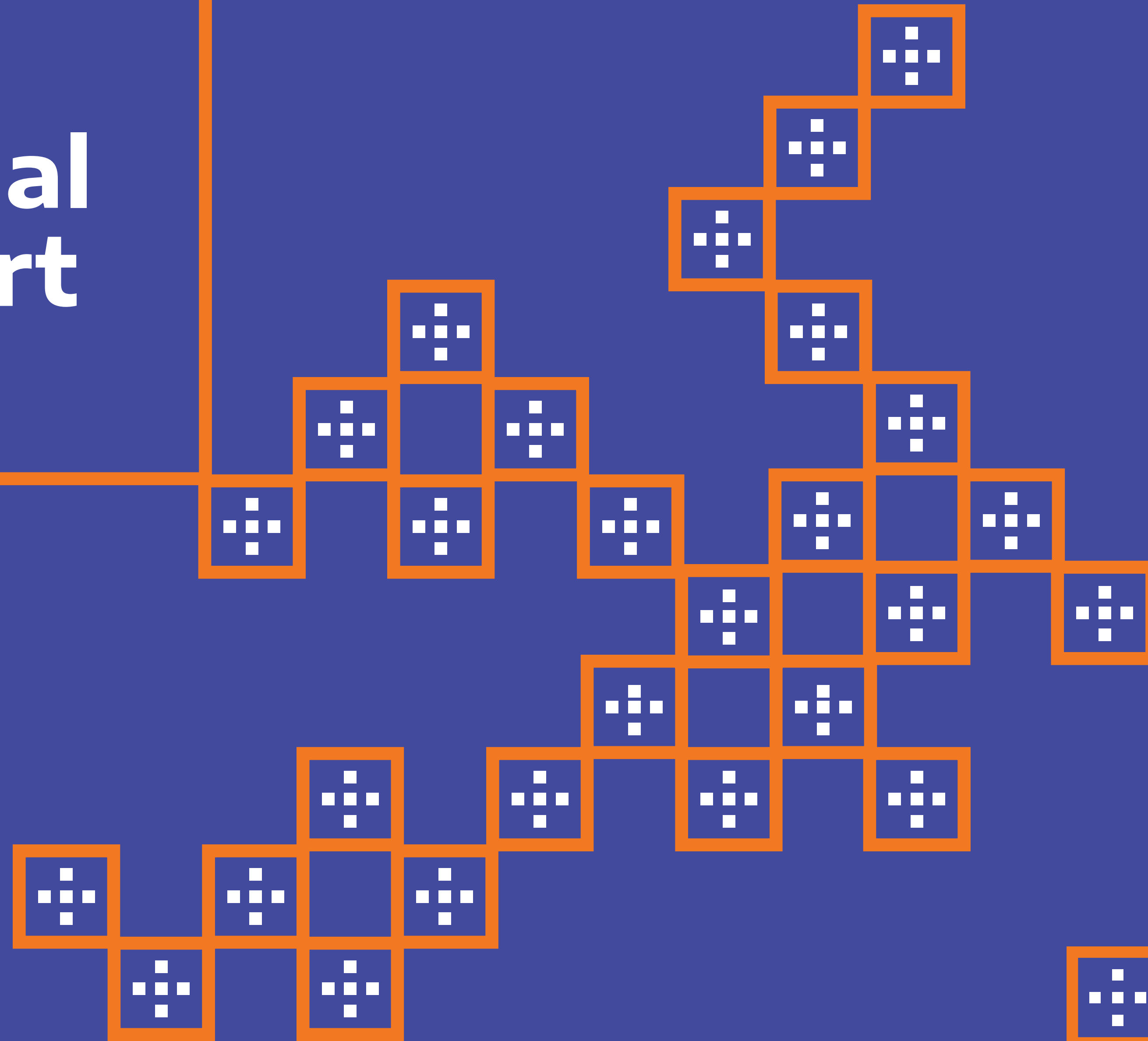


2019 Annual Report



UTAustin
Portugal

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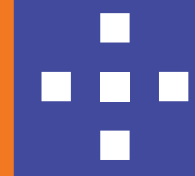
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Executive Summary



01

The UT Austin Portugal Program is a partnership between the Portuguese Science and Technology Foundation (FCT) and The University of Texas at Austin (UT Austin) in conjunction with several national universities and laboratories.

It was launched in 2007, as part of a strategy to promote Portuguese scientific institutions at an international level, through a series of main structured areas of research and education organized in the form of a Collaboratory for Emerging Technologies (CoLab). Additionally, the CoLab included a series of entrepreneurial projects and new technology-based business initiatives developed through a network of “Technology Transfer Offices” in Portugal and at UT Austin which became known as the University-Technology-Enterprise Network or UTEN.

After a decade setting up joint projects and building unique scientific, technology transfer and entrepreneurship capabilities, the transatlantic partnership moved into a new phase in 2018 towards 2030, determined to ensure its actions would go on shaping research agendas and delivering transformative results.

The UT Austin Portugal Annual Report is a management document produced by the Board of Directors (BoD) in close collaboration with the Program’s Executive Team, operating from Portugal. The report reflects the international partnership’s good practice of looking back to what the Program has done and achieved through the course of a reporting year and anticipating the actions needed going forward.

Considering that the Program is financed through public funds, with FCT as the main sponsor, annual reports play a very important part in showing whether such funds are being wisely and efficiently allocated to initiatives that should be contributing to the public good. Additionally, such reports constitute the basis on which the partnership signatories and sponsors not only take full responsibility for the decisions they have made but also lay the groundwork for the years to follow. Since the start of the transatlantic partnership in 2007, 20 annual reports have been produced and made available to the general public.

The report is divided as follows:

- The first part, split into 5 sections, in the form of a narrative text, explains what was done between January 1 and December 31, 2019 and how the Program is delivering on its commitments, while critically analyzing factors and circumstances that may have either prevented the Program from meeting predefined targets or, instead, made it realize value in the reporting period. This critical analysis takes into consideration the international partnership’s Technical Annex which sets out the goals for the time horizon 2018-2030.
- The second part is the annex, where additional or more detailed information is provided to the reader, thus complementing the first part of the document.

If 2018 marked the beginning of the partnership’s third phase, 2019 was the year to operationalize some of the Program’s lines of action or instruments through very concrete activities and build, grow and nurture a community of stakeholders (direct beneficiaries and interested parties) across the Program’s knowledge areas. The following figures tell us how the Program performed in 2019.

2019 in numbers

8 training activities in Portugal

- 270 direct beneficiaries;
- 8 organizations coordinating the line-up of scientific agendas;
- 12 speakers* from UT Austin involved;
- 6 speakers* outside the partnership's geographic scope;
- 92% of respondents to the post-event evaluation forms declared that the training was excellent or good.

*at events with UT Austin Portugal Program as main coordinator

2 calls for short and long-term research projects accounting for a total available funding of:

- PT - 6,4 million* + 400 thousand euros
- US - 5 million + 400 thousand dollars

* funding available through ERDF as per call announcement

1 Annual Conference in Braga, Portugal

- 14 speakers from Portugal, UT Austin and Germany;
- Over 100 attendees.

14 applications for Strategic Projects* with industry collaboration

* also designated R&TD Co-Promotion Projects

8 mobility fellowships supported in 2019 under the Advanced Computing Training Program initiative

- 8 placements supported representing a total investment of nearly 48 000 euros;
- 648 days of immersive hands-on training in Advanced Computing at UT Austin;
- 9 mentors at UT Austin, from 6 different departments involved.

13 no cost-extension requests analyzed (2017 Exploratory Research Projects - Phase 2)

1 Portuguese Delegation visit to UT Austin

Leadership's Introductory Statement

02





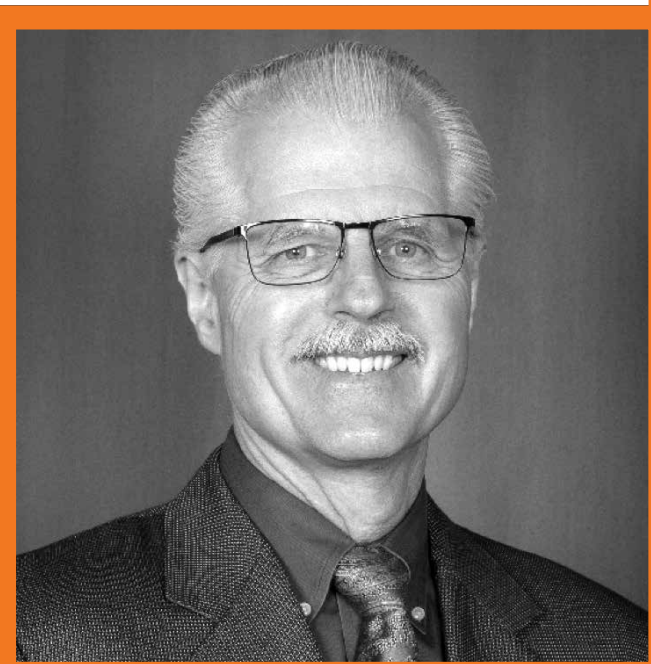
José Manuel Mendonça
National Director
Portugal

The UT Austin Portugal Program lies on the strong belief that working together is the best way to craft long-term success and purposeful, impactful change. The transatlantic partnership has been running for more than a decade, fostering successful international Science and Technology (S&T) cooperation between UT Austin and Portuguese universities, research labs and companies.

Although geographically confined to two epicenters, from an operations standpoint - Portugal and Austin, in Texas - the Program's stage is the world. Indeed, thanks to its highly interdisciplinary scientific areas, the Program is more than ever determined to contribute towards some of the most pressing global challenges through on the ground collaborative research, education and entrepreneurship activities, while pushing Portugal to be at the forefront of cutting-edge science and technology in a number of application areas of great strategic value to the country.

2019 was a plentiful year for the Program and this report clearly shows how far we have come since the start of the third phase of the partnership. Many of the new collaborative arrangements we had planned, many of the ideas we had championed years before came into action in 2019. We granted researchers from Portuguese organizations the opportunity to benefit from an advanced training scheme at The Texas Advanced Computing Center (TACC), home to the fastest academic supercomputer in the world, the Frontera. Thanks to the dedication of Robert A. Peterson, former Principal Investigator of the Program, we were able to bring to Minho Portugal's first super computer, BOB, the cornerstone of the Minho Advanced Computing Center. For the first time ever, we supported the engagement of researchers both from Portugal and UT Austin with Portuguese companies, through a dedicated call for three-year industry-driven R&D projects. We also launched a call to fund high-risk and high-impact collaborative one-year research projects. Several scientific events across all areas of the Program were organized with the seal of the Program, fostering discussion and knowledge sharing and opening up new partnering opportunities for attendees and speakers. Also, as we gathered pace, our community of stakeholders grew significantly and we were able to take our brand beyond the partnership's geographic boundaries.

Expectations are now higher than before, and therefore we must not rest on our laurels. With an eye on 2030, we will continue to work hard to meet our long-term goals. Times ahead look challenging but exciting! Our stakeholders will certainly count on us to go on creating knowledge, fostering change.



John Ekerdt
Principal Investigator
UT Austin

This report marks the end of Year 1 of Phase 3 of the UT Austin Portugal Program – a collaboration involving The University of Texas at Austin and several top-tier universities throughout Portugal and several research laboratories in the country. The ground work for Phase 3 began in the summer of 2017 when the future vision and areas of focus were settled that led to the September 2018 formal renewal of the collaboration. With Phase 3, the UT Austin Portugal renewed its focus on Advanced Computing and the University Technology-Enterprise-Network (UTEN), and transitioned its focus from Digital Media, Applied Mathematics, and Emerging Technologies to Space-Earth Interactions, Nanotechnologies, and Medical Physics. There were also some leadership changes, with José Manuel Mendonça and Rui Oliveira now serving as the Principal Investigator and Co-Principal Investigator, respectively, in Portugal and John G. Ekerdt and Marco Bravo in similar roles at UT Austin.

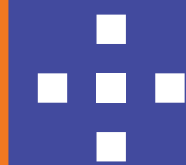
The UT Austin Portugal continued to support programs begun under Phase 2 while we transitioned to the new agenda and programs. There are now two primary modes of direct research engagement – Strategic Projects and Exploratory Projects. These continue to require multiple collaborators within Portugal and within UT and a company partner within Portugal. The Strategic Projects are intended to be three to five years in duration and of a scale to enable the cross-cutting research to target important societal challenges. The call for Strategic Projects resulted in 14 proposals by teams from Portugal with UT Austin. The ones ranked most deserving are now being notified of their selection and we look forward to reporting on their results and the impact of their work over the coming years. The call for Exploratory Projects, which are smaller in duration (12 months) and scope of effort, resulted in an amazing 58 teams forming between Portugal institutions and UT Austin. These will be selected for funding in 2020. It is safe to say we are off to a great start in establishing meaningful collaborations in multidisciplinary research collaborations that will contribute to a knowledge-based society and foster science and innovation-based companies, enabling Portugal to better face the challenges of the future.

There are other modes of engagement within the UT Austin Portugal including workshops and exchanges. Over the course of the past year we have hosted eight researchers at the Texas Advanced Computer Center (TACC), UT researchers participated in nine workshops/hackathons/conferences in Portugal on topics ranging from Immersive Training in Scientific Visualization to New Space Hackathon to New Challenges in Medical Physics. One of the central elements of the Advanced Computing focus is the Minho Advanced Computing Center (MACC). The MACC dedicated its high performance super computer during our annual Conference this fall and officially named it Bob in recognition of all the work Robert (Bob) A. Peterson did in the background to secure the hardware that is the first phase of the MACC. Robert was also awarded the Portugal Medal of Scientific Merit by Minister Heitor in further recognition of his contributions to the UT Austin Portugal over the years and Portugal’s high performance computing initiatives. Following the formal program, subject matter experts from UT and Portugal presented masterclasses on Quantum Computing and Wearables and Advanced Textile.

There are many programs already in the works for the coming year and we look forward to sharing them with you.

The Program in Brief

03



3. The Program in Brief

This section gives an overview of the Program since its inception to the present. Particular attention is paid to the Program's configuration in the third phase and how it will be delivering on the Partnership's overarching goals.

3.1 Mission, Vision and Values

The UT Austin Portugal Program is no longer in its infancy; it has hit a decade of existence, learned from previous experiences and evolved from them. This new stage of maturity represents an increased capability to devise and implement new collaborative arrangements, amplify support to activities from the lab to the market and embrace new areas of knowledge in order to have a real impact on the ground.

Nevertheless, the Program remains committed to its foundational mission and vision statements as well as to its core values.

Mission

To promote and enable the engagement of Portuguese scientists and companies with the University of Texas at Austin and the University of Texas System at large in multidisciplinary research, technology transfer and commercialization activities.

Vision

To contribute to a knowledge-based society and foster science and innovation-based companies, enabling Portugal to better face the challenges of the future.

Values

In the UT Austin Portugal Program's motto - Create Knowledge: Foster Change - resides its core values: to face new challenges, creating relevant scientific knowledge that fosters impactful change for the future.

more partnerships > more connections > more value =

Create

more experience > more competence > more credibility =

Knowledge

more entrepreneurship > more development > more consistency =

Foster

more internationalization > more vision > more ambition =

Change

3.2

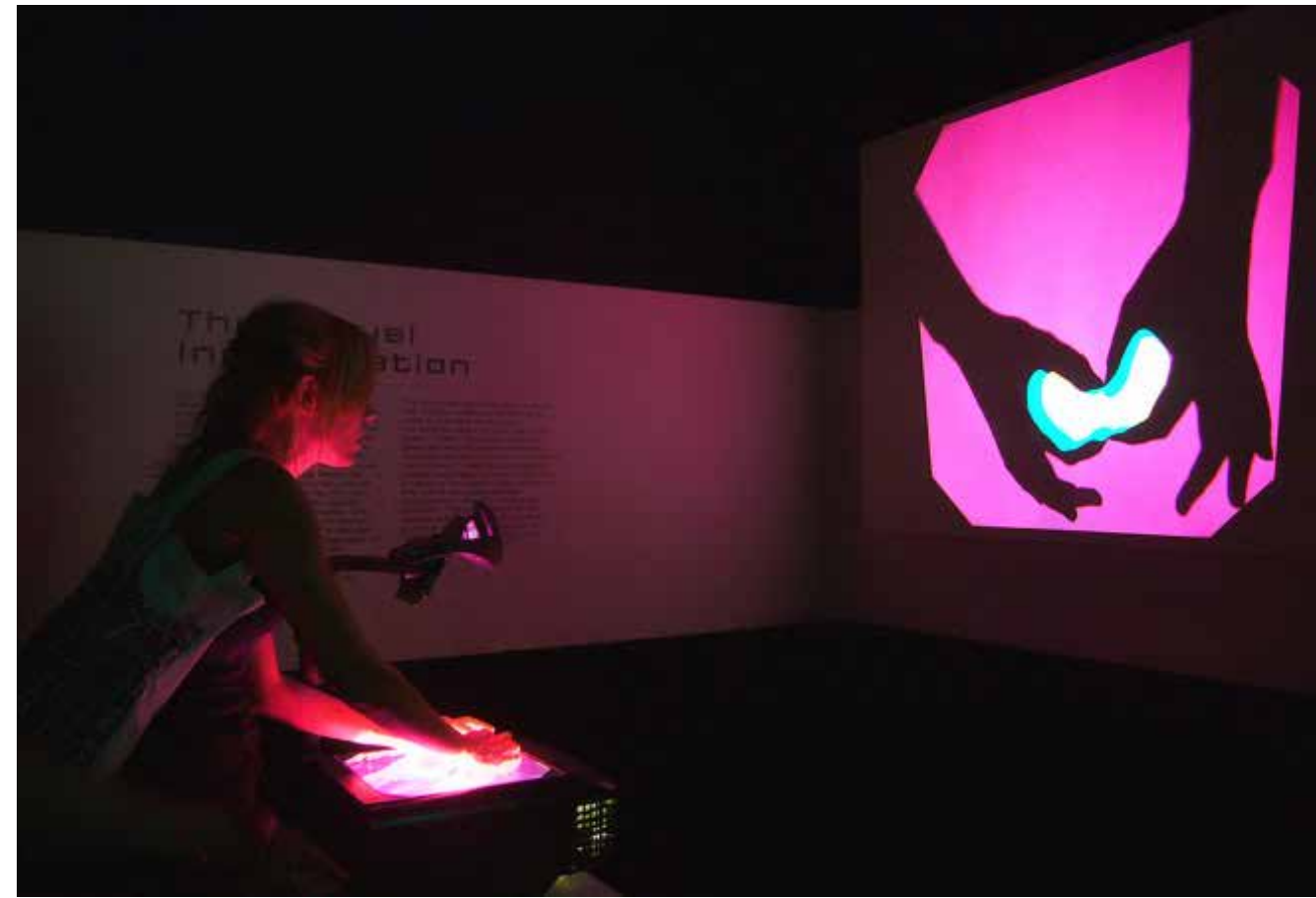
The Last Decade: 2007-2017

The UT Austin-Portugal International Collaboratory for Emerging Technologies or CoLab is a partnership between the Science and Technology Foundation of Portugal (FCT) and the University of Texas at Austin, in conjunction with several national universities and laboratories. It was launched on March 22nd of 2007, as part of a strategy to promote Portuguese scientific institutions at an international level. Since then and up until 2018 – during Phase 1 (2007-2012) and Phase 2 (2013-2017), the CoLab was a long-term collaborative project that aimed to increase research and postgraduate studies in emerging technologies, with particular emphasis on Digital Media, Advanced Computing, Applied Mathematics, and other Emerging Technologies with an emphasis on Nanosciences, as well as the area of science and technology commercialization.

CoLab's strategy relied on promoting Portuguese scientific and technological capacity and reinforcing the status of Portugal's scientific institutions at an international level. Several achievements were accomplished through the participation of hundreds of graduate students and faculty members from both sides of the Atlantic, as well as some entrepreneurial projects that remain ongoing as result of collaborative research activities. Much has been achieved, and further results will be attained up until the conclusion of the exploratory research projects funded by the last call of Phase 2. This will allow both broader and deeper activities to take place and facilitate the development of entrepreneurial efforts through a close collaboration with UTEN (www.utenportugal.org) as well as scholarly and inventive explorations, thus impacting Portugal and its social capital for the long run. In addition to Digital Media, Advanced Computing, and Mathematics, Emerging Technologies in the field of nanotechnology became part of the Program, building on the installed capacity and strategy in Portugal.

During this period, the Program formally collaborated with more than 50 schools and other institutions and 73 Portuguese faculty and 35 Principal Investigators, as well as with 13 Digital Media Industrial Affiliates Companies (Brandia Central, Bycom Industries, Innovagency, Cinemateca Portuguesa, Critical Software, Duvideo filmes, Casa da Música, Media Capital, Fundação Serralves, Porto Editora, YDreams, INTELI, MOG Technologies, Zon Lusomundo, Público.) In total, 337 students participated in CoLab activities, with an emphasis on research workshops and exchanges at UT Austin, with a total of 113 PhD and 11 Postdoc scholarships granted. More than 100 submissions led to about 35 research projects funded throughout multiple calls. Five startup companies spun off from the Program: Bagabaga Studios, Realizasom, PLUNC – Associação Cultural, Gimme 'Da Blues, and Face In Motion.

Specifically, the **Digital Media** area was designed to support the creation of new intellectual capabilities in understanding and creating content, platforms, and applications in the digital arena. It created a doctoral program shared between the New University of Lisbon (UNL) and the University of Porto (U.Porto), and also backed a large Multimedia MA program at U.Porto. It also supported various capacity-building festivals and symposia to create opportunities for exhibiting new work and for convening and cultivating a peer culture and broader social network in digital media. Furthermore, this area supported various research efforts by linking UT Austin and Portuguese faculty and graduate students.



During the first decade of the Program, the collaboration in the area of **Advanced Computing** covered a variety of subjects including computer science, high-performance computing (HPC), graphics, computational sciences and applications to multidisciplinary engineering. Today, these areas are foundational to most of science and even in areas like humanities and arts, where computers and quantitative methods are increasingly being used. 16 PhD students spent research periods at UT Austin. Training activities have been mostly directed to two main types of initiatives:

1. Summer internships for about 15 master/PhD students per year at UT Austin;
2. Advanced schools and Workshops in Portugal with invited specialists in leading-edge topics.

Several short courses and workshops were organized:

- WACS: Winter Advanced Computing Seminars
- GPU Programming for Scientific Application – 2011
- Workshop on Modeling and Simulation of Physiological Systems – 2012
- Workshop on PDE's
- Biomedical Applications and Tutorial on High-Performance Parallel Graph Analytics
- International Summer School on Parallel High Performance Computing Using Accelerators – 2014
- Autumn School and Workshop on Data Driven Computations in the Life Sciences and on Innovative Modeling Techniques for Predictive Medicine
- Summer School in Distributed Computing – 2015
- Summer School on Isogeometric Analysis
- Summer School in Advanced Scientific Computing
- Summer course on Automated Question and Answer Systems using the IBM Watson System
- UT Austin|Portugal Workshop on Nonlinear Mechanics and Applications in Life Sciences - 2016.

All of the research projects pursued by the Advanced Computing group involved complex mathematical applications, including those with the object of creating animated visual modeling. In order to create these models, mathematical analyses and understanding of the subject's physics was prerequisite for presenting these subjects in meaningful animation - often at a cellular or molecular level, but which might as easily implement large geographic or galactic views - including sequences of events over time. Against all Advanced Computing research projects, classic metrics apply as follows:

- Advancement regarding the mathematical solutions required to meet the need or model the subject;
- Software development against those mathematical solutions;
- Publications describing mathematical advancements achieved, processes in software development, implications that are revealed through modeling processes, among others.

The UT Austin Portugal **Applied Mathematics** Program involved the Department of Mathematics at UT Austin and The Institute for Computational Sciences and Engineering (ICES) at The University of Texas at Austin, along with mathematical research centers and groups in four Portuguese universities, namely the Mathematics Department of Instituto Superior Técnico (IST) of the University of Lisbon, the Mathematics Department in the School of Sciences at the University of Lisbon (FCUL), the Mathematics Department in the School of Sciences and Technology at the New University of Lisbon (FCTUNL), and the Department of Mathematics of the School of Sciences and Technology at the University of Coimbra (FCTUC). In Phase 2 (2013-2017) of the program the Mathematics Department of the School of Sciences at the University of Porto was also one of the main partners.

During the first five years, through this program, 13 PhD students and 9 post-doctoral fellows were recruited from countries such as Armenia, Brazil, Italy, Iran, Lebanon, Portugal, Spain and the United States, as well as involving other PhD students and post-docs in research projects. Seven research projects were approved. More than seven Portuguese faculty members spent extended periods (between 1 month and 1 semester) at UT Austin. A large number of publications (more than 50) appeared in international mathematics journals as a result of collaborative research or research projects. During Phase 1 of the Program, 12 international schools and workshops were organized for researchers at all levels. In addition, more than 20 Portuguese undergraduate students participated in research training groups.





The Lisbon-University of Texas at Austin PhD Program in Mathematics (LUTAMath) was created as a dual PhD program between the Mathematics Departments of the three Lisbon public universities (Instituto Superior Técnico, Universidade de Lisboa and Universidade Nova de Lisboa) partnered with the University of Texas at Austin.

The main purpose of the UT Austin Portugal Program in **Emerging Technologies**, launched in 2013, was to advance a collaborative vision in nanotechnology research, education, and training, as well as to explore common interests in technology commercialization. There was also a special interest in promoting the transfer of new nanotechnologies to industry in Portugal and nurturing the formation of new companies located in Portugal to exploit the latest scientific and technological advances.

The UT Austin Portugal Program concentrated efforts around four thematic areas with particularly exciting possibilities for commercial impact, considering the expertise at U Austin and in Portugal:

1. Advanced Lithium-ion Batteries: UT Austin has considerable expertise in the area of lithium-ion batteries, and new nanomaterials are promising batteries with unprecedented high energy density, storage capacity, and low cost. Next generation lithium-ion batteries were then being developed for large-scale energy storage (i.e., on the grid for storing electricity from renewable, yet intermittent, energy sources like solar and wind) and battery-powered vehicles. The market potential for those products was tremendous and there was a race to develop the nanomaterials that would enable the development of those batteries. It was a unique target opportunity for commercial development and UTEN seeded collaborative research in this area. Additionally, there was the potential for interfacing with the University's Emerging Frontiers Research Center (EFRC) funded by the Department of Energy (DOE).

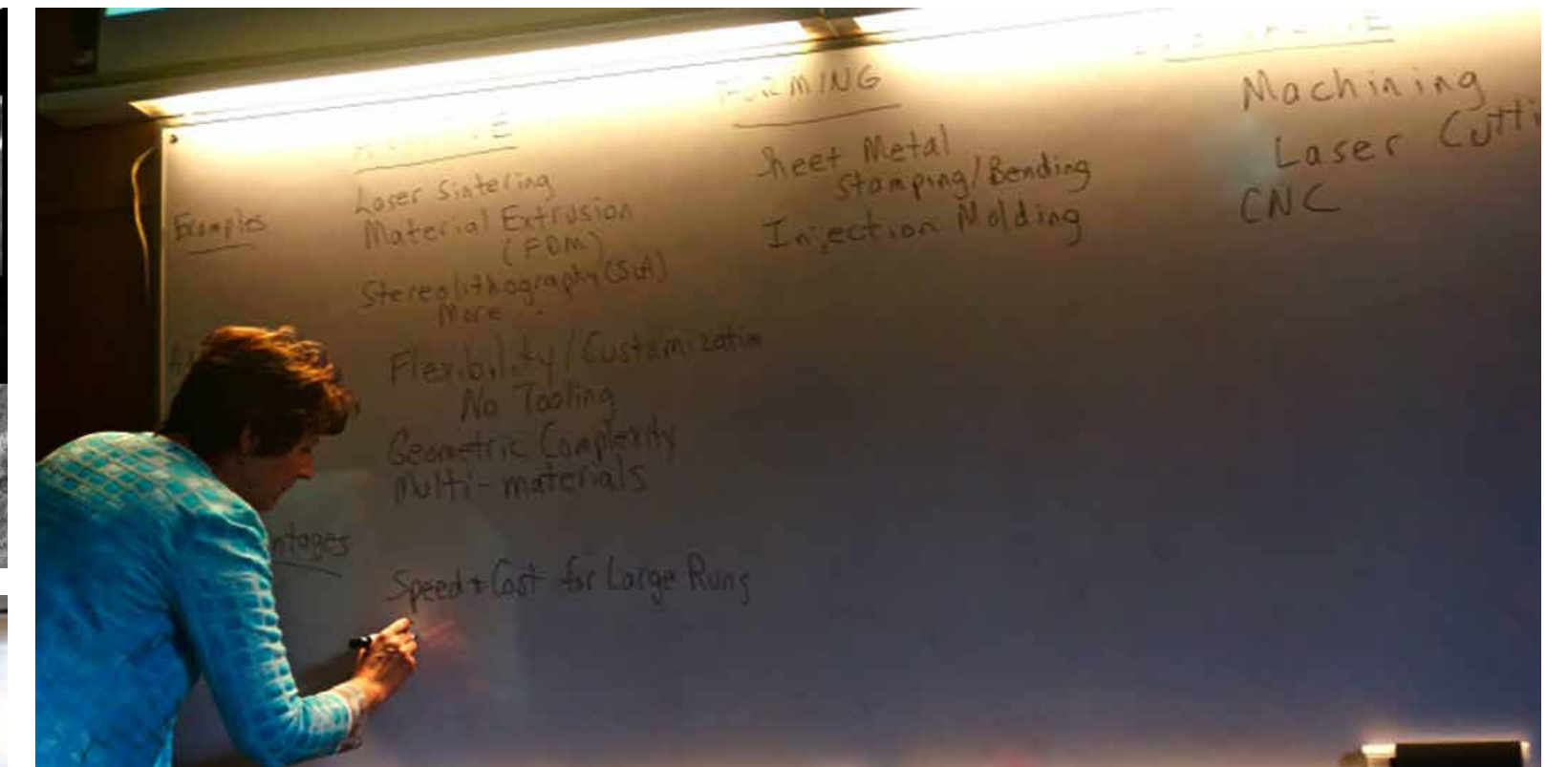
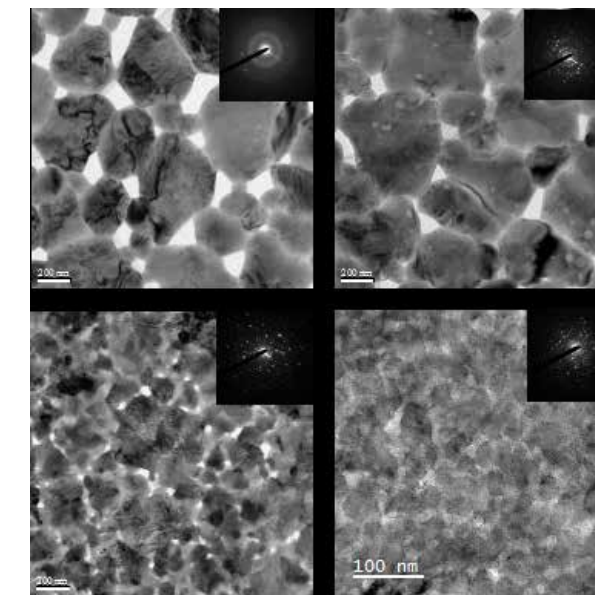
2. Next Generation Photovoltaics: UT Austin leveraged its NSF-sponsored Industry/University Cooperative Research Center (I/UCRC) on Next Generation Photovoltaics to help support collaborative research between the University and Portugal in developing new solar cell technology. NSF offered funding to I/UCRC's for international collaboration and the University Director, Professor Brian Korgel, sought this funding to support these efforts. There was a strong effort in Portugal as well for developing photovoltaics. There was the potential for Portugal to become a manufacturing hub, for Europe especially, in photovoltaics, and this represented a significant commercial opportunity for Portugal.

By developing the next generation technology within Portugal and controlling the critical intellectual property, new industries could have been developed. The I/UCRC was also composed of several member companies, some based in Europe, and UT Austin would bring these commercial connections to the table through the collaborative research projects in Portugal. The UTEN program seeded preliminary experiments and collaborative work between UT Austin and Portugal that would grow into larger projects with larger sustained funding from NSF, FCT, and industry.

3. Nanomaterials for Medicine: UTEN seeded collaborative research projects between UT Austin and Portugal in the area of nanomaterials for medicine. There was deep expertise in this area at UT Austin and significant interest and expertise in Portugal. This was an emerging research area with tremendous opportunity for new fundamental discoveries that would have a significant economic impact. Research would initially focus on the use of nanoparticles for disease detection and therapy. For example, new biocompatible nanoparticles like silicon could be functionalized with biologically relevant molecules like peptide fragments, aptamers, and DNA strands. Ongoing work at UT Austin in this area in various collaborations between engineers and clinicians would provide seeding of new collaborative projects in Portugal. One of the goals of this program was to make connections between researchers in science and engineering and medical doctors.

4. Smart Nano-Based Fabrics and Textiles: Research at UT Austin in the creation of new nanomaterials like semiconductor nanowires and nano-cellulose that could form fabrics with unique combinations of materials properties provided the focus of this research theme. There is a strong tradition of textiles manufacturing in Portugal and this research area would play to those strengths by introducing materials with new and unique properties that could provide unprecedented functionality in fabrics. For example, clothing that had built-in sensing capability, energy generation and storage, as well as more advanced anti-wetting and anti-bacterial properties could be developed with these materials. Fabrics with extremely high strength-to-weight ratios and new environmentally friendly nanocomposite fibers were developed. This focus area played off the strengths of UT Austin faculty members in their development of these new materials, nanomaterials researchers in Portugal and their expertise, and the deep expertise of textiles processing and research within Portugal. There was a tremendous opportunity in this research area for economic revitalization in the textiles industry in Portugal, and this was one of the goals of the CoLab initiative.

Throughout the years, several research workshops were executed. Examples are Multiexciton Solar Cells of CuInSe₂ Nanocrystals, CuInSe₂ Nanocrystal Surface Characterization: Valence Band Tunability and Raman Spectroscopy, Seeing Small: Enabling New Discoveries in Nanomaterials Through Advanced Transmission Electron Microscopy, and Design and Delivery of Protein Therapeutics: Molecular Engineering to Prevent Disease in 2014, Inverse Design for Directed Assembly, Investing in World-Class Research to Spark Economic Development, and Light-Matter Interaction on the Nanoscale in 2015, Innovation Arts and the Conception of Rapid Design, Silicon and Germanium Nanowires for Lithium and Sodium Ion Batteries, Creating Collaboration between Artists and Scientists / Engineers, Microstructural Evolution of K_{0.5}Na_{0.5}NbO₃ Thin Films by In-situ TEM Sintering, and Indirect Selective Laser sintering of Yttria-stabilized Zirconia for Dental Applications in 2016, and Engineering Patient-specific bioprinted constructs for treatment of degenerated Intervertebral Disc and Exploring stresses to develop functional nanoceramics by in-situ TEM sintering in 2017.



UTEN – University Technology Enterprise Network

Competences in technology transfer and commercialization have been systematically developed throughout the country and, today, most of the Portuguese universities, associated laboratories and research institutions facilitate specialized technical support fostering technology transfer and commercialization. This movement has been strengthened since 2007 through the UTEN initiative, which comprises scientific and academic institutions in Portugal oriented to emphasize technology transfer and commercialization at an international scale. This initiative involved strategic partnerships with leading institutions worldwide and has been promoted and supported by the FCT, in close collaboration with the Council of Rectors of Portuguese Universities (CRUP) and in coordination with the Portuguese Industrial Property Institute (INPI). UTEN's mission has been gradually evolving to build a professional, globally competitive and sustainable technology transfer and commercialization network in Portugal oriented toward international markets. Specifically, objectives include:

- Developing a globally competitive and sustainable commercialization infrastructure in Portugal;
- Facilitating networking among researchers, technology transfer managers, entrepreneurs, commercialization experts, business angels, venture capitalists, and academic leaders;
- Providing hands-on training through real-life commercialization experiences;
- Offering U.S. market soft-landing opportunities and promoting business development activities for Portuguese university-based startups
- Programs and activities undertaken since 2007 have allowed UTEN to take full advantage of, and consolidate, the emerging network of Portuguese technology transfer offices. Business development activities have accelerated the global commercialization of Portuguese science and technology.

The UTEN initiative provided a commercialization outlet for the science and technology (S&T) in-country investments. UTEN's mission gradually evolved to build a professional, globally competitive and sustainable technology transfer and commercialization network in Portugal oriented toward international markets.

Since the start of the UTEN program in March 2007, a key strategy has been to deliver technology transfer and commercialization training for international markets using Portuguese S&T. This approach has numerous advantages as it applies UTEN staff effort aUTENst real cases to learn key issues and challenges faced by Portuguese technology transfer offices, and to impart knowledge to Portuguese professionals in a manner that maximizes their future ability to adapt and apply that knowledge in real world situations. For these professionals, participating in internship-based technology assessments helps place learning in context, while it results in work that contributes directly to productivity. This use of “living cases” implies implementing training processes at a grass roots level while simultaneously building positive relationships and trust with TTOs. It also promotes UTEN's interest beyond generic training, toward the larger goal of making an overall impact on Portuguese technology transfer and commercialization activities. UT Austin's UTEN staff members now hold intimate knowledge of the Portuguese technology transfer and commercialization ecosystem, including deep networks and personal relationships with senior administrators, key front-line staff, and thought leaders throughout the country.

More than 150 technologies from Portuguese institutions and companies have been entered into a UTEN database that is available in a national portfolio. Ninety-two technologies have been assessed, primarily from Portuguese public universities, with many recent assessments performed independently by Portuguese TTOs. Infrastructure is in place that would automatically grow the national portfolio based on local assessment efforts in TTOs. Twelve Portuguese institutions have received S&T assessment training for their technology transfer staffs. In some cases, university researchers were also trained to help them better understand commercialization issues. Broad outreach was performed at Days of Innovation 2009, where training sessions drew a combined audience of over 100 technology transfer officers and researchers all interested in TT and commercialization issues. Overall, UTEN has promoted a series of specialized training activities that have accelerated the development of a professional network of technology transfer professionals in Portugal.

Between 2007 and 2010, UTEN organized more than 50 specialized training sessions and networking events both in Portugal and in the United States, with the involvement of more than 1500 participants. Furthermore, more than 30 TTO staff members had the opportunity to spend time in Texas under the umbrella of the international internships program, and more than 100 technology-based startups have been screened towards business development and landing pad possibilities in the U.S. market.

A survey of the TTOs conducted in 2011 showed that during the period 2007-2010 there was a 49% increase of invention disclosures within universities, a 1,900% increase of universities' provisional patents, and a growth of 19.6% in patents granted per year. Also, the TTOs reported a 26% increase of university-executed licenses and agreements per year during the same period, as well as a 137% rise in licensing income at universities. There was also a 132% increase in new academic spinoff projects, and within those academic startups the annual growth rate in revenue has been 127%. Moreover, 37% of those early stage companies were already exporting products and services with a 38% annual growth rate in hiring skilled personnel.

In 2011, UT funded a separate, but complementary pilot program, US Connect. Its purpose is to help startup ventures make the transition to global markets, primarily by closing business deals in the United States. US Connect focuses on university spinoffs that have demonstrated success in domestic markets, but have yet to expand into global markets. From a two-stage selection process with many applications received, five companies were selected for focused business development effort.

- Bioalvo
- FeedZai
- Inovapotek
- Tecla Colorida/schooooools.com
- WS-Energia

US Connect developed, in collaboration with each company, marketing strategy and marketing materials to support US outreach efforts. In addition, all companies reaching Stage 1 were introduced to a select set of North American companies that may have need or fit for the Portuguese technology or product. For example, continuing efforts by US Connect for Technophage, in spite of not reaching Stage 2, resulted in a manufacturing proof of concept agreement (at no cost to Technophage – a \$100,000 value) with a US contract manufacturing organization and in person meetings with Imclone. Stage 2 companies have experienced significant business traction, although to a greater or lesser degree, depending on the company. Early in Stage 2, WS Energia

acknowledged that it was not ready to support international business deals after understanding the requirements through meetings arranged by US Connect. It will continue to build its technology and business platform to re-engage the US market in the next year. Inovapotek was subject to a broad email and phone campaign. Several leads were engaged in business discussions are ongoing. Tecla Colorida was guided through several in-school pilots in the US UTENing feedback, measuring business model and developing a more focused strategy. Bioalvo has been introduced to leading pharmaceutical, cosmeceutical and cosmetic companies in the US. In a trip planned for early May, Bioalvo has met with eight companies in four days and closed its first deal ever in the US with AlphaVektor for new lead product discovery. In January 2012, a flagship accomplishment was achieved when FeedZai, a Portuguese company incubated at IPN, became the first company accepted into the Austin Technology Incubator. ATI accepts approximately 6% of all applicants, a fact that confirms Portugal's capacity to create world-class science and technology that leads to commercial application. Further, US Connect has introduced FeedZai to more than 10 potential partners, including IBM and Dell. From these introductions, two business deals have emerged solidifying the role of the US subsidiary in the further of the FeedZai business.

In summary, UTEN has generated a deep and significant economic and social impact in Portugal through training and business development activities. From 2007 to 2012, through the development of a country-wide network of technology transfer offices and professionals, UTEN's actions have contributed, at the university level in Portugal, to a 20% increase in patents granted per year, 26% rise in executed licenses per year, a staggering 137% of increased licensing income, and 132% more new academic spinoff companies, 37% of which exported technology to the world, growing at an average annual rate of 127% in revenue. From 2012 to 2016, with the creation of the Global Startup Program, UTEN had an overall economic impact of \$95 million, translated in venture capital captured from U.S. investors, sales, and trials. Three companies have been spun-out by direct program actions and these ventures generated 67 qualified jobs that had a \$35 million wage impact in Portugal. The total economic impact of this initiative during this period raised to \$130 million, meaning that UTEN actions returned \$40 for every dollar invested by FCT in the program.

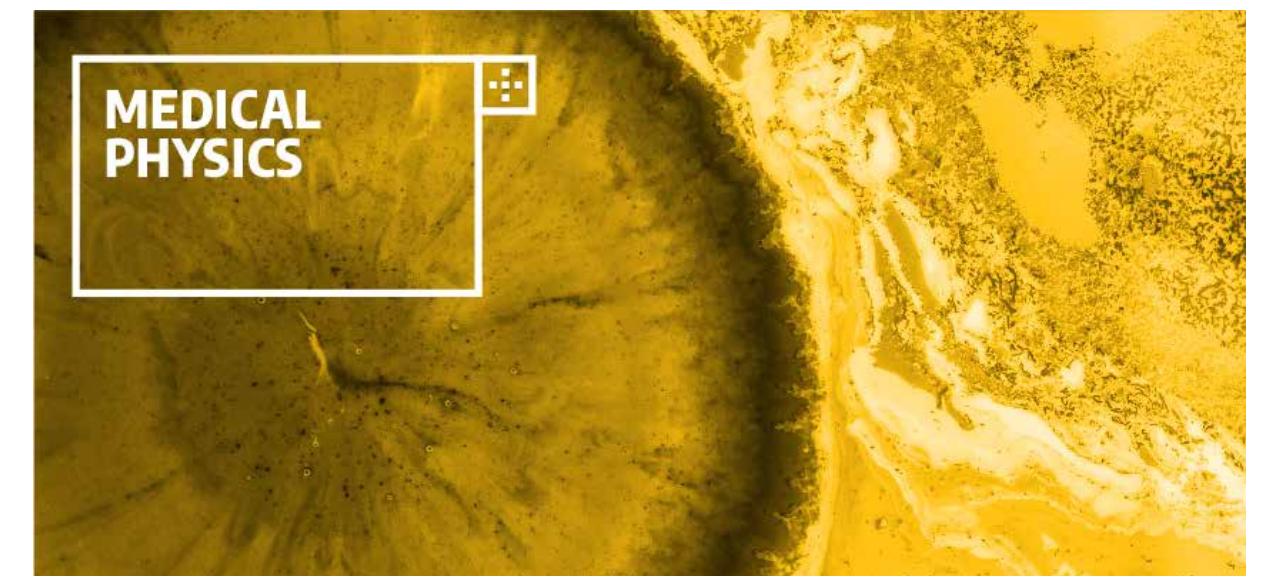
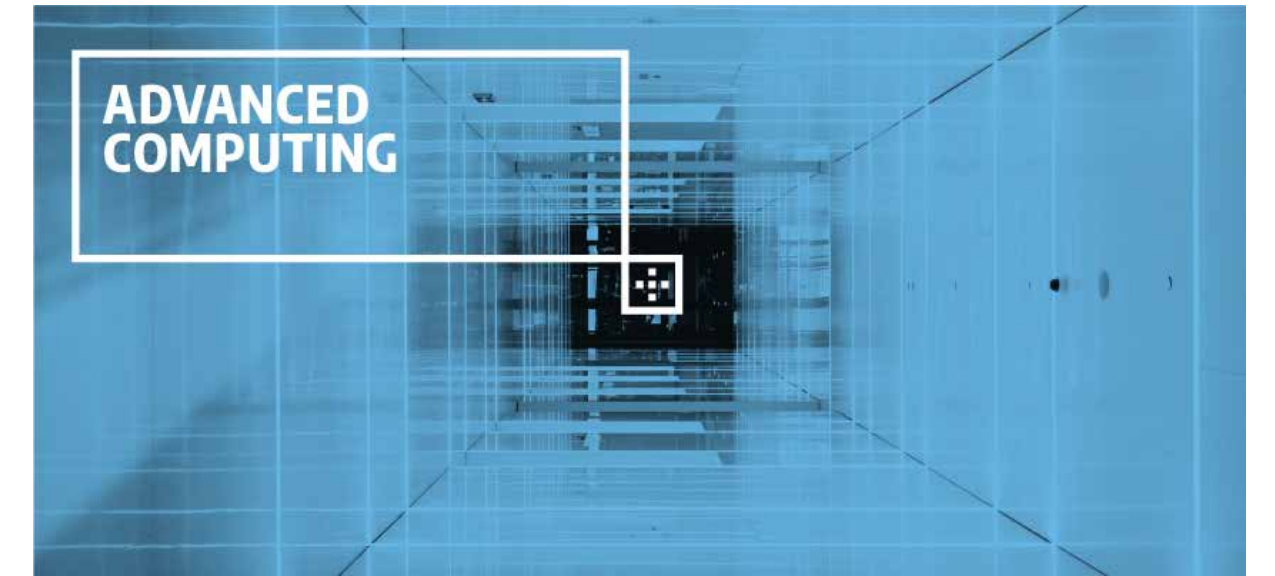
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The New Stage: From 2018 towards 2030

Building on its past experience, the Program aspires now to new and bolder challenges with strong global dimension, for which cutting edge research and innovation can make a significant contribution.

To this end, the Program addresses a number of ground-breaking scientific areas (see section 3.5) whereby Portuguese researchers and industry professionals in Portugal deeply engage with their counterparts from The University of Texas's ecosystem, with UT Austin taking on the leading role on the US side of the partnership.

New areas of knowledge (Medical Physics and Space-Earth Interactions) have been added to the Program's portfolio, coexisting now with other areas inherited from previous editions and where the Program was able to make a difference (Advanced Computing, Nanotechnologies and Technology, Innovation and Entrepreneurship).



The five knowledge areas of the Program are interdisciplinary in their own nature, they foster cross-sectoral, cross-actor collaborations and gear science and technology to some of the greatest challenges our society faces: cancer research; climate change and clean energy; management of natural resources and hazards; increased security of citizens; mobility, just to name a few.

These global challenges have local resonance and, therefore, demand local scale action backed up by coordinated efforts at transnational level. Portugal's geo strategic position between Europe, Africa and America, alongside its unique biodiversity, natural resources, political stability and scientific and innovation capabilities are key to understand the role the country plays and should continue to play in well-orchestrated transnational initiatives to meet some of the most pressing societal challenges.

Therefore the Program's scientific agenda for this new phase is rooted in a number of strategic and evolving R&D+I agendas designed either at national or international level and whose underlying missions or goals cannot overlook Portugal's unique assets.

Additionally, the cooperation with UT Austin has proven fundamental to provide Portugal with access to resources and talent that leverage the country's scientific and technological capabilities in transformative domains, while turning it into a key partner in the design and implementation of cross-border collaborations with high societal value.

These are some of the top-level (inter)governmental initiatives the Program is currently aligned with:

[Resolution of the \(Portuguese\) Council of Ministers no. 28/2018 setting out the strategic guidelines for the creation of a health unit for cancer treatment with proton beam therapy](#)

With more studies showing the superiority of high-energy proton beam therapy in cancer treatment, this resolution of the Portuguese Government offers strategic guidance on the requirements that are key in developing a first-class health unit within the national health system, specialized in the treatment of cancer patients with such advanced form of radiation therapy. As the setting up of this facility calls for interdisciplinary research collaboration, a memorandum of understanding has been signed between FCT and the International Atomic Energy Agency (IAEA) to strengthen technical and trilateral cooperation that should feed research developments into promising clinical applications.

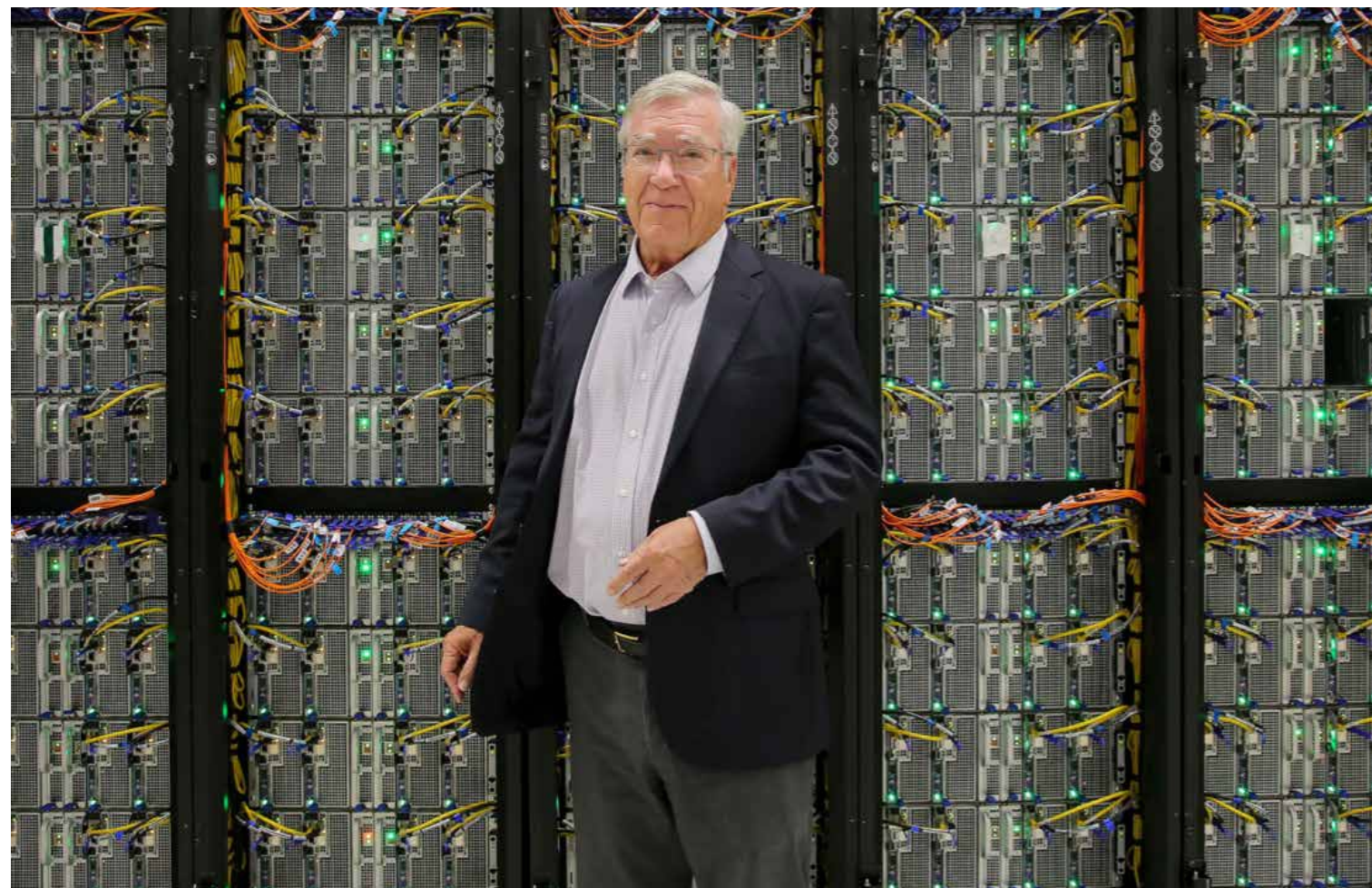
The UT Austin Portugal will be contributing to this endeavour through the establishment of new joint ventures among UT Austin's Dell Medical School and Cockrell School of Engineering, MD Anderson Cancer Center, and Portuguese research groups in medical physics, proton therapies, and radiation oncology. Advanced training and collaborative research projects under the Program should be pushing this area forward.



Visualization Laboratory (Vislab)
Source: Texas Advanced Computing Center



Frontera
Source: Texas Advanced Computing Center



Advanced Computing Portugal 2030

“The Portugal INCoDe.2030 initiative addresses the concept of digital competences in a broad manner. It includes the notion of digital literacy (i.e. the ability to access digital media and ICTs, understand and critically assess contents, and communicate effectively), as well as the production of new knowledge through research, which involves processing information, and communicating, interacting with and producing digital content”.

Underlying INCoDe.2030’s Action 5 – Research, is the National Strategy for Advanced Computing. The main goal of this Strategy is to promote Portugal as a living lab and a key provider of Advanced Computing software, services, and highly-qualified talent, in the hopes of creating an environment where knowledge and talent materialize into added-valued solutions. The strategy converges towards the European Union’s agenda for Advanced Computing and benefits from the country’s participation in the European High-Performance Computing Joint Undertaking (EuroHPC JU), which pools European computing resources in view of developing a network of top-performer exascale supercomputers for big data processing under severe constraints.

The UT Austin Portugal Program has been and will go on contributing to this research agenda through close collaboration with The Texas Advanced Computing Center (TACC), the world’s leader in academic supercomputing. Thanks to the Program, in 2019, the country became home to one of the best performing supercomputers in Europe, brought all the way from TACC to the newly created Minho Advanced Computing Center (MACC). TACC’s Stampede 1 supercomputer, renamed BOB by the Portuguese Minister of Science, Technology and Higher Education in honour of the Program’s former Principal Investigator at UT Austin, played a key role in Portugal’s successful application to host Deucalion, an even more powerful supercomputer that will push the envelope of the country’s computational capabilities in the European landscape.

Under the Program, specific actions and research on data analytics and visualization will be carried out, together with a number of pilot projects to better assess and exploit the use of advanced computing facilities for big data in a variety of domains, including cities, agriculture, fisheries, earth observation, and security, among other application areas.

Source: Portugal INCoDe.2030: https://www.incode2030.gov.pt/sites/default/files/incode2030_en.pdf

Atlantic Interactions

Atlantic Interactions is an intergovernmental initiative focused on unleashing the potential of the Atlantic Ocean as a living laboratory for conceiving and testing science-based solutions for global needs. It brings together decision makers, scientists and industrial partners from Atlantic countries to support, develop and fund integrated approaches to issues related to space, oceans, climate, natural resources and hazards and data science. To this end, the initiative relies on an intergovernmental scientific organization, the Atlantic International Research Centre (AIR Centre), with headquarters in the Azores Islands.

Portugal Space 2030: A Research, Innovation, and Growth Strategy for Portugal and Advanced Computing Portugal 2030 are two national research agendas aligned with the Atlantic Interactions initiative.

The UT Austin Portugal Program is committed to providing opportunities for transatlantic cooperation in focal matters of the initiative through the area of Space-Earth Interactions. Although this is a new addition to the Program, the groundwork for turning it into a core scientific area started some time ago when UT Austin Center for Space Research (CSR) and UT El Paso jointly led a feasibility assessment study on the creation of a spaceport in the Azores islands, requested by FCT.



In 2019, collaboration with CSR went on, this time with the organization of a New Space Hackathon aimed at validating a forward-looking resource for helping thought leaders and decision makers identify and characterize research and business opportunities for Portugal's space sector in and outside domestic borders.

In addition, the involvement of TACC at UT Austin should also become even more relevant for building new data analytics and visualization methods for earth observation and climate change studies.

National Strategy for Entrepreneurship Startup Portugal

Launched by the Portuguese Government in 2016, this strategy has a threefold purpose: to create and support the national ecosystem; to attract national and foreign investors and to accelerate the growth of Portuguese startups in foreign markets.

Drawing on the past activities of the University-Technology-Enterprise Network (UTEN), the Program's cross-cutting area of Technology Innovation and Entrepreneurship will shift to faculty and researchers with entrepreneurial drive, and to early stage venture development, supporting hands-on training actions inspired by successful entrepreneurial and technology commercialization training programs in the United States.

The scientific area of Nanotechnologies is not rooted in any particular governmental initiative but spans most, if not all, of the initiatives mentioned before. It establishes a new research and innovation agenda involving complex materials engineering and science focused on an integrative approach to Nano sciences over diversified applications.

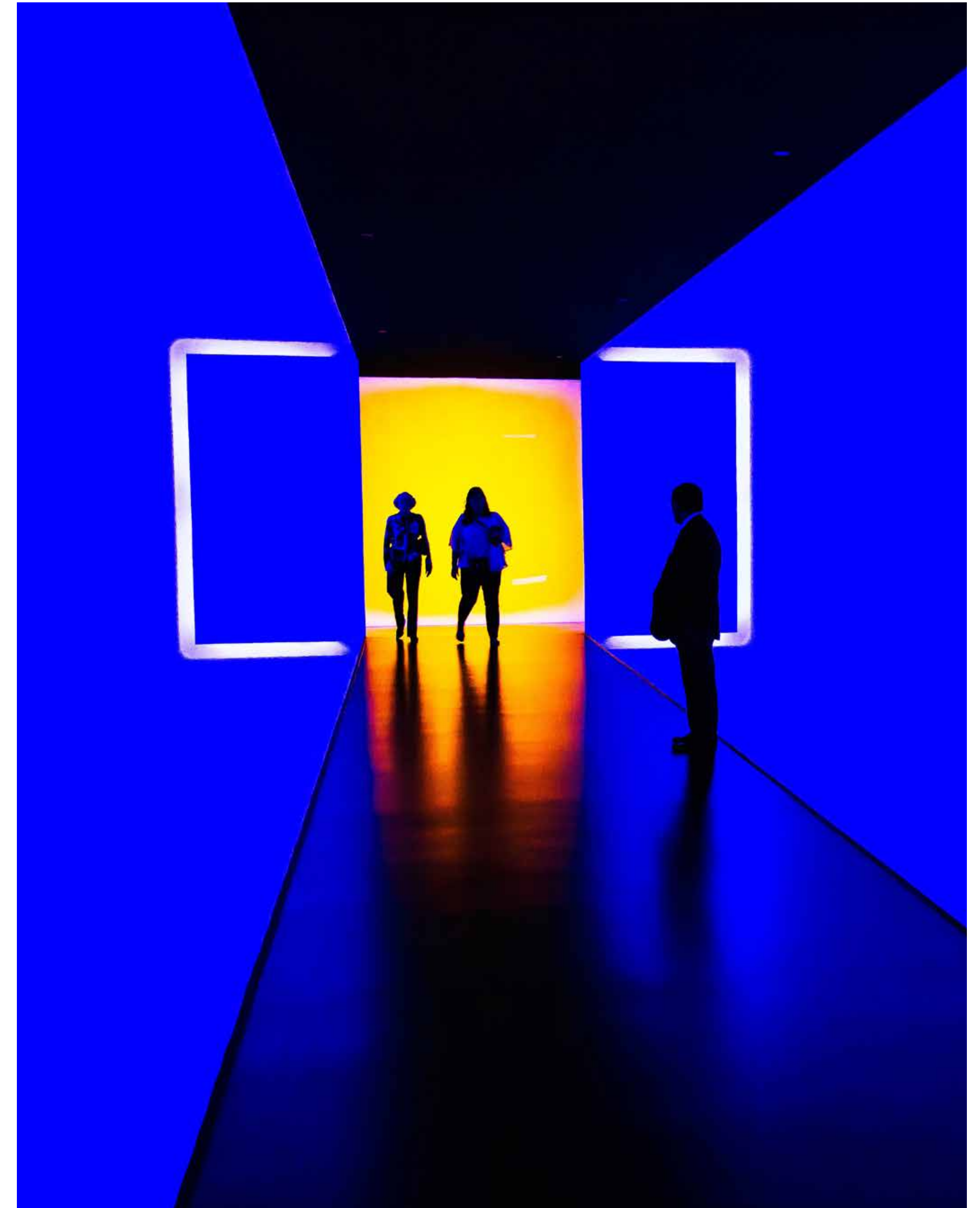
3.4

Strategic Objectives 2018-2030

After a decade of a structured UT Austin Portugal joint venture, it was time to deepen this partnership but in a totally innovative way in order to develop a sound and scientifically relevant research-based agenda at international level, while contributing towards reinforcing Portugal's S&T capabilities in applications domains where the country is capable of becoming a key science-based knowledge and innovation provider in the international landscape.

In the pursuit of tackling major societal challenges, which are intrinsically complex and call for cross-disciplinary, cross-actor and cross-sector collaborations, the Program proposes activities across three structural lines of action that cover the knowledge-to-value chain: education; research; innovation (see section 3.5).

Many of these activities generate additional opportunities for the Program to become an important stakeholder of other research and innovation networks / platforms with common goals (e.g.: AIR Centre) and jointly develop highly synergetic activities. If individually considered such activities are mostly connected to short-term objectives, combined they should be supporting the partnership to meet, over the next decade, a number of strategic objectives set in the following table. In Section 4 of this report, the activities will be presented in detail.



UT Austin Portugal Program - Decade long Objectives: 2018-2030

Technical Annex | UT Austin-Portugal 2018-2030: towards a new decade

Lines of Action or Instruments

Competitive funding for medium to large-scale collaborative research projects:
 — Exploratory Projects
 — Strategic Projects

Advanced training programs in topics at the forefront of knowledge:
 — Explore possibility of implementing affiliated specialized post-graduate programs

Research exchanges of Portuguese and UT Austin faculty, researchers, and graduate students:
 — Explore possibility of implementing a visiting affiliate faculty program

PT-Corps, Customer Discovery Residency in Austin and Mentoring of entrepreneurial projects.

Initiative 1 "CoLab" Flagship Initiatives

Atlantic Interactions

Medical Physics for Emerging Cancer Therapies

High-Performance Computing, Data Analysis and Visualization

Nano Materials for New Markets

Initiative 2

UTEN

Program's Knowledge Areas - Phase 3

SPACE EARTH INTERACTIONS

MEDICAL PHYSICS

ADVANCED COMPUTING

NANOTECHNOLOGIES

TIE | UTEN

2018
2019
Main Activities

- 1) New Space Hackathon Event (Portugal) and Report;
- 2) Interdisciplinary Earth Observation: Land, Ocean, and Atmosphere Workshop (Portugal) and Follow-up Program;
- 3) Participation in the Deep Ocean Observing Strategy Meeting and OceanObs'2019 (Hawaii, USA);
- 4) Participation in the Southeast International Innovation & Commerce Summit: Energy, Ocean Economy and Sustainable Development (Charlotte, USA);
- 5) Tackling Observation Challenges in the Atlantic: The Case of Small Satellite Constellations Workshop (Portugal) and Report;
- 6) Calls for Strategic and Exploratory Research Projects (Space-Earth Interactions topics covered);
- 7) Participation in the Atlantic from Space Workshop (Southampton, UK).

- 1) Calls for Strategic and Exploratory Research Projects (Medical Physics topics covered);
- 2) Conference on Medical Physics (with invited specialists from MDACC and DKFZ) (Portugal).

- 1) Installation of STAMPEDE 1 hardware, renamed BOB (Portugal);
- 2) Opening of MACC (Portugal);
- 3) Portugal's successful application to host Deucalion, as part of the EuroHPC JU (Portugal);
- 4) Training of Portuguese researchers at TACC (Advanced Training Computer Program) (USA);
- 5) Applied Visualization Workshop (Portugal);
- 6) Immersive Training in Advanced Computing: Scientific Visualization (Portugal);
- 7) Masterclass on Quantum Computing (Portugal);
- 8) Participation in Supercomputing 2019 (USA);
- 9) Calls for Strategic and Exploratory Research Projects (Advanced Computing topics covered);
- 10) Participation in the Arm Research Summit 2019 (Austin, USA).

- 1) Calls for Strategic and Exploratory Research Projects (Nanotechnologies-related topics covered);
- 2) Masterclass on Wearables and Advanced Textiles;
- 3) Participation in European Coatings Technology Forum (Germany).

- 1) Participation in the Tough Tech Summit 2019 (Boston, USA) (Further activities in this area are expected after the exploratory and strategic projects from Phase 3' kick-off)

2020

2030

Technical Annex Long-Term Strategic Objectives

Development of computational and observational oceanography research

Quantification of oceans and climate science

Uncertainty characterization

Development of risk assessment tools in oceans and climate science

Installation in Lisbon of a protonics facility for advanced cancer therapies

Start of an international advisory group

Training of radiation oncologists at MD Anderson Cancer Center

Development of a joint initiative on high-energy cancer therapies

Installation of STAMPEDE 1 hardware from TACC in Portugal

Installation of a new platform with higher capacity

Increase the usage of advanced computing resources

Implementation of a comprehensive teaching and support program

Discovery and development of new nano materials

Engagement of national Research institutions and at UT Austin

Engagement of leading industries in the area

Development of PT-Corps

Development of customer Discovery Residency in Austin

Provision of mentoring and professional support

3.5

Key Areas & Lines of Action

As mentioned earlier, the Program elected five key areas of knowledge to create real impact on the ground and in the years to come. Some of these areas are new ventures (Space-Earth Interactions and Medical Physics) while others were already covered in the previous editions of the Program (Advanced Computing, Nanotechnologies and Technology Innovation and Entrepreneurship).

ADVANCED COMPUTING UTAustin Portugal

Big Data / Networks / Super Computing / Quantum Computing / Data Visualization / High Performance

This program area promotes and supports joint projects and training actions on high performance and high throughput computing systems, quantum computing, data science, big data management and visualization, and machine learning, aiming at better exploiting the use of advanced computing facilities at the Texas Advanced Computing Center (TACC), at the newly installed Minho Advanced Computing Center (MACC) in Portugal, as well as in a variety of domains in Europe, including, but not limited to, cities, agriculture, fisheries, space-earth observation, security, and health applications.

Rui Oliveira
Area Director
Advanced Computing in Portugal

Paulo Mateus
Area Director
Advanced Computing in Portugal

Dan Stanzione
Area Director
Advanced Computing at Austin

MEDICAL PHYSICS UTAustin Portugal

Proton Therapy / Diagnosis Treatment / Advanced Training / Radiation Oncology / Healthcare

This program area fosters the establishment of new joint ventures among UT Austin's Dell Medical School and Cockrell School of Engineering, UT MD Anderson Cancer Center, and Portuguese research groups in medical physics, proton therapies, and radiation oncology. This initiative intends to boost the advanced training of oncology radiology experts, aligned with the national strategy for the development of high energy particle beam therapies for cancer treatment.

José Marques
Area Director
Medical Physics in Portugal

Carla Silva
Area Director
Nanotechnologies in Portugal

João Oliveira
Area Director
Medical Physics in Portugal

Paulo Ferreira
Area Director
Nanotechnologies in Portugal

NANOTECHNOLOGIES UTAustin Portugal

Nanoscience / Nanomaterials / Sensing / Nanoparticles

This program area establishes a new research and innovation agendas, involving complex materials engineering and science focused on an integrative approach to nanoscience, over diversified applications. Further research will focus on the discovery and development of innovative nanomaterials, with unique properties suitable for various applications in space, sensing, the internet of things, information technology energy harvesting and storage, and other, with the engagement of leading research organizations in Portugal such as the international Iberian Nanotechnology Laboratory (INL), as well as the National Science Foundation (NSF) Materials Research Science and Engineering Center (MRSEC) for Dynamics and Control of Materials (CDCM).

Brian Korgel
Area Director
Nanotechnologies at Austin

Carla Silva
Area Director
Nanotechnologies in Portugal

Paulo Ferreira
Area Director
Nanotechnologies in Portugal

SPACE-EARTH INTERACTIONS UTAustin Portugal

Space Technologies / Earth Observation / Climate Change / Maritime Safety / Deep Sea Interactions

The agenda on this area foresees transatlantic and north-south cooperation in complex engineering systems and science towards an integrative approach to space technologies, sea, climate and clean energy. It will focus on exploring the potential of integrating spaceborne, airborne, marineborne, along with underwater, data, towards a better understanding of the ocean, including deep-sea areas, and its interactions with the earth and the atmosphere, aiming at improving predictive capabilities under climate change scenarios. This research will be developed together with the Atlantic International Research Center (AIR Center), in the Azores, Portugal.

Lúisa Bastos
Area Director
Space-Earth Interaction in Portugal

Pedro Camanho
Area Director
Space-Earth Interaction in Portugal

Patrick Heimbach
Area Director
Space-Earth Interaction at Austin

TECHNOLOGY INNOVATION AND ENTREPRENEURSHIP UTAustin Portugal

Technology Commercialization / Innovation Internationalization / Venture Mentoring / Business Assessment / Networking

This area provides a comprehensive early venture assessment strategy, leveraging its previous high-impact work in transforming science into valuable technologies for businesses and helping Portuguese technology start-up companies to attain success globally. The UT Austin-Portugal Program intends to further develop commercialization activities in a way that promotes new frontiers of knowledge in emerging areas worldwide, as well as the development of new network opportunities, oriented towards global markets.

Teresa Mendes
Area Director
Technology Innovation and Entrepreneurship in Portugal

João Claro
Area Director
Technology Innovation and Entrepreneurship in Portugal

Marco Bravo
Area Director
Technology Innovation and Entrepreneurship at Austin

ADVANCED COMPUTING



Big Data / Networks / Super Computing / Quantum Computing / Data Visualization / High Performance

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Area Director
Advanced Computing
in Portugal



Dan Stanzione
Area Director
Advanced Computing
at Austin



Rui Oliveira
Area Director
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in Portugal

MEDICAL PHYSICS



Proton Therapy / Diagnosis Treatment / Advanced Training / Radiation Oncology / Healthcare

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Medical Physics
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José Marques
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Brian Korgel
Area Director
Nanotechnologies
at Austin



Paulo Ferreira
Area Director
Nanotechnologies
in Portugal

Carla Silva

Area Director
Nanotechnologies
in Portugal



SPACE-EARTH INTERACTIONS



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Pedro Camanho
Area Director
Space-Earth Interaction
in Portugal



Patrick Heimbach
Area Director
Space-Earth Interaction
at Austin

Luísa Bastos

Area Director
Space-Earth Interaction
in Portugal



Technology Commercialization / Innovation Internationalization / Venture Mentoring / Business Assessment / Networking

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**João
Claro**

Area Director
Technology Innovation
and Entrepreneurship
in Portugal



**Marco
Bravo**

Area Director
Technology Innovation
and Entrepreneurship
at Austin



**Teresa
Mendes**

Area Director
Technology Innovation
and Entrepreneurship
in Portugal

Lines of Action

UT Austin Portugal offers an integrated and consistent approach to the knowledge-to-value chain thanks to its three types of instruments - Research, Education and Innovation.

Education: Create Knowledge. Learn together.

The Program intends to design and organize educational opportunities for Portuguese students, academics and industry professionals ranging from lectures and thematic workshops to advanced training courses and research exchanges in cutting-edge science topics covered by the areas of the Program.

The activities can take place in Portugal and in Austin and they always imply mobility of talent, either of faculty and researchers from UT Austin who come to Portugal to deliver talks, conduct Masterclasses, give hands-on training or of researchers moving from Portugal to Austin to learn and develop new skills and capabilities.

Activities held in Portugal are expected to cater for a higher number of beneficiaries, but may not be as immersive as training schemes happening at UT Austin, in particular when they are designed as short-term training actions. Nevertheless, they can be highly complementary and one type of training does not replace the other.

Research: Create Knowledge. Challenge together.

The Program expects to go on involving researchers at UT Austin and in Portuguese scientific institutions, who, in close association with other institutions, researchers and companies worldwide, are committed to tackling important societal challenges through collaborative research projects.

This line of action of the Program relies on competitive calls, managed by FCT or other sponsors, through which collaborative projects oriented towards the key main scientific areas of the Program are selected, funded and supported:

- Exploratory research projects addressing emerging and transformative R&D topics and encompassing high-risk and high-impact activities;
- Strategic research projects which are large scale, cross-cutting research projects, placing companies at the forefront of new research agendas to make sure that research is turned into innovation with social impact and economic relevance.

By accommodating these two types of projects, the Program covers the entire innovation value chain, supporting both downstream and upstream activities that feed into each other. This means that a groundbreaking or exploratory project could be later developed and matured into a strategic research project.

Innovation: Create Knowledge. Venture together.

The Program expects to foster the development and growth of new Portuguese technology-based business ventures in emerging markets.

This core line of action of the Program focuses on early stage venture development, transforming science into valuable technologies for businesses and societal matters, to invest and increase the knowledge and know-how of entrepreneurs.

Alongside its industry affiliates (see section 3.6) and other institutions, the Program will support entrepreneurial initiatives through:

- advancement of thorough customer discovery to launch and accelerate Portuguese start-up companies;
- mentoring and professional guidance on corporate structure, strategy, business model development;
- training professionals and entrepreneurial teams, facilitating their access to employment, market and funding opportunities, and network growth.

3.6 Governance and Management Model

The UT Austin Portugal Program is a partnership program in Science and Technology between FCT and The University of Texas at Austin. As of January 1, 2018, INESC TEC (Institute for Systems and Computer Engineering, Technology and Science) became the institution accountable for managing and coordinating the UT Austin Portugal Program.



INSTITUTIONAL

José Paulo Esperança

Chair of the Board
Representative of FCT



INSTITUTIONAL

Robert A. Peterson

Representative of the University of
Texas at Austin



INSTITUTIONAL

José Manuel Mendonça

Representative of Portuguese
Universities



INSTITUTIONAL

Célia Reis

Representative of the Industrial
Advisory Board



INSTITUTIONAL

António Vidigal

Representative of the Industrial
Advisory Board

Governing Board

The Governing Board has overall responsibility and assesses the Program's activities, reviews the progress achieved, and approves the activity report and the future plan of activities. The Board meets face-to-face in Portugal at least once a year.

Constituted by one representative of FCT, one representative of The University of Texas at Austin, one representative of Portuguese universities, appointed by FCT, and two representatives of the industrial sector. The Vice-President of FCT chairs the Governing Board.

External Review Committee

The External Review Committee (ERC) is appointed by FCT and consists of academic peers from internationally recognized institutions who serve the Program in an advisory role. The ERC is independent and reviews the scientific progress of the Program periodically, providing a set of detailed recommendations that should then feed into a report to be submitted to FCT and the Program's Governing Board. The report should allow all parties involved to understand whether the Program is taking the right pathways.

The committee's composition should be announced in the first quarter of 2020.

Industrial Affiliates

The Program is established in close collaboration with Portuguese industry affiliates who are very important to help close the gap between research and innovation. Currently, the Program is supported by a group of 10 industrial partners who bring guidance and resources to the Program:



Examples of interactions with industrial affiliates during 2019:

- 4 were Leading Institutions of Strategic Projects applications submitted in June 2019 and 2 others were Participating Institutions. The meetings carried out in the beginning of the year with the industry affiliates of the Program in order to raise awareness of the forthcoming call for Co-Promotion R&D projects have certainly contributed to generating interest among them and leading some to either coordinate or participate in project proposals;
- Manuel Coutinho from Edisoft participated as a Creative on the New Space Hackathon on July 4-5, 2019 at CEiiA;
- Bruno Figueiredo from Graphenest participated as a Speaker in the Workshop at the Ciência 2019 – Science and Technology Summit with a talk on “A provider of graphene-based solutions”;
- Koushik Panda from Deimos gave a talk on “Earth Observation Business” at the UT Austin Portugal Interdisciplinary Earth Observation: Land, Ocean, and Atmosphere Workshop on November 12, 2019 at INESC TEC;
- Nuno Ávila, from Deimos was a Moderator at the first roundtable, José Ferreira, from TEKEVER and Nuno Catarino, from Deimos were both Speakers at the Workshop Tackling Observation Challenges in the Atlantic: The case of small satellite constellations on December 6, at Cascais and hosted by AIR Centre and +Atlantic.

Board of Directors

Composed by two teams, one in Portugal and one at Austin, the Board of Directors guarantees the overall governance of the partnership.

The Directors work collegially to lead the operations of the Program. Its purpose is to establish educational and research agendas among the partnering institutions through specific programs and projects.



José Manuel Mendonça
Director in Portugal



Rui Oliveira
Co-Director in Portugal



John G. Ekerdt
Principal Investigator at UT Austin



Marco Bravo
Co-Principal Investigator and Executive Director at UT Austin



Andreia Passos
Executive Director in Portugal



Rui Oliveira
Area Director of Advanced Computing in Portugal



Dan Stanzione
Area Director of Advanced Computing at Austin



João Oliveira
Area Director in Medical Physics in Portugal



Paulo Ferreira
Area Director of Nanotechnologies in Portugal



Paulo Mateus
Area Director of Advanced Computing in Portugal



José Marques
Area Director of Medical Physics in Portugal



Carla Silva
Area Director in Nanotechnologies in Portugal



Brian Korgel
Area Director of Nanotechnologies at Austin



Luísa Bastos
Area Director of Space-Earth Interaction in Portugal



Patrick Heimbach
Area Director of Space-Earth Interactions at Austin



João Claro
Area Director of Technological Innovation and Entrepreneurship in Portugal



Pedro Camanho
Area Director of Space-Earth Interactions in Portugal



Teresa Mendes
Area Director of Technological Innovation and Entrepreneurship in Portugal



Marco Bravo
Area Director of Technological Innovation and Entrepreneurship at Austin

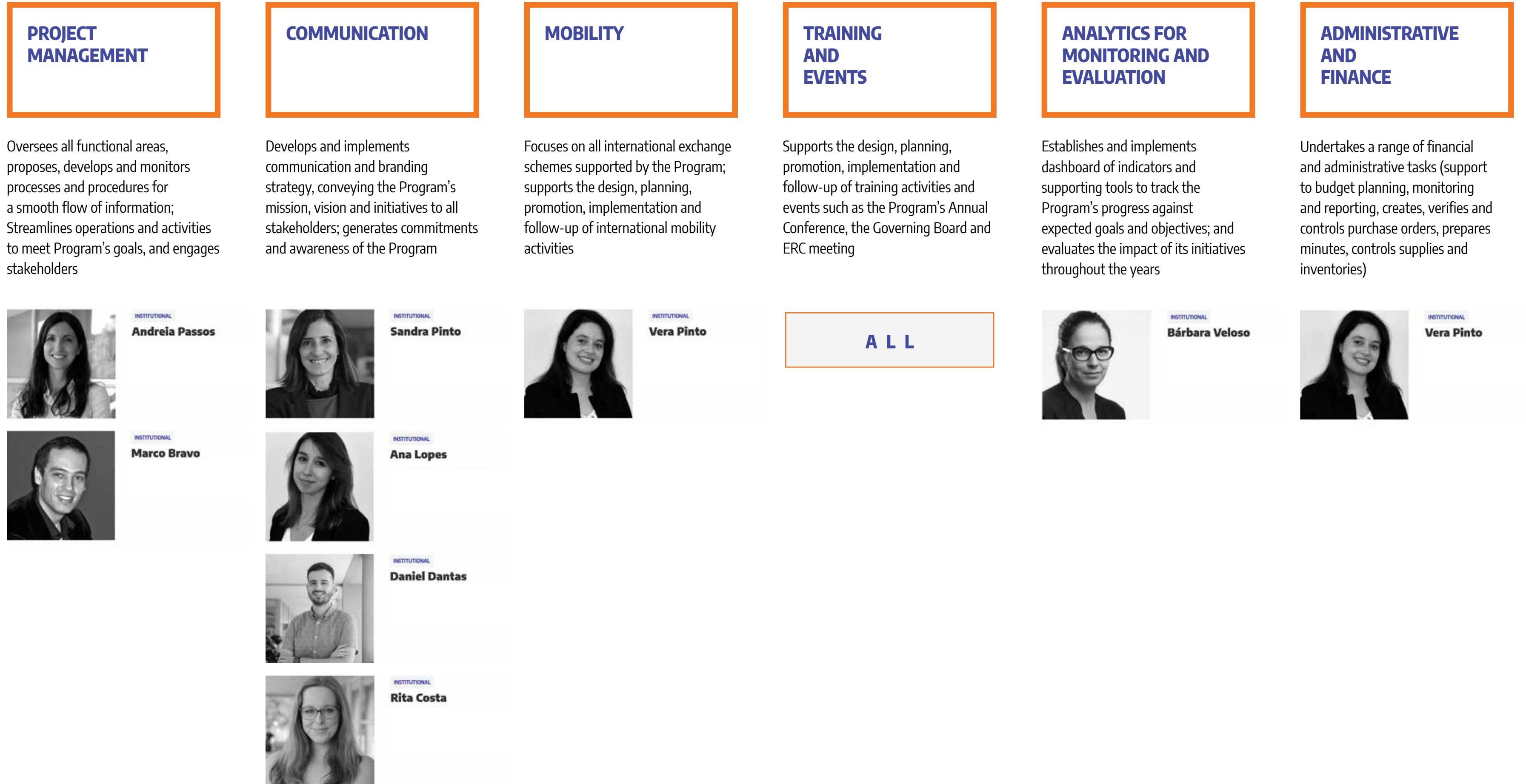
Area Directors

Assigned to each program area, both in Portugal and at UT Austin (with the exception of Medical Physics), the Area Directors assist the Board of Directors in defining and running the Program's initiatives from a scientific standpoint to ensure that education, research and innovation activities with the seal of the Program pursue scientific excellence and are in line with relevant scientific agendas. Their expected contribution is a strategic and consulting one, very much focused on the design of initiatives and mobilization of potential beneficiaries and other interested parties.

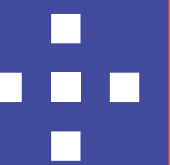
Executive Team

The Board of Directors is assisted by two executive directors – one in Portugal and one at UT Austin – and their respective teams who manage and coordinate the day-to-day activities of the Program; help implement new instruments to address new potential areas of collaboration of strategic interest to the Program; bridge institutional and operational mobilization and coordination of the Program stakeholders, in close contact with multiple higher education institutions, research units, companies, and innovation and entrepreneurship support organizations; communicate to the Program’s community and the public in general the Program’s initiatives, results, and impact.

The team supporting the Program is now organized according to 6 functional areas: Project management, communication, mobility, training and events, analytics for monitoring and evaluation, administrative and finance.



2019 Activity Report



04

2019 work program

2019

JAN

FEB

MAR

APR

MAY

JUN

JUL

AUG

SEP

OCT

NOV

DEC

ADVANCED COMPUTING TRAINING PROGRAM

CALL FOR CO-PROMOTION R&TD PROJECTS

CALL FOR EXPLORATORY RESEARCH PROJECTS

2017 Exploratory Research Projects (Phase 2)
Extension Requests Analyzed

- Applied Visualization Workshop
June 7-8
- Immersive Training in Scientific Visualization
June 11-14

New Space Hackathon
July 4-5

- Masterclass I: Quantum Computing
September 20
- Masterclass II: Wearables and Advanced Textiles
September 20

Interdisciplinary Earth Observation
November 11-12

- Tackling Observation Challenges Workshop
December 6
- New Challenges in Medical Physics Conference
December 12-13

Area Director's mission to UK

Nano Sessions

UT Austin Portuguese delegation visit

Call for Expressions of Interest

Start of collaboration with TACC's Communications, Media and Design Department

New Website Launch
Start of collaboration with Cockrell School of Engineering's Communications and Marketing Team

Signature of the Program's Management Contract
14 June

Call for Posters (Annual Conference)

Area Director's mission to Japan

Ciência 2019

MACC INAUGURATED

NOVEL NANOGEL AWARD

CHEMISTRY NOBEL PRIZE AWARDED TO UT AUSTIN'S JOHN GOODENOUGH

DEUCALION AGREEMENT SIGNED

Area Directors' missions to Charlotte, Austin & Hawaii

Visit to MACC
Annual Conference

New Institutional Video

Area Directors' missions to Austin, Boston and Germany

MIT Aerospace Engineering

Call for Cooperation Profiles for Matchmaking

Area Director's mission to Denver

Legend

- Activities under Lines of Action
- Communication Activities
- Stakeholders' Engagement Activities
- OTHER EVENTS

4. 2019 Activity Report

This section takes a look at the main structural activities carried out by or involving the Program during the reporting period of January 1, 2019 up to December 31, 2019. Additionally, stakeholders' engagement activities, including communication efforts and related outreach, are also highlighted here.

The section ends with a critical analysis of the main challenges encountered during the implementation of the 2019 work plan and with a glimpse of what 2020 holds for the transatlantic partnership.

4.1 Main Achievements of the Program

This has been an important year in the Program's alignment towards 2030 as significant progress has been made since the start of the partnership's third phase, in 2018. It has been, first and foremost, a year for sowing the seeds of transformative collaborations that should come to fruition over the next coming years.

On an operational level, the Program was able to undertake several research and education activities and connect with relevant actors, both at national and international levels, acting in scientific or application domains related to the Program's core areas of knowledge. This is something to be valued, in particular in the new areas that have been added to the Program's agenda (Space-Earth Interactions and Medical Physics), where additional networking efforts had to be made with a view to raising awareness about the Program and getting the right people and institutions on board for collaboration.

Notwithstanding some contextual constraints, which will be critically analyzed in section 5 of the report, management did faithfully execute on the overall strategy as seen through the diverse actions taken to leverage the Program's presence within the academic, research and business communities.

At the end of 2019, the following achievements must be highlighted:

- Setting up of the Minho Advanced Computing Center (MACC);
- Implementation of an advanced training scheme in partnership with TACC;
- Launch of two competitive calls, managed by Portuguese funding agencies, for collaborative projects oriented towards pre-defined research and innovation agendas;
- Increased visibility of the Program, through enhanced communication outreach;
- Organization of several training and networking activities in practically all areas of the Program in partnership or with the support of relevant stakeholders.

Setting up of the Minho Advanced Computing Center (MACC)

MACC was inaugurated in July 2019 through the installation, in the Riba d' Ave data center, of 800 supercomputer nodes, with a memory capacity of 266TB, 1PB storage capacity and 1 PF calculation performance, transferred from TACC - Texas Advanced Computing Center, under the collaborative joint venture UT Austin Portugal.

The supercomputer BOB - designated in appreciation to professor Robert A. Peterson for his leadership of the UT Austin Portugal Program between 2007 and 2017 and his vision to foster global research and innovation communities - has been decisive to bring Deucalion to Portugal. Deucalion is among the 8 new European supercomputers and, together with BOB, will turn MACC into one of the advanced computing centers of a world-class pan-European supercomputing infrastructure, the EuroHPC network.

MACC will enable numerous breakthroughs when it comes to digital processing of information and is expected to create great opportunities for Portuguese scientists and companies, thus contributing to strengthening Portugal's scientific and technological capabilities and industrial competitiveness in the international landscape.

Implementation of an advanced training scheme in partnership with TACC

The full exploitation of MACC's capabilities and benefits is very much dependent on having a community of users, both from academia and the industry, profoundly knowledgeable about how to use the available computational infrastructure to meet their specific research or business needs. At the same time, the country needs to have advanced computing experts who can assist and train such users to identify, develop, monitor and evaluate advanced computing technologies.

In anticipation of these needs, in 2018, the Program took advantage of FCT's instrument known as "mobility fellowships" and launched two competitive calls aiming at selecting high-profile candidates in Portugal to take part in a pilot training scheme at TACC, the world's leader of academic supercomputing, specially designed for the joint venture UT Austin Portugal. In 2019, 8 out of 14 admitted candidates from Portuguese organizations were able to benefit from a comprehensive educational hands-on and semi-tailored pilot program at TACC, which should inspire similar new mobility opportunities attached to training goals in the coming years and with the support of FCT.

Launch of two competitive calls, managed by Portuguese funding agencies, for transatlantic collaborative projects oriented towards pre-defined research and innovation agendas

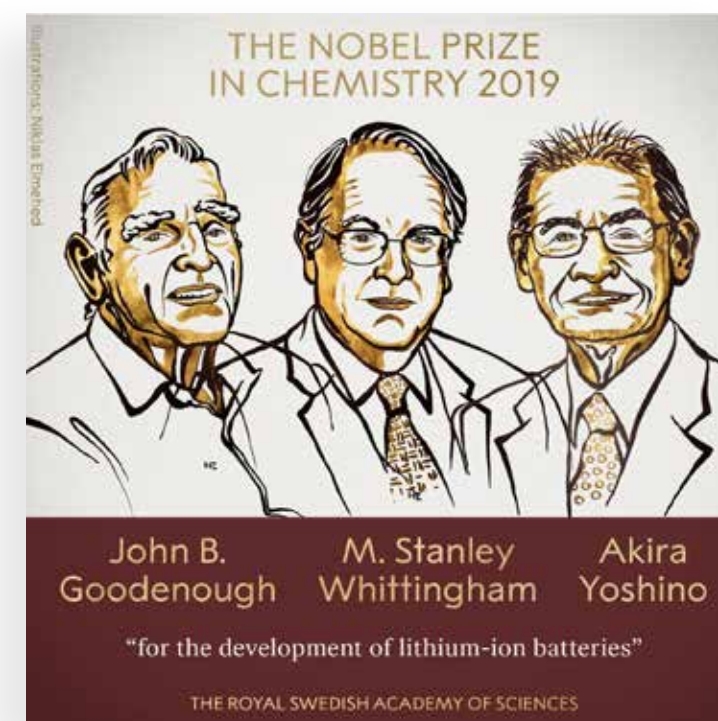
The launch of two competitive calls for projects proposals was also important to ensure support of the Program to research activities along the knowledge-to-value chain and reinforce alignment with both national and international research agendas.

Increased visibility of the Program, through enhanced communication outreach

The reinvigorated ambition the UT Austin Portugal joint venture seeks to convey has prompted the team in Portugal to develop a totally new communication approach, being the launch of the new website one of, if not the most important milestone of the Program's 2019 Communication Plan. The Program's increasing visibility comes now from its internal and external communication activities, directly promoting calls for projects, training programs, key achievements of projects supported either by the Program (1) or its main stakeholders, international prizes awarded to world recognized fellows belonging to UT Austin, such as the 2019 Nobel Prize for Chemistry, John Goodenough (2) or any of the Program's industrial or academic partners, and organizing different types of events (including matchmaking and networking activities), either for more influential players or for the public, at large.

(2) <https://utaustinportugal.org/media-post/john-goodenough-beyond-the-nobel-in-chemistry/>

The Nobel Prize in Chemistry 2019
Source: The Nobel Prize (Twitter)



(1) <https://news.utexas.edu/2019/09/27/novel-nanogels-hold-promise-for-improved-drug-delivery-to-cancer-patients/>

UT NEWS

MENU



SCIENCE & TECHNOLOGY

© Sep 27, 2019

Novel Nanogels Hold Promise for Improved Drug Delivery to Cancer Patients



With new areas of knowledge side by side with former ones, the Program needed to mobilize new potential beneficiaries and interested partners and still be able to retain and go on attracting existing contacts. Approach to such target profiles ranged from tailored to mass communication, to careful hand-picking of contacts in LinkedIn to insertion of a new tick box in event registration forms, whereby registrants could opt for being added to the Program's MailChimp database and subscribe the Program's newsletter.

The Annual Conference, held in September 20, and the first since the start of Phase 3, was a major highlight in the Program's list of events organized in the course of 2019. More than 100 people gathered for a full day at University of Minho to learn about the challenges of innovation commercialization and the hottest topics on Quantum Computing and Wearables and Smart Textiles and get to know breakthrough research projects spanning all areas of the Program.

In 2019, one of the goals of the communication strategy was also to create and reinforce links with communication teams at UT Austin to increase awareness about the Program among potential beneficiaries of the partnership's lines of action on the US side.

Organization of several training and networking activities in almost all areas of the Program in partnership or with the support of relevant stakeholders

Drawing on the steady achievements of the communication strategy for 2019, and taking advantage of a growing community of stakeholders and the commitment of the Area Directors, the Program was able to cater for the majority of its knowledge areas with several training and networking activities in the course of the year, acting either as the main coordinator or as an associate partner.

In the course of 2019, the Program was particularly focused on building up the relationship with partners AIR Centre and Portugal Space, as evidenced by the joint organization of the New Space Hackathon, in July, under the coordination of Burke Fort from the UT Austin's Center for Space Research or of the technical workshop on an all-Atlantic small satellites constellation, held in Cascais in December; or even the participation of the Program's Leadership, in September, at the 2019 Southeast – International Innovation & Commerce Summit, hosted by Professor Yesim Sireli from the University of North Carolina at Charlotte and coordinated by AIR Centre.

4.2 Implementation of the 2019 Work Program

Committed to achieving the targets set out in the Technical Annex for Phase 3, the international partnership in 2019 used the funding made available either directly or indirectly by the Program's main sponsor, FCT, to develop and implement several activities across the different scientific areas and framed by the existing lines of action.

Activities carried out under Line of Action “Research”

In 2019, the Program was involved in two calls for project proposals, one published by COMPETE2020 and the other by FCT. Additionally, the Program organized profile matchmaking initiatives and monitored, from a scientific standpoint, ongoing projects from the 2017 Exploratory Research Projects Call.



2019 Call for Expressions of Interest to support Mapping of R&DI Competencies

Call for Expressions of Interest to support Mapping of R&DI Competencies

FEBRUARY—MARCH




Cooperation Profiles for Faculty Matchmaking - 2019 Call for Exploratory Research Projects

Call for Cooperation Profiles for Faculty Matchmaking

SEPTEMBER—DECEMBER




Call for Co-Promotion R&TD Projects - International Partnerships

Call for R&TD Projects in Co-Promotion - International Partnerships



MARCH—JUNE



2019 Call for Exploratory Research Projects (ERPs)

Call for Exploratory Research Projects



NOVEMBER—JANUARY 2020

Call for Co-Promotion R&TD Projects (Strategic Projects) – International Partnerships

Between March 13 and June 19, for the first time at the framework of Portugal2020, a call for research projects with the scientific seal of the three existing partnerships with American universities (the University of Texas in Austin, Carnegie Mellon University (CMU) and Massachusetts Institute of Technology (MIT)) was launched.

The call placed at the heart of proposal design the main priorities of the National and Regional Research and Innovation Smart Specialization Strategy for the period 2014-2020 alongside the Atlantic Interactions' strategic research agenda.

Submitted proposals had to configure international consortia-based innovative projects led by Portuguese companies, partnering with, at least, two non-corporate research organizations in Portugal and, at least, two Principal Investigators (PIs) at UT Austin (or at UT MD Anderson Cancer Center, for proposals in the area of Medical Physics).

With companies setting the pace and the scope of research activities, awarded consortia would have to be highly committed to creating or developing, in a three-year timeframe and in, at least, one of the four areas of the Program, new or significantly improved market applications, with the potential to drive economic growth. Cross-pollination of scientific areas in submitted proposals was particularly encouraged, as breakthrough innovations often come out of unexpected intersections of disciplines.

A top-down approach: scientific topics addressed by the call and within the scope of the Program:

- Space-Earth Interactions;
- Medical Physics for Emerging Therapies;
- Advanced Computing, Quantum Computing, Data Analysis and Visualization;
- Nano Materials for New Markets.

Available funding for the Program's strand in the Call:

A minimum of 5 (five) million euros was available to fund Portuguese partners in projects submitted under this Partnership. Each project should not exceed, for the total duration of the 3 years, 1,25 million euros for the Portuguese consortium.

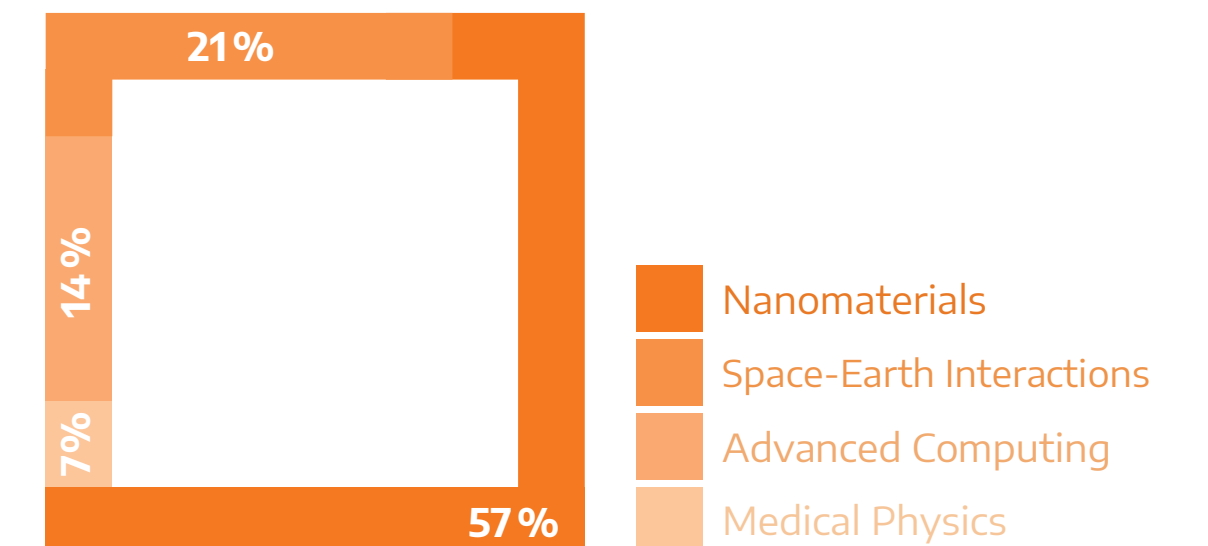
PIs from UT Austin would not be funded by the Portuguese Call. They would be directly funded by the UT Austin Portugal Program's budget available at UT Austin (up to one million dollars for each approved project from a total budget of 5 million dollars devoted to this call by the American partner).

Call Management and Evaluation of Proposals

The Program was neither accountable for conducting eligibility checks nor for evaluating proposals. However, the Program was consulted by Agência Nacional de Inovação (ANI) and FCT on the required expertise for the evaluation panel.

According to information provided by ANI, 14 applications over the 4 selected strategic areas were submitted to the call under the Program's strand – see Graph "Applications received under the Call for Co-Promotion R&TD Projects, by scientific topic and consortia analysis" (against 17 applications submitted under CMU Portugal and 10 under MIT Portugal). In the proposal stage, 37 organizations in Portugal collaborated with 12 partners at UT Austin. Applicants should be notified about the outcomes of project evaluation by the end of the first quarter in 2020, and grants should be signed afterwards.

APPLICATIONS RECEIVED UNDER THE CALL FOR CO-PROMOTION R&TD PROJECTS, BY SCIENTIFIC TOPIC AND CONSORTIA ANALYSIS



Dissemination and Matchmaking activities

The Program played an important role in promoting the call among potential applicants and interested partners through its different communication channels, and even developed a FAQs section on its website to clarify critical components of the call to applicants in Portugal and at UT Austin as well.



With a view to facilitating partner search for international consortia composition, and in addition to some meetings held with companies that had expressed interest in submitting proposals to the call, the Program released a form to be filled in by individual researchers at UT Austin and in Portugal with information about their competencies, research interests and partner search requirements.

Part of the information collected through this form led to the production of a portfolio with cooperation profiles from UT Austin which was then distributed among individuals in Portugal, either with submitted forms or representing the Program's Industrial Affiliates.

From this pool of profiles, 6 PIs at Austin and 7 companies in Portugal submitted joint applications in the call for projects that followed. This matchmaking activity would inspire the creation of a public partnering opportunity database, available at the Program's website, and specifically linked to the 2019 Call for Exploratory Research Projects.

Call for Exploratory Research Projects

A call for Exploratory Research Projects (ERPs) opened in November 6 until January 8, 2020. The Program was accountable for writing and proposing the call's Terms of Reference (ToRs), while adhering to the sponsor's applicable funding rules. The main goals underpinning the drafting of these ToRs were two: explore unexplored paths and support riskier experimentation in topics of the four scientific areas of the Program.

The ERP call was therefore designed to assist teams of researchers from non-corporate entities of the National Scientific and Technology System and The University of Texas at Austin, alongside industry partners, by bootstrapping high-impact potential research activities of strategic relevance for the UT Austin Portugal Program. Proposals needed to stimulate and strengthen Portugal's international competitiveness and innovation capacity in Science and Technology (S&T) in the scientific areas addressed by the call, with a focus on the opportunities provided by the data economy as a driver of growth and change. They also had to configure groundbreaking, high-risk/high-reward projects, and hold promise of moving into higher Technology Readiness Levels.

Although ERPs are not expected to achieve, during their execution timeline, the fully developed and ambitious results that are typical of longer-term projects, proposals would have to be very concrete on the activities and outcomes that the consortium would undertake and achieve within the scope of the ERP, and clearly link them to longer-term objectives. ERPs needed to value impact, i.e., propose potential solutions to real-world problems, going beyond the production of research papers.

A top-down approach: scientific topics addressed by the call and within the scope of the Program:

- Advanced Computing (High Performance Computing, High Throughput Computing and Quantum Computing);
- Medical Physics for Emerging Cancer Therapies;
- Nano Materials for New Markets;
- Space-Earth Interactions.

Available funding

A total budget of 400,000 euros was available for Portuguese research institutions, with each project awarded up to 50,000 euros to fund the research work conducted by the Portuguese team. Participating researchers at UT Austin would be funded by the UT Austin counterpart of the Program at a similar level.


Dissemination and Matchmaking Activities

Besides promoting the call through a campaign-style approach and preparing a FAQs section that was embedded in the call's online page, the UT Austin Portugal Program invited PIs at UT Austin and in Portugal to create and submit cooperation profiles to be disseminated through the Program's website and with the main purpose of facilitating and accelerating the creation of partnering opportunities for the call for Exploratory Research Projects. This time, received profiles were made public.

The matchmaking profile included the following information:

- a. The PI's short bio, highlighting their research work and interests;
- b. Up to 6 keywords describing the PI's area of expertise;
- c. Area (or areas) of the Program the PI's project idea best fits in;
- d. Expertise the PI behind the profile is looking for from potential UT Austin or Portuguese partners to build and submit an ERP proposal;
- e. The PI's contact details: First name and last name; affiliation institution; preferred mode of contact.

Below are some examples of the 54 profiles available to view at the Program's website:



Jah Moriba
The University of Texas at Austin


Areas of Interest: Astrodynamics, Spacecraft Navigation, Space Situational Awareness

Name: Jah Moriba
Role: Associate Professor, Aerospace Engineering and Engineering Mechanics
Institution: The University of Texas at Austin
Contact: moriba@utexas.edu

Key Words / Areas of Interest: Astrodynamics, Spacecraft Navigation, Space Situational Awareness

Expertise Sought: I'm looking for expertise in Uncertainty Quantification (aleatory and epistemic), multi-fidelity dynamics modeling, big data science and analytics, ontology development and implementation, and multi-source information fusion.

Bio:
Moriba Jah is the director for Computational Astronautical Sciences and Technologies (CAST), a group within the Oden Institute for Computational Engineering and Sciences at The University of Texas at Austin. He is also the Lead for the Space Security and Safety Program at the Robert



Inês Domingues
IPO Porto Research Centre


Areas of Interest: Machine Learning, Deep Learning, Pattern Recognition, Image Processing, Biomedical Applications, Cancer

Name: Inês Domingues
Role: Post doctoral researcher
Institution: IPO Porto Research Centre (I-IPOP)
Contact: ines.domingues@isec.pt

Key Words / Areas of Interest: Machine Learning, Deep Learning, Pattern Recognition, Image Processing, Biomedical Applications, Cancer

Expertise Sought: - Small data
- Data protection
- Text Mining
- Medical Image Acquisition
- Medical Image Formation

Bio:
Inês Domingues graduated in Applied Mathematics in the School of Sciences at the University of Porto in 2004, completed a Masters degree in Electrical and Telecommunications Engineering at Aveiro University in 2008 and finished the PhD in Electrical and Computer Engineering in the School of Engineering at the University of Porto in 2015 (Cum Laude). She is currently a post doctoral researcher in the ESTIMA project, Member of the Medical Physics, Radiobiology and



Donglei (Emma) Fan
The University of Texas at Austin


Areas of Interest: Nanomanufacturing, 3D porous materials, micro/nanorobotics, biochemical sensing, self-powered sensors and flexible energy devices, graphene/graphite/nanowires.

Name: Donglei (Emma) Fan
Role: Associate Professor
Institution: The University of Texas at Austin
Contact: dfan@eectm.utexas.edu

Key Words / Areas of Interest: Nanomanufacturing, 3D porous materials, micro/nanorobotics, biochemical sensing, self-powered sensors and flexible energy devices, graphene/graphite/nanowires

Expertise Sought: We are interested in collaboration in a variety of areas depending on specific projects. We are particularly interested in partnering with colleagues who are skilled in computer simulation, device packaging, commercialization, or having expertise in specific types of devices.

Bio:
Dr. Donglei "Emma" Fan is an Associate Professor in the Department of Mechanical Engineering and the Graduate Advisor of the Materials Science and Engineering Program at The University of Texas at Austin. Among various honors and awards, Prof. Fan received the National Science



António José Ribeiro Neves
University of Aveiro

Areas of Interest: Image processing, intelligent systems, machine learning, robotics, data compression.

Name: António José Ribeiro Neves
Role: Assistant Professor
Institution: University of Aveiro
Contact: anj@ua.pt

Key Words / Areas of Interest: Image processing, intelligent systems, machine learning, robotics, data compression.

Expertise Sought: Researchers with background in machine learning and image processing with interests in the application of High Performance Computing to solve practical challenges that involve a huge amount of image data.

Bio:
Over the last 15 years I have been using computers to solve complex problems in the field of signal processing and image compression, which have been my main research areas, as well as in the exploration of other research areas. During the last 12 years as an assistant professor, I have carried out research duties that have enabled me to broaden my horizons, from robotics and Intelligent Systems to bioinformatics, with more than 150 publications in these areas and collaboration in

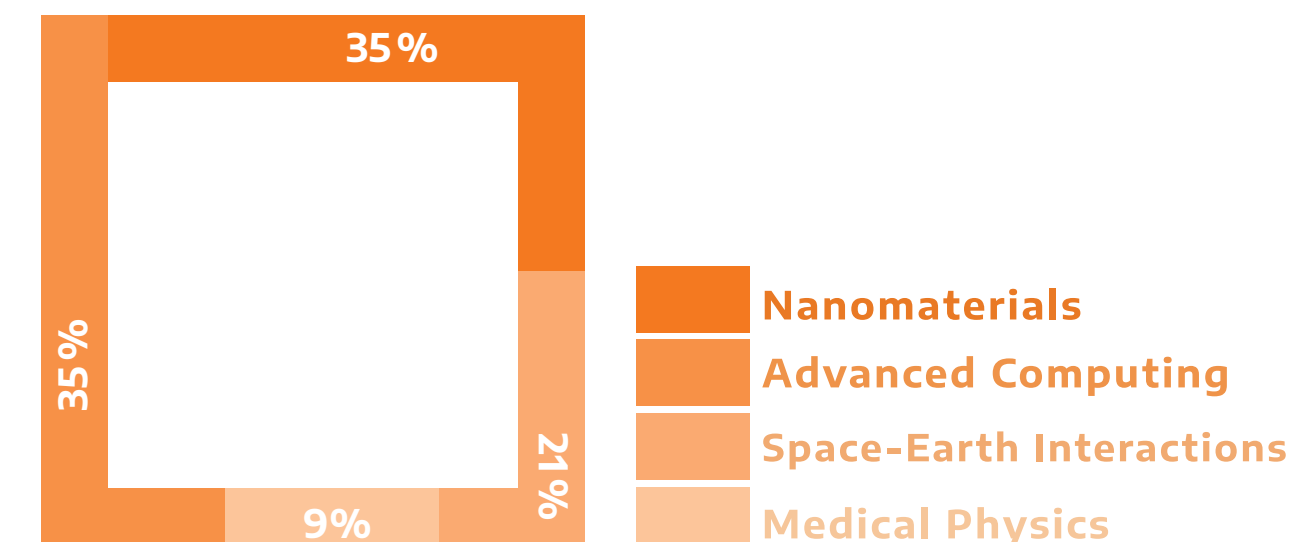
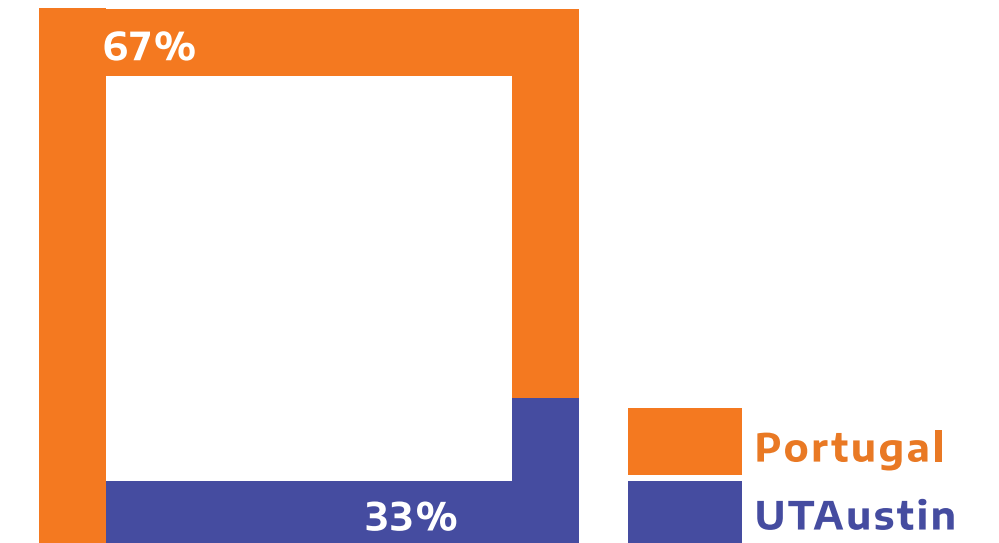
In addition to creating and actively promoting a partnering opportunities database, the Program wanted to help participants quickly find potential partners. To this end, through a thorough data analysis process, the Program was able to identify over 80 direct matches between all profiles, being some of the most popular keywords machine learning, nanoparticles, and energy systems. 40% of all profiles had 4 or more matches.

The added-value resulting from this data analysis activity was that the Program was capable of recommending profiles to participating individuals through targeted, tailored e-mail messages with the goal of reducing the time they would probably spend searching for a potential match and get them started with proposal planning.

Number of received proposals

Outcome analysis only possible to conclude once the call for the projects is closed on January 8, 2020 and the Program can assess actual partnerships established.

COOPERATION PROFILES RECEIVED UNDER THE MATCHMAKING ACTIVITY FOR THE CALL FOR EXPLORATORY PROJECTS, BY SCIENTIFIC AREA AND SPLIT BETWEEN PORTUGAL AND UT AUSTIN



Projects from previous calls

Between September and November 2019, FCT approved 13 project no-cost extension requests out of the 14 projects granted funding in the 2017 Call for Exploratory Research Projects.

The most frequent reasons for requesting a no-cost extension period related to delays in the recruitment process of qualified researchers for the project team and to unexpected scientific constraints due to the very own exploratory nature of such projects.

FCT's decision was based on a number of criteria, including the Program's scientific assessment of such requests. All assessments carried out by the Program supported the granting of the extension period to the involved Principal Investigators. Most of the projects provided evidence of effective international cooperation with some joint scientific articles produced or on the go and dissertation thesis supported on both sides of the partnership.

Nevertheless, whenever appropriate, the Program did not hesitate making recommendations to projects that seemed to be falling behind their work schedule. Although such projects were not funded under the international partnerships' Phase 3 budget, in the course of 2019, several news pieces were written and published shedding light on their goals, the research teams behind them, the work in progress, awards and prizes received, and expected impact on society.

The 2017 Exploratory Research Projects will go on being monitored over 2020, with the Program looking in particular to the following performance indicators: joint papers and oral communications produced; academic dissertations and theses produced in Portugal and at UT Austin; organization of workshops or other scientific events to promote the project; participation in workshops or other scientific events upon invitation to promote the project; patents filed, pending or published; prototypes and demonstrators; awards or prizes received; other funds raised to expand the project goals; and collaboration with industry.

The Program expects to give visibility to these outcomes in the future through the publication of success stories as well as of interviews with the PIs involved. The full list of these projects can be found below:

Exploratory Research team expects to decrease the side effects of anticancer drugs

October 9, 2019



The principal investigators of project DREAM are developing a different approach for HPV infection therapy, expecting to improve the effectiveness of patient treatment.

The exploratory research project DREAM, coordinated by Principal Investigators Carla Cruz ([Faculty of Health Sciences of the University of Beira Interior](#)) and Andrew Ellington ([College of Natural Sciences, The University of Texas at Austin](#)), consists of a vehicle-drug nanosystem capable of solving the lack of selectivity of the aptamers that intends to minimize the side effects of the anticancer drugs. This novel method, ultimately, hopes to prevent healthy tissues to be targeted by the toxins, delivering drugs to the dying cells only.

Recently, their work was recognized by the [Portuguese Association for Cancer Research \(ASPIC\)](#) and highlighted in its [website](#). The investigators are committed to spread awareness about the work they are conducting, reinforcing the key role of their multidisciplinary team during this journey.

This month, we conducted an interview with Carla Cruz and Andrew Ellington, who are now starting "the in vivo stage of compound testing", about their differentiating methodology and the direct effects of nanosystems on cancer patients and long-term cancer therapies.

Example of news piece published at the Program's website

Acronym	Project Title	Scientific Area	Leading Institution in Portugal	PI in Portugal	Leading Institution in UT Austin	PI in UT Austin	Start Date	Revised End Date
STREACKER	Skeletal Tracking Enhanced with Anatomically Correct Kinematics for Exergames and Rehabilitation	Advanced Computing	“Instituto de Engenharia de Sistemas e Computadores, Investigação e Desenvolvimento”, Lisbon (INESC ID/INESC/IST/ULisboa)	Daniel Simões Lopes	Walker Department of Mechanical Engineering, Cockrell School of Engineering	Richard Neptune	01/10/2018	31/03/2020
ISEA	Immersive virtual reality environments to evaluate audience attitudes about science communication projects: a pilot study of deep sea ecosystems	Space-Earth Interactions	Faculty of Sciences of the University of Porto (FCUP)	Carla Morais	Stan Richards School of Advertising & Public Relations, Moody College of Communication	Lucy Atkinson	01/11/2018	30/04/2020
MEPHEES	Nanostructured transition Metal Phosphides for Electrochemical Energy Storage	Nanotechnologies	International Iberian Nanotechnology Laboratory (INL)	Lifeng Liu	Walker Department of Mechanical Engineering, Cockrell School of Engineering	Guihua Yu	01/11/2018	15/02/2020
UT-BORN PT	Unconventional Thermoelectrics Based on Self-Organized Binary Nanocrystal Superlattices	Nanotechnologies	International Iberian Nanotechnology Laboratory (INL))	Yury Kolen'ko	McKetta Department of Chemical Engineering, Cockrell School of Engineering	Brian Korgel	01/11/2018	30/04/2020
Electrowave	ELECTROWetting heat pipes for cooling Applications in Electric Vehicles	Nanotechnologies	Association of Instituto Superior Técnico for Research and Development (IST-ID)	Ana Sofia Moita	Walker Department of Mechanical Engineering, Cockrell School of Engineering	Vaibhav Bahadur	01/12/2018	31/05/2020
STorM	Atmosphere – Ocean – Solid Earth Coupling: Seismic Tools to Explore and Monitor the Oceans	Space-Earth Interactions	FCiências.ID – “Associação para a Investigação e Desenvolvimento de Ciências” (FCiências.ID)	Susana Custódio	Department of Aerospace Engineering and Engineering Mechanics, Cockrell School of Engineering and Oden Institute for Computational Engineering and Sciences	Tan Bui-Thanh	06/11/2018	05/05/2020
DGCOAST	Modeling and Analysis of Coastal Hydrodynamics and Erosion	Space-Earth Interactions	Association of Instituto Superior Técnico for Research and Development (IST-ID)	Juha Hans Videman	Aerospace Engineering and Engineering Mechanics, Cockrell School of Engineering	Clint Dawson	01/11/2018	31/10/2020
DREAM	Drug delivery nanosystem for HPV infection therapy Nanotechnologies	Nanotechnologies	University of Beira Interior (UBI)	Carla Cruz	College of Natural Sciences	Andrew Ellington	05/11/2018	04/11/2020

Acronym	Project Title	Scientific Area	Leading Institution in Portugal	PI in Portugal	Leading Institution in UT Austin	PI in UT Austin	Start Date	Revised End Date
BlueEnergy	Large scale blue energy harvesting using hybrid triboelectric/photovoltaic systems for the long term deployment of Autonomous Underwater Vehicles	Nanotechnologies	Faculty of Sciences of the University of Porto (FCUP)	João Oliveira Ventura	Electrical and Computer Engineering, Cockrell School of Engineering	Edward Yu	01/10/2018	31/03/2020
NANOTHER	TAMs-targeted and externally controlled nanotheranostics of triple-negative-breast-cancer	Nanotechnologies	International Iberian Nanotechnology Laboratory (INL)	Manuel Bañobre López	Dell Medical School	Zhengrong Cui	01/11/2018	31/07/2020
2DMS	Two dimensional magnetic semiconductors	Nanotechnologies	International Iberian Nanotechnology Laboratory (INL))	Joaquín Fernández-Rossier	College of Natural Sciences	Xiaoqin Li	01/09/2018	30/04/2020
MECHANO	From the mechanobiology of the glial to the management of multiple sclerosis	Nanotechnologies	Institute of Biomedical Engineering (INEB Porto)	Ana Paula Pêgo	College of Natural Sciences	Laura Suggs	01/11/2018	30/04/2020
CONTROLLUB	Self lubricant coatings for high temperature applications with controlled released of the lubricious agent	Nanotechnologies	University of Coimbra (UC)	Albano Rodrigues Carvalho	Walker Department of Mechanical Engineering, Cockrell School of Engineering	Yuan Yue Liu	01/11/2018	30/06/2020
MUSAS	Mapping of Underwater Soil of the Azores using Sdr based in-sas Ocean Science	Space-Earth Interactions	Faculty of Engineering of the University of Porto (FEUP)	Sérgio Reis Cunha	Walker Department of Mechanical Engineering, Cockrell School of Engineering	Preston Wilson	28/01/2019	

Activities carried out under Line of Action “Education”

Education activities taking place in Austin

Advanced Computing Training Program

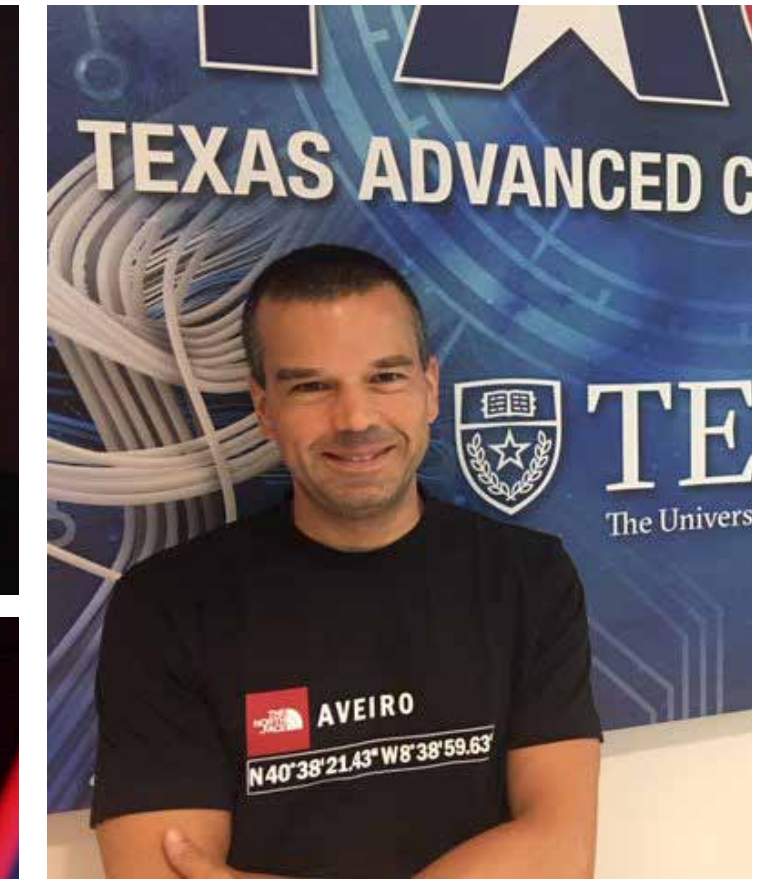
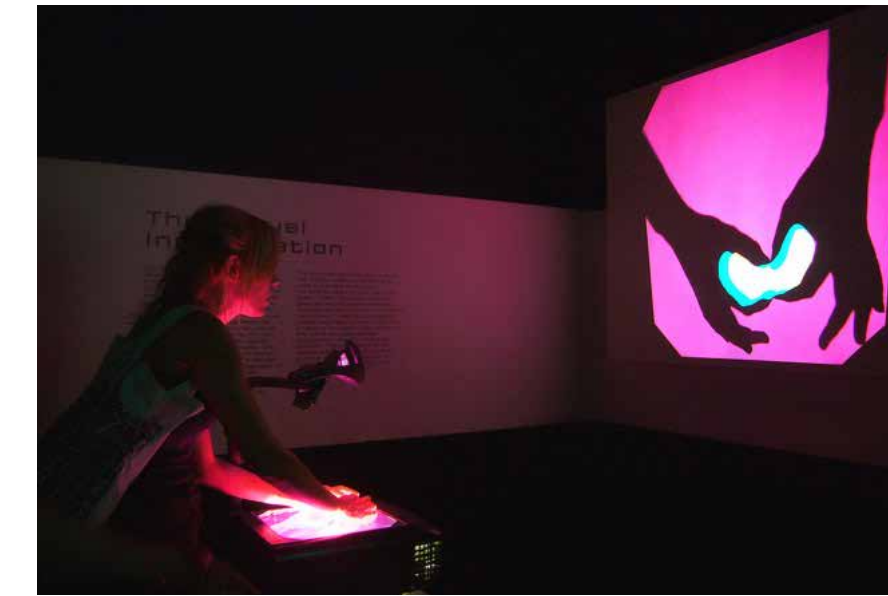
In 2019, the Program offered an intensive Advanced Computing Training Program (ACTP) in which individuals holding a Master or Doctoral degree and having a solid background in ICT, could spend up to 4 months at UT Austin, to apply and develop their skills.

The main goal of ACTP - which highly benefitted from FCT’s mobility fellowship instrument to take researchers in Portugal to Austin – was to train these in high-performance computing technologies and services that could accelerate the tasks of digital modeling and simulation, big data processing and visualization applied to any scientific domain.

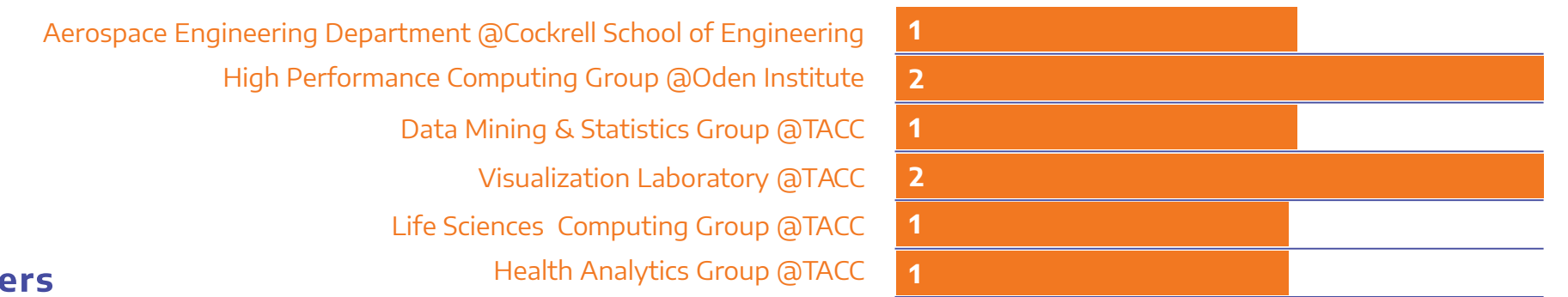
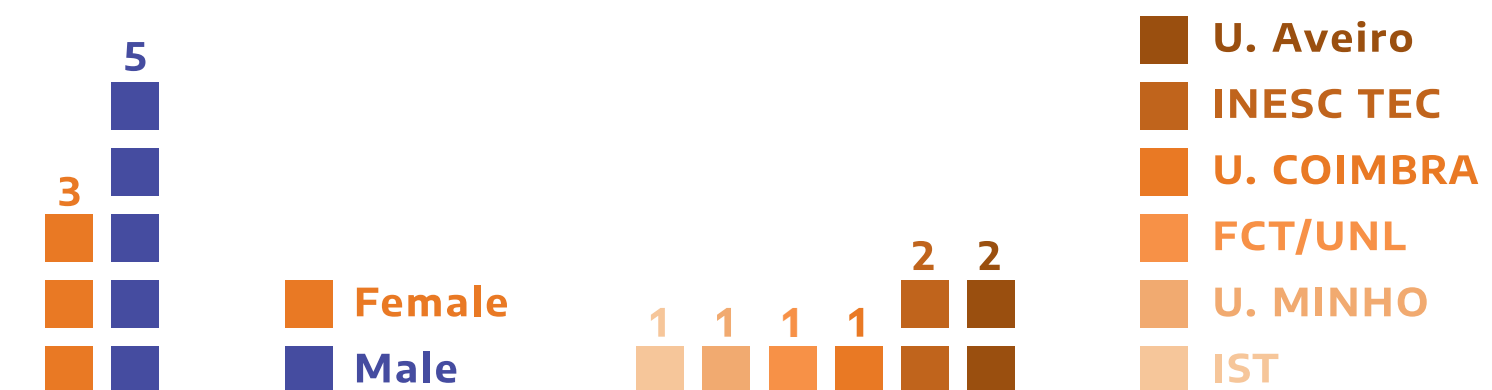
While broadly rooted in ICT, the program aimed at developing multidisciplinary prowess to enrich the existing High-Performance Computing (HPC) body of knowledge and, simultaneously, increase the accessibility of current toolsets to domain-specific scientists. Admitted candidates would benefit from tailored work plans at TACC, i.e., plans addressing their research goals and interests, while having access to TACC’s portfolio of training in advanced computation and related resources.

A total of 14 candidates had been selected in 2018 through two competitive calls fully designed and managed by the Program, with 13 of them expected to enroll on the training scheme in the course of 2019. As 5 applicants ended up withdrawing from the training program either for personal or professional reasons, the Program supported, in total, 8 placements at ACTP (Graph "ACTP total placements by gender, affiliation, academic degree and UT Austin host department"), representing a total of 648 days spent in Austin, an average stay of 2 months and 21 days and a total funding of nearly 48,000 euros related to the granting of mobility fellowships. From UT Austin’s side, 9 mentors were mobilized.

This one-of-a-kind pilot training scheme was indeed a unique opportunity for researchers in Portugal to gain access to a research center that designs and operates some of the world’s most powerful computing resources. Additionally, through TACC, participants could also extend their learning experience to other departments, centers or schools of the University of Texas at Austin.



ACTP TOTAL PLACEMENTS BY GENDER, AFFILIATION, ACADEMIC DEGREE AND UT AUSTIN HOST DEPARTMENT



The outcomes and new opportunities resulting from this pilot training in Austin with the support of the Program are even more relevant with the creation of MACC in Portugal and converge towards the Advanced Computing Portugal 2030's intent to not only train an elite of Advanced Computing experts available to support and educate experts from other research fields and businesses to take full advantage of computational and visualization resources but also lead the latter to improve their understanding about how Advanced Computing can advance their research goals.

Upon their return to Portugal, participants were requested by the Program to produce a write-up on their experience in ACTP as a way to capture their very own perceptions about the training scheme and track outcomes and the potential impact of their exchange.

Examples of comments from participants' final reports:

“The program will definitely have an impact on my future research directions.”

Leonardo Pereira, Instituto Superior Técnico, mentored by Tan Bui-Thanh, Leader of Computational Engineering and Optimization Group Department of Aerospace Engineering and Engineering Mechanics Institute for Computational Engineering and Sciences

“My overall impression of this experience is highly positive: the institution has excellent working conditions, the team there is collaborative and welcomes you, the city has a vibrant culture and a high standard of living.”

Ariel Guerreiro, INESC TEC/CAP, mentored by Weijia Xu, Zhao Zhang and João Barbosa of the Data Mining & Statistics group at TACC

“Finally, I can say my experience at TACC exceeded all my initial expectations. My knowledge on HPC significantly expanded, and I had the opportunity to work closely to great professionals and people passionate for what they do. We all shared a common vision: make research more productive, in a way this can have an impact in science and society.”

Ana Pádua, FCT-UNL, mentored by John Fonner of the Life Science group at TACC

Education activities taking place in Portugal

In the third phase of the Program, and in the course of 2019, thanks to some support activities to further develop the Program's community of stakeholders, it was possible to engage researchers and faculty from different organizations in Portugal and UT Austin to come forward with proposals for training activities with the seal of the Program. In order to ensure adherence to the Program's mission and values and scientific excellence, the BoD with the support of the Area Directors would always review proposals and decide on the amount of budget allocated to each initiative in compliance with the FCT's budgetary provisions.

In 2019, a total of 8 short-term training events, mobilizing 270 attendees, were carried out in Portugal (Braga, Porto, Coimbra and Lisbon) with the seal of the Program, either as the main coordinator/sponsor or as an associated partner.

Whenever appropriate, the Program fostered connections with other organizations outside the geographic boundaries of the transatlantic partnership, reinforcing the Program's visibility on the international stage and possibly laying the groundwork for collaborative opportunities between the Program and other relevant R&D and Innovation ecosystems around the world (Norway, Germany, Japan, South Africa and United States – beyond Texas) - see map “Country of Speakers' Institutions involved in Education Events of the Program”.



**Country of origin of
Speakers' Institutions
involved in Education
events of the Program**



(*) Tackling Observation Challenges in the Atlantic: The case of small satellite constellations

Pioneer event which paved the way for joint work on technical developments on satellite constellations.

No. of participants: 35

The rise of the New Space movement along with the desire to massify low-cost sensors and integrated information systems, and the potential demonstrated by the application of Artificial Intelligence and Big Data technologies to data management has led to unprecedented interest in small satellites (micro-, nano- and pico-) and their application to Earth Observation and interconnectedness.

Following the Victoria Island Declaration of April 2019, the AIR Centre organized, alongside +ATLANTIC and the UT Austin Portugal Program, this technical workshop to characterize current observation challenges in the Atlantic, map current efforts from Atlantic nations, and identify and discuss the characteristics of small satellite constellations and desired performance of sensors required to address these issues.

Examples of precursor work and lessons learned so far were presented at the workshop with a view towards setting up follow-up joint work on technical requirements /development. The workshop was aimed at technical representatives of stakeholders of Atlantic nations with interest in sharing their views on current efforts and discussing potential baselines for constellations of small satellites and their sensors and led to the production of a report that should inspire new collaborative efforts in this area at international level.



The Program also worked to give visibility to stakeholders partnering with the Program in the design and implementation of scientific training events, by introducing the role of the scientific coordinator or host, i.e., an entity or expert in charge of coordinating the scientific line-up of a training Program and inviting other speakers.

In events where the program served as a partner (*), it sought to actively contribute either by appointing speakers, preparing communication materials, communicating and promoting the event or preparing the agenda's line-up.

Area Directors both in Portugal and at UT Austin also played several times an important role by providing scientific advice on the proposed topics, line-up and goals of the advanced training activities; by suggesting and inviting speakers and panelists and by disseminating the activities among their contacts to mobilize potential attendees from academia as well as from economic/industrial sectors.

As of the second quarter of the year, the Program had already streamlined practices and procedures in order to:

- Improve the design and careful planning of events;
- Bring improved consistency to the visual and textual narratives used to communicate events;
- Use event registration forms to increase and diversify the Program's list of contacts;
- Enhance continuous learning processes to feed lessons learnt into the planning of future training activities;
- Reduce the number of no-show ups by reinforcing in e-mail messages sent out to registered participants that with attendance being free of charge, no show-ups would always represent a misuse of public funds;
- Systematically evaluate participants feedback through post-event questionnaires and ensure compliance both with data protection rules and systematic reporting rules.



Training event	Coordinator	Scientific Area	Partnering Institutions	Scientific Host / Coordinator	UT Speakers	Other speakers	No. of registrations received	No. of attendees (per type of affiliation)
UT Austin Portugal Applied Visualization Workshop	UT Austin Portugal	Advanced Computing	IB-S and School of Engineering of the University of Minho	Luís Paulo Santos, School of Engineering, University of Minho	Paul Navrátil, TACC	Jan Byska, University of Bergen (Norway) Carla Silva, FCUP Nuno Feixa Rodrigues, FCT Jason Haga, National Institute of Advanced Industrial Science and Technology (Japan)	37	23 Universities: 20 Research Centers: 2 Industry: 1
Immersive Training in Scientific Visualization	UT Austin Portugal	Advanced Computing	Faculty of Sciences from the University of Porto	Ariel Guerreiro, Faculty of Sciences of the University of Porto	Paul Navrátil, TACC Gregory Abram, TACC Anne Bowen, TACC João Barbosa, TACC		20	17 Universities: 8 Research Centers: 8 Industry: 1
New Space Hackathon	UT Austin Portugal	Space-Earth Interactions	CEiiA	Burke Fort, Center for Space Research, UT Austin	Burke Fort, Center for Space Research	Carina Amaro, Vieira de Almeida Law Firm Magda Cocco, Vieira de Almeida Law Firm Heitor Benfeito, Portugal Ventures Rodolfo Condessa, Armilar Luísa Bernardes, Copernicus Accelerator Sérgio Rodrigues, Invicta Angels	12	11 Universities: 3 Research Centers: 3 Industry: 5
Masterclass I: Quantum Computing – Principles, algorithms and applications	UT Austin Portugal	Advanced Computing	University of Minho	Luís Soares Barbosa, School of Engineering, University of Minho		Luís Soares Barbosa, University of Minho Joaquín Rossier, INL Paulo Mateus, IST Mikhail Vasilevskiy, University of Minho Luís Paulo Santos, University of Minho Afonso Rodrigues, QuantaLab Ana Neri, QuantaLab.	45	17 Universities: 12 Research Centers: 4 Industry: 1 Government: 1
Masterclass II: Wearables and Advanced Textiles	UT Austin Portugal	Nanotechnologies	University of Minho	Brian Korgel, UT Austin Carla Silva, CeNTI Paulo Ferreira, INL	Deji Akinwande, Department of Electrical and Computer Engineering Jonathan Wells, Department of Electrical and Computer Engineering	Carla Silva, CeNTI André Pereira, IFIMUP Vadim Tenner, ITA Aachen (Germany) Luís Pereira, CENIMAT/IBN	52	25 Universities: 9 Research Centers: 15 Industry: 0
Interdisciplinary Earth Observation (EO): Land, Ocean, and Atmosphere Workshop	UT Austin Portugal	Space-Earth Interactions	University of Coimbra	Vasco Mantas, Faculty of Sciences and Technology of the University of Coimbra	Zong-Liang Yang, Jackson School of Geosciences	George Xian, Earth Resources Observation and Science Center (USA) Zhong Liu, NASA & George Mason University (USA) Paulo Baganha, University of Aveiro Sandra Fernandez, University of Aveiro Koushik Panda, Deimos Vasco Mantas, University of Coimbra	39	31 Universities: 15 Research Centers: 9 Industry: 6 Government: 1
New Challenges in Medical Physics Conference	UT Austin Portugal	Medical Physics	Faculty of Medicine of the University of Coimbra; Institute for Clinical and Biomedical Research; Environment, Genetics and Oncobiology	Maria Filomena Botelho, Faculty of Medicine of the University of Coimbra José Marques, Técnico Lisboa João Oliveira, IPO Lisboa	Steven Hsheng Lin, MD Anderson Cancer Center X. Ronald Zhu, MD Anderson Cancer Center	António Paulo, IST Filipe Caseiro Alves, FMUC João Casalta Lopes, CHUC João Seco, DKFZ (Germany) Maria Filomena Botelho, FMUC Luís Freire, ESTeSL Paula Alves, IPOCFG E.P.E. Paulo Crespo, LIP Pedro Vaz, IST Cátia Pedro, IPO Lisboa João Pedroso de Lima, FMUC (Chair) José Marques, IST (Chair) João Oliveira, IPO Lisboa (Chair)	146	111 Universities: 76 Research Centers: 8 Industry: 4 Government: 23



NEW SPACE HACKATHON
4-5 JULY 2019

SPACE-EARTH INTERACTIONS

UT Austin Portugal
New Space Hackathon

JULY



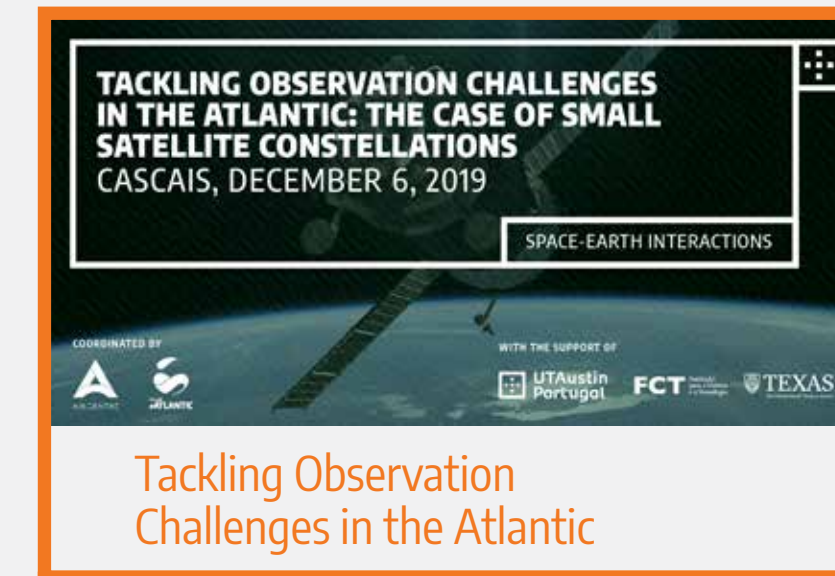
INTERDISCIPLINARY EARTH OBSERVATION: LAND, OCEAN, AND ATMOSPHERE
PORTO, NOVEMBER 11-12

SPACE-EARTH INTERACTIONS

UT Austin Portugal FCT TEXAS WITH THE SUPPORT OF COIMBRA IOCUS

Interdisciplinary Earth Observation:
Land, Ocean and Atmosphere

NOVEMBER



TACKLING OBSERVATION CHALLENGES IN THE ATLANTIC: THE CASE OF SMALL SATELLITE CONSTELLATIONS
CASCAIS, DECEMBER 6, 2019

SPACE-EARTH INTERACTIONS

COORDINATED BY WITH THE SUPPORT OF UT Austin Portugal FCT TEXAS

Tackling Observation Challenges in the Atlantic

DECEMBER



NEW CHALLENGES IN MEDICAL PHYSICS
COIMBRA, DECEMBER 12-13, 2019

MEDICAL PHYSICS

SCIENTIFIC COORDINATION: UT Austin Portugal FCT TEXAS COIMBRA CIMAGO

New Challenges in Medical Physics

JUNE



Applied Visualization Workshop

APPLIED VISUALIZATION WORKSHOP 7-8 JUNE

ADVANCED COMPUTING

UT Austin Portugal FCT TEXAS WITH THE SUPPORT OF IB-S



Immersive Training in Advanced Computing

IMMERSIVE TRAINING IN ADVANCED COMPUTING – SCIENTIFIC VISUALIZATION
11-12-13-14 JUNE

ADVANCED COMPUTING

UT Austin Portugal FCT TEXAS A TRAINING BY TACC WITH THE SUPPORT OF PORTO

SEPTEMBER



Masterclass I: Quantum Computing

UT AUSTIN PORTUGAL ANNUAL CONFERENCE
Masterclass I: Quantum Computing
SEPTEMBER 20, 2019

UT Austin Portugal FCT TEXAS WITH THE SUPPORT OF IB-S



Masterclass II: Wearables and Advanced Textiles

UT AUSTIN PORTUGAL ANNUAL CONFERENCE
Masterclass II: Wearables and Advanced Textiles
SEPTEMBER 20, 2019

UT Austin Portugal FCT TEXAS WITH THE SUPPORT OF IB-S

Events with UT Austin Portugal as main coordinator

Applied Visualization Workshop

Braga, June 7-8

The major aim of Scientific Visualization and Information Visualization is to facilitate analysis, discovery and communication of knowledge from large volumes of multidimensional data. This is achieved by generating pictorial representations of the data, which enable domain experts to understand and gather insight into this data. As the volume of available data keeps increasing, the benefits of visualization become more and more relevant for researchers from the most diverse domains of knowledge. This one-and-a-half-day workshop gave participants the opportunity to learn from national and international experts (UT Austin, Norway and Japan) about the latest topics and trends in data visualization and how data visualization can aid science and business handle and extract value out of large volumes of data (either collected or generated by computer simulations).

Having Professor Luís Paulo Santos (School of Engineering of University of Minho) as scientific host, the workshop brought to Braga the Director of the Visualization area of TACC, Paul Navrátil, who delivered a talk on Recent Advances in Queuing Ray Tracing for Simulation and In Situ Analysis. Besides Paul Navrátil, the panel of speakers included Jason Haga, from the Cyber-physical Cloud Research Group of the National Institute of Advanced Industrial Science and Technology, in Japan; Jan Byška from VisGroup, University of Bergen, in Norway and Carla Silva from Faculty of Sciences, University of Porto, in Portugal.

The training combined theoretical with hands-on learning sessions to demonstrate the advantages of using visualization techniques to gain insights on huge data volumes and explain how to operationalize and maintain large visualization devices. On the second day, participants were welcomed by Professor Nuno Feixa Rodrigues, Member of FCT's Board of Directors, who took the chance to present the "Advanced Computing Portugal 2030" strategy,

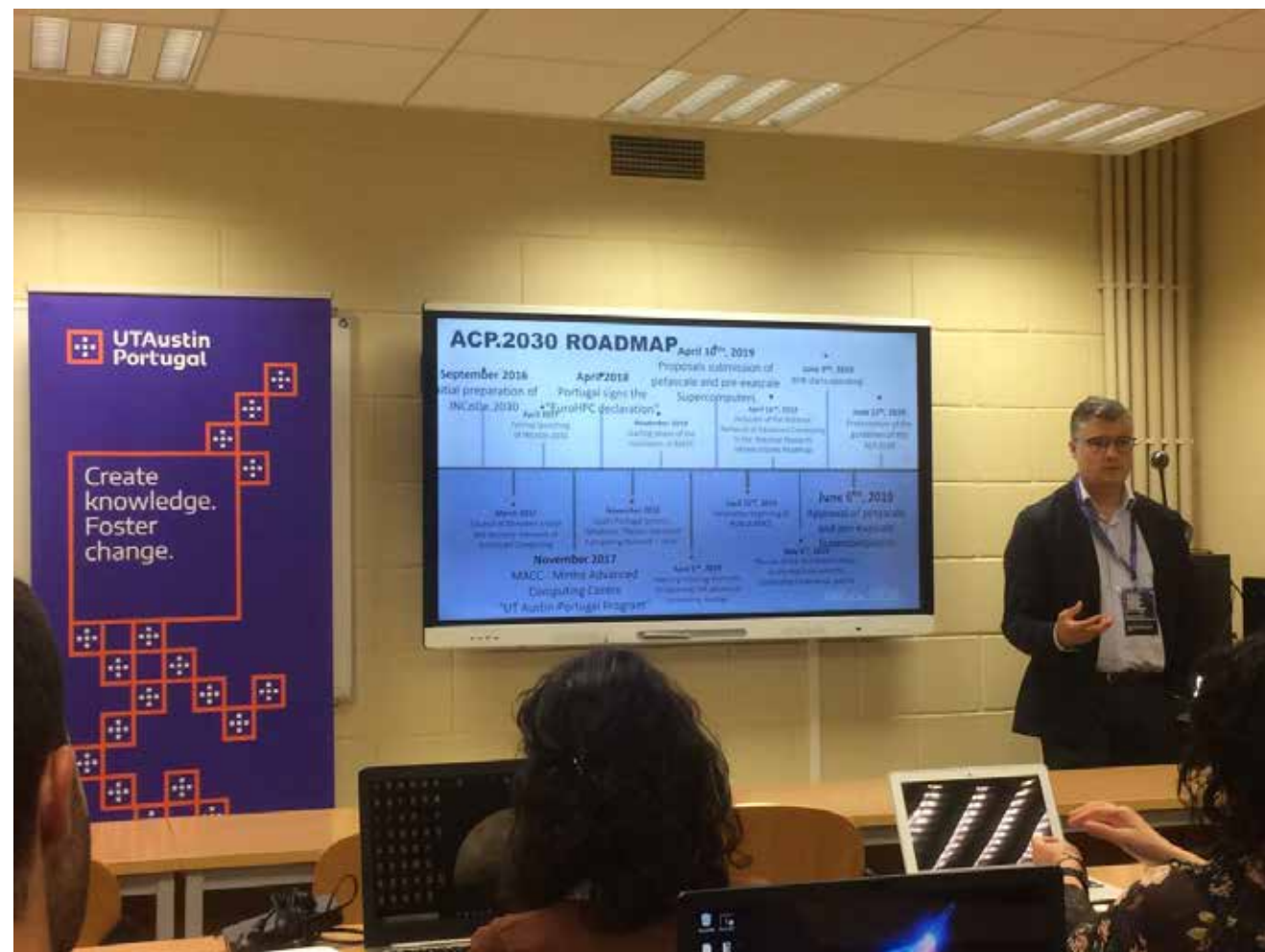
The event took place at VisLab, set up in 2019 at the IB-S building, at the University of Minho, and offering a display wall for remote visualization and local rendering.

Audience profile:

Day 1 - researchers from the most diverse fields of knowledge whose work requires handling large volumes of data (either collected or generated by computer simulations)

Day 2 - visualization researchers and IT engineers willing to maintain such facilities, both for their own use or to make them available to a wider research community.





Immersive Training in Advanced Computing: Scientific Visualization

Porto, June 11-14

This 4-half day immersive training was hosted in Portugal by Professor Ariel Guerreiro (Faculty of Sciences of University of Porto), he himself a former participant of UT Austin Portugal's Advanced Computing Training Program (ACTP) initiative. Participants were given the opportunity to learn more on geographic and information visualizations through graphical analysis and visualization tools.

The Immersive Training in Scientific Visualization was part of the TACC Institute Series, which offered attendees intensive immersive training in advanced computation, with topics ranging from developing parallel applications for modern high performance computers to visualizing and analyzing large data sets, administering leadership-class advanced computing systems, executing reproducible experiments in the cloud, and purchasing and operating considerations for organizations wanting to add advanced computing resources to their R&D portfolio.

At the premises of Faculty of Sciences of University of Porto, the UT Austin Portugal Program organized the course as a remote online training program for a small group of researchers in Portuguese organizations. For four days, participants were instructed on the latest tools, topics, and trends in advanced computing and had the opportunity to learn how to generate visualizations for simulations results and data analysis, with programs such as VisIt and Paraview, through the guidance of TACC's visualization area leader Paul Navrátil and researchers Gregory Abram and Anne Bowen. João Barbosa, Research Associate at TACC's Scalable Visualization Group, was the monitor on site.

In the last day, Nuno Feixa Rodrigues, member of FCT's Board of Directors, presented the National Strategy for Advanced Computing to the attendees, within the scope of the Portugal InCoDe.2030 program.

Audience profile:

This immersive training intended to introduce participants to some of the most current graphical analysis and visualization tools of the methodologies developed and used at TACC. It aimed at reaching a target audience of several scientific areas and included application exercises being taught jointly with various international institutions.

UT Austin Portugal New Space Hackathon

Matosinhos, July 4-5

In close collaboration with the Centre of Engineering and Product Development (CEiiA), AIR Centre, Portugal Space, FCT and Pedro Nunes Institute (IPN), and support of the scientific area of Space-Earth Interactions, represented by Professor Luísa Bastos, the UT Austin Portugal Program organized the first hackathon of the international joint venture on the topic of the New Space Economy.

Burke Fort of the University of Texas Center for Space Research was behind the design and technical implementation of this activity, whose main goal was to identify prospective contemporary and near-term space-related ventures and research initiatives that, from a technical standpoint, could be suitable for targeted investment along a pathway that should lead to widespread benefits within Portugal.

The New Space Hackathon was held at the Portuguese R&D center CEiiA, in Matosinhos. Participating were two specialized groups of people, carefully handpicked by the Hackathon's partnering organizations, according to a predefined list of profiles: Technical "Creatives," who were active in Portugal's technical talent community, and Business "Enablers," who provided professional advice to technologists, entrepreneurs, investors, and regulators within Portugal's entrepreneurial ecosystem.

Both groups engaged in a structured two-day "deliberative" process to identify "low-hanging fruit" market opportunities within the emerging New Space Economy and "high-leverage inflection points," which are actions that might be taken by gatekeepers and stakeholders to expeditiously optimize Portugal's chances for commercial success. Unlike the free-form atmosphere commonly found in conventional "hackathons," this highly regimented initiative employed a survey questionnaire to capture the opinions and perspectives held by the Creatives before, and then after, presentations by six Enablers on relevant technology market topics, including business modeling, public policy tools, regulatory frameworks, funding sources, and investment behavior and trends. The survey instrument collected and characterized each Creative's "before" and "after" opinions about (a) the technical innovation potential, (b) the business success potential, and (c) the readiness of Portugal's Research and Technology Development (R&TD) Ecosystem to successfully compete for global market opportunities among 53 New Space "Specialties." Also collected were the Creatives' opinions of their own personal level of "background familiarity" with each Specialty. The results were made public in October through a report which is now available at the Program's website.

The event received the high support of the Portuguese Ministry of Science, Technology and Higher Education, Manuel Heitor, who was at CEiiA, with FCT's President, Helena Pereira, to convey his enthusiasm and belief in what the future holds for the country in the New Space Economy and explain what was being done at governmental level to take full advantage of Portugal's capabilities and resources in the global New Space Economy. Also, Chiara Manfletti, President of the Portugal Space Agency, was able to send attendees and organizers a short video message highlighting the importance of endeavors such as that of the Hackathon for the execution of Portugal Space 2030 strategy.





Masterclass I: Quantum Computing – Principles, algorithms and applications

Braga, September 20

Arguably quantum computing is coming of age. With the race for quantum rising between major IT players and the public availability of the first prototype, proof-of-concept machines, the area is on the verge of a real shift. For the first time, the viability of quantum computing may be demonstrated in a number of real problems extremely difficult or even thought to be impossible to handle, and its utility discussed across industries. In a sense, Feynman’s dream of letting Nature, suitably engineered, compute for us through its own natural quantum behaviour, seems to be closer, even if the project of a universal quantum computer has still a long way to go.

In this context, the Masterclass, which was hosted during the Program’s Annual Conference in tandem with a second Masterclass on Nanotechnologies, aimed at introducing the principles of Quantum computing and its engineering. It was coordinated by Luís Soares Barbosa, Full Professor at University of Minho, who also provided the session introduction emphasizing what Quantum Computing could do for everyone. There were 4 further lectures by: Mikhail Vasilevsky (UMinho & INL) on “Grover’s algorithm: an example of the use of quantum superposition and interference principles”; Joaquín Rossier (INL) on “Using quantum computing to model matter”; Paulo Mateus (IST) on “Quantum Information and Cryptography”; and Luís Paulo Santos (UMinho & INL) on “Algorithms: Quantum Monte Carlo integration”. Particular emphasis was then placed on applications for simulation of complex systems and cryptography with a demo session with IBM’s Quantum Experience with QISKIT by Afonso Rodrigues and Ana Neri (UMinho & INL).

Audience profile:

Researchers in Computer Science, Physics and Mathematics, as well as Engineers of different backgrounds, preferably, but not necessarily, with some previous contact with Quantum Computing.

Masterclass II: Wearables and Advanced Textiles

Braga, September 20

Smart textiles are fabrics that provide the wearer with increased functionality. These textiles have numerous potential applications, such as the ability to communicate with other devices, health monitoring, protection from environmental hazards and promotion of healthy lifestyle due to enhanced properties (e.g. antimicrobial, flame-retardant, easy-cleaning, thermal comfort). Research and development towards wearable and advanced textiles are a fastest growing area, with practical applications into sportswear, automotive and entertainment, healthcare & safety and military products.

In this context, this Masterclass, also held within the Program's Annual Conference and in tandem with another Masterclass on Quantum Computing, was coordinated by a team of experts in the area and with a very strong relation to the Program, all being Area Directors of Nanotechnologies: Brian Korgel, T. Brockett Hudson Professor of Chemical Engineering at the University of Texas at Austin; Carla Silva, Chief Technology Officer of the Center for Nanotechnology and Smart Materials (CeNTI); and Paulo Ferreira, Professor at Instituto Superior Técnico (IST) and Head of Department of Advanced Electron Microscopy, Imaging and Spectroscopy at International Iberian Nanotechnology Laboratory (INL).

The main goal of the Masterclass was to bring together renowned researchers from various disciplines who are at the forefront of wearable and advanced textiles research and are contributing to improving textile properties by adding new functionalities and smartness to fabrics, such as Deji Akinwande (UT Austin), André Pereira (IFIMUP & U.Porto), Jonathan Wells (UT Austin), Vadim Tenner (ITA Aachen), and Luís Pereira (CENIMAT/IBN).

The Masterclass also promoted crosstalk at the intersections of frontiers in electronics, physics, materials science and nanotechnology, by exploring several approaches to the development of advanced textiles.

Audience profile:

Researchers from academia and industry who deal with the development of new products or applications and would like to develop a deeper understanding of wearable and advanced textiles.



Interdisciplinary Earth Observation: Land, Ocean, and Atmosphere

Porto, November 11-12

Earth Observation (EO) technologies allow the advancement of science, management, and decision-making through the frequent acquisition of multivariate global data. Natural and manmade processes and features can be identified, monitored, and characterized in unprecedented ways. EO systems like Europe's Sentinels, the American Landsat, or sensors on-board the International Space Station, provide near real-time data useful for ocean, land, and atmospheric research and applications. Leveraging and interpreting the enormous volume of data produced by such systems requires specific skills, which are often interdisciplinary in their nature. Mining Space-based Big Data relies increasingly on machine and deep-learning techniques, bringing together two fields of enormous potential but complex requirements. Despite the challenges, businesses and public agencies alike are incorporating EO data in operations, which are now employed in a routine manner.

Vasco Mantas, Principal Investigator of Project FOCUS (H2020) at the Earth Sciences Department of the University of Coimbra, was the scientific coordinator of the workshop which aimed at giving participants the chance to learn from senior researchers and practitioners across different fields through a combination of theoretical sessions and hands-on training modules. From UT Austin came Zong-Liang Yang, Professor in the Department of Geological Sciences, Jackson School of Geosciences and currently holding the John A. and Katherine G. Jackson Chair in Earth System Sciences. In addition, the workshop agenda accommodated talks from George Xian (U.S Geological Survey, Earth Observation and Science Center); Zhong Liu (NASA and George Mason University); Paulo Baganha and Sandra Fernandez (University of Aveiro) and Koushik Panda, from Deimos, one of the Program's industrial affiliates.

The profiles of the invited speakers allowed the Program to cater for an audience with experts both from academia and the industrial sector and give a sense of how interdisciplinarity in earth observation can significantly contribute toward the value creation along the end-to-end chain, from research to market and vice-versa. Registration for the workshop was very successful, closing just 48 hours afterwards, as researchers and professionals from a broad range of non-space disciplines were aiming to get insights on how to incorporate satellite data in earth-centred research and applications. The workshop was also particularly useful for those developing businesses that rely on satellite data, as it entails specific challenges and opportunities, that require strategies to cope with this rapidly evolving industry and state-of-the-art.

To ensure a lasting footprint, the workshop included a 3-month follow-up program, managed by Vasco Mantas, from the University of Coimbra, with the support of UT Austin Portugal, which ultimately will allow participants to:

- Participate in a network dedicated to EO professionals operating in Portuguese organizations;
- Identify pressing training needs useful to the community;
- Connect participants with researchers and businesses, creating training opportunities and the advancement of the state-of-the-art.

The 3-month period is meant to map needs and requirements of the participants and take the necessary steps to establish the network afterwards. To this end, the following activities are planned to happen:

- Sending of questions written down by participants to speakers;
- Preliminary mapping of the Portuguese EO community's (training) needs, requirements and aspirations through a structured questionnaire to be sent to participants;
- Creation of thematic discussion groups (Atmosphere, Land, Oceans) for networking purposes and recognition of the work done so far in the EO field;
- Visit to ESA-BIC in Coimbra, presentation and discussion of main achievements and conclusions from the 3-month program, next steps to create and grow a collaborative network with common needs and goals.

Vasco Mantas's interaction with the Program started earlier in 2019 through the matchmaking exercise carried out in anticipation of the Co-Promotion R&D Projects Call.

Audience profile:

This workshop targeted undergraduate and graduate students, professional users of geospatial data and decision makers. A basic understanding of Earth Observation technologies and Geographic Information System was also recommended.





New Challenges in Medical Physics

Coimbra, December 12-13

The first event of Medical Physics promoted by the UT Austin Portugal Program, which attracted to the city of Coimbra over 100 medical practitioners and researchers.

This conference aimed at facilitating scientific and professional networking opportunities under different topics related to the new challenges in Medical Physics.

A handful of experts from different research fields and organizations in Portugal but also from the University of Texas MD Anderson Cancer Center (MDACC) and the German Cancer Research Center (DKFZ) convened in Coimbra to discuss current trends and spark knowledge exchange in Medical Physics, with innovative approaches in radiotherapy, targeted radionuclide therapy and proton therapy having a special place in the agenda. The invited speakers looked not only into the foundations of the selected core topics, but also into related novel developments and clinical applicability.

This one-and-a-half-day event was scientifically coordinated by Professor Maria Filomena Botelho, from the Faculty of Medicine of the University of Coimbra Institute for Clinical and Biomedical Research and the research strand Environment, Genetics and Oncobiology, with the close support of UT Austin Portugal's scientific directors for the area of Medical Physics.

Collaboration with Professor Maria Filomena Botelho (FMUC), also an invited speaker at the Program's workshop within Ciência 2019, in July, in Lisbon, was on the back of the delegation visit carried out in February 2019 to Austin whereby her research work caught the attention of Dr. Ruben Rathnasingham, Assistant Dean for Health Product Innovation, Health Ecosystem, at UT Austin Dell Medical School.

Audience profile:

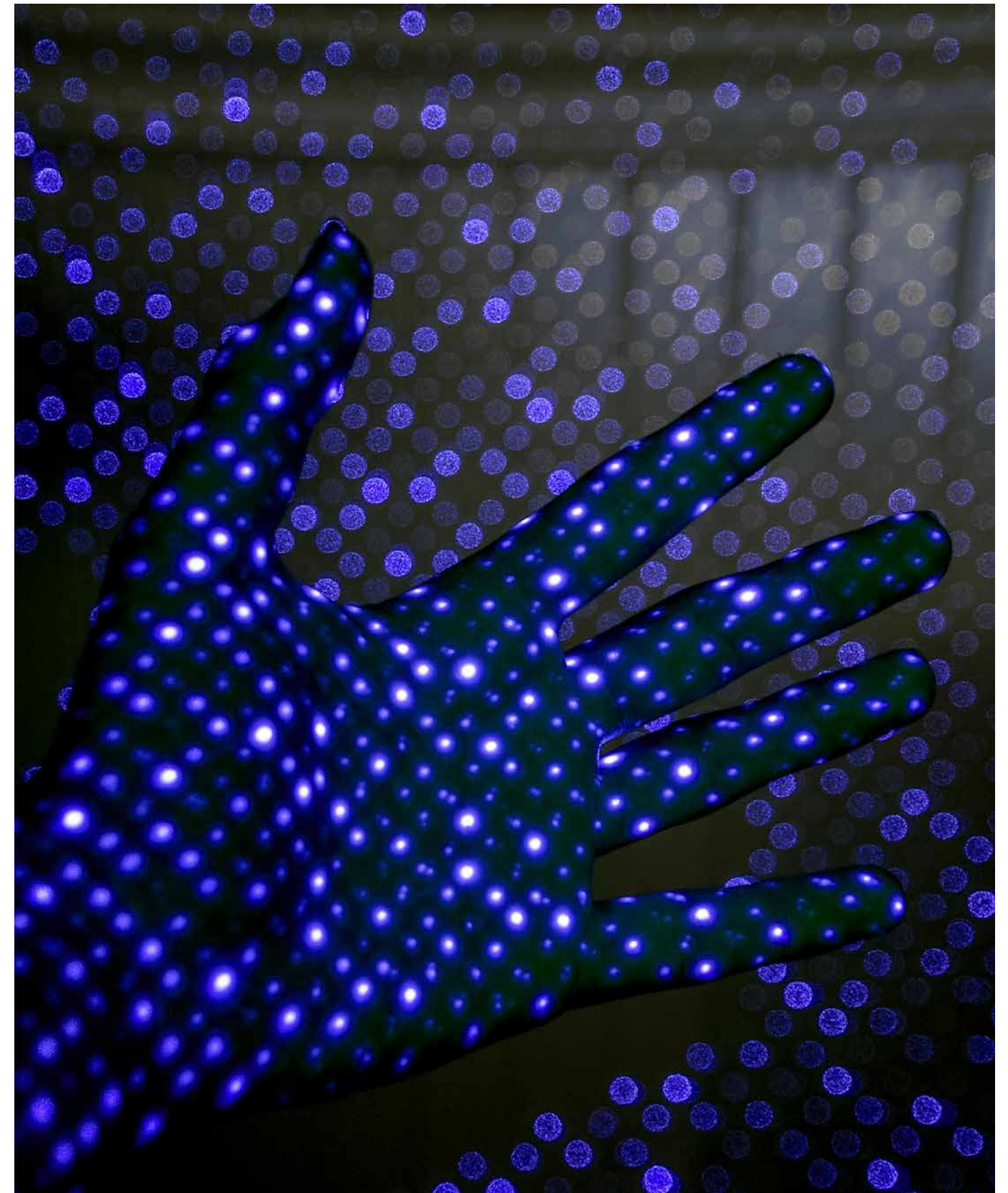
The Conference was designed for medical residents, medical oncologists, biomedical engineers, physicists, nurses, medical imaging, radiotherapy technologists, researchers and students from all involved disciplines, interested in taking part in a wider discussion about the scientific and clinical directions of Medical Physics.

4.3

Stakeholders' Engagement Activities

These are activities aiming at increasing awareness about the Program and improving the engagement of key stakeholders. They have proven fundamental to leverage the presence of the international joint venture within the academic, scientific and entrepreneurial communities in and outside its primary geographic boundaries and at different levels: awareness, understanding and action.

- Sessions | UT Austin Portugal Program in Nanotechnologies: The New Decade, with Brian Korgel – Porto, Lisbon, Coimbra, Braga, Aveiro and Famalicão January 8-11, 2019;
- Portuguese delegation visit to UT Austin – Austin, February 21-22, 2019;
- Workshop at “Ciência 2019” (Science and Technology Summit) – Lisbon, July 8, 2019;
- UT Austin delegation’s visit to MACC – Riba d’Ave, September 19, 2019;
- UT Austin Portugal Program’s 2019 Conference – Create Knowledge, Foster Change: Towards a New Decade of Joint Achievements – Braga, September 20, 2019;
- Aerospace Engineering – Future Challenges on Education and Research – Guimarães, October 14, 2019;
- Area Directors’ Missions – 2019.





Sessions | UT Austin Portugal Program in Nanotechnologies: The New Decade

Area directors in Nanotechnologies, Brian Korgel and Paulo Ferreira, discussed one of UT Austin Portugal Program's strategic areas in a series of open sessions, between 8 and 11 January, with the participation of Luisa Gil Fandino, Associate Professor of Instruction at the Division of Textiles and Apparel at the University of Texas at Austin.

These open sessions took place at ISL (Lisbon), CENTI (Famalicão), INL (Braga), FCUP (Porto) and UA (Aveiro).

UT Austin Portugal delegation visit to UT Austin

Between February 21 and February 22, a Portuguese delegation comprising FCT's President at that time, Paulo Ferrão; the Director of AIR Centre, Joaquín Brito; the National Directorate of the UT Austin Portugal Program and the Area Directors in Portugal, was at UT Austin campus to prepare the ground for a number of promising activities planned for 2019.

The two-day agenda provided the right context to confirm a series of opportunities for reinforced and impactful collaboration between Portugal and the American University in the third phase of the joint venture and to define the next steps to turn those opportunities into real, high-value actions. Side by side, new and former stakeholders of the Program came together to discuss the future of the transatlantic partnership, building on the Program's past experience, lessons learned and the strong network of relationships built over the last decade.

The agenda of the visit relied on different discussion formats to foster networking and interdisciplinary brainstorming moments, allowing the Portuguese delegation to get a better sense of UT Austin's research, innovation and entrepreneurial ecosystem.

At the end of the visit, all areas of the Program were able not only to identify avenues for international collaboration in relevant R&D + I topics – reflecting major societal challenges and global and intergovernmental strategic agendas – but also to understand how they could use the Program's available instruments (exploratory research projects, strategic industry-driven projects, research exchanges and training) to meet their goals.

Workshop at Ciência 2019– Science and Technology Summit

Through the lens of this transatlantic Science & Technology partnership, the workshop proposed to examine the importance of enhanced international R&D cooperation to address major societal concerns. The workshop was particularly suited for Portuguese experts in the emerging areas of knowledge of the UT Austin Portugal Program and for S&T policy researchers / practitioners.



Workshop Synopsis

In the course of 2019 some noteworthy science anniversaries will be celebrated: 50 years have passed since the first moon landing; 500 years ago, Magellan circumnavigated the globe; in 1869, the first periodic table of elements was created. Although representing scientific achievements in distinct fields of knowledge, these events remind us of how science, in its aspiration to universalism, has contributed to globalization, breaking the boundaries not only of human knowledge but also of territories.

Science itself has been shaped by globalization in many different ways. The increasing support of governments and of international political organizations to the development of international research agendas or to international research programs is a good indicator that science has never been so reliant on international collaborative efforts as nowadays.

At the same time, the urgency of societal challenges such as climate change, population growth, social inclusion, health and well-being, just to list a few, calls for well-orchestrated cooperation among scientists from different disciplines and geographies.

The UT Austin Portugal Program has been establishing for more than a decade long lasting-relationships between Portugal and The University of Texas at Austin which build scientific research capacity and pave the way for impactful transatlantic R&D projects while tackling some of the most relevant global challenges.

Having entered a new phase in 2018 towards 2030, the Program addresses a number of ground-breaking scientific areas where Portuguese researchers and industry professionals in Portugal deeply engage with their counterparts at UT Austin.

Program

Lisbon Congress Centre, Auditorium 3, 11:30

OPENING WORDS

Rui Oliveira
Co-Director UT Austin Portugal Program

INVITED SPEAKERS

**Advanced Computing
Big Data and Machine Learning
in High Energy Physics**
Nuno Castro
University of Minho and LIP

**Space Earth Interactions
Space Assets: International synergies
for resilient communities and ecosystems**
Vasco Mantas
University of Coimbra

**Nanotechnologies
Graphenest – a provider of graphene-based solutions**
Bruno Figueiredo
Graphenest

**Medical Physics
Radiation effects. Physical and Biological
Modelling in Cancer**
Maria Filomena Botelho
University of Coimbra

**TIE|UTEN
International Collaboration in Technological
Innovation and Entrepreneurship –
UT Austin Portugal**
Teresa Mendes
University of Coimbra and IPN

UT Austin Portugal Program at Ciência 2019

Bruno Figueiredo
Chief Officer and Head of R&D
Graphenest

Bruno is Graphenest's Chief Operating Officer and Head of R&D. He is a chemical engineer PhD with the ability to solve any problem related with reactions and separation processes. He was elected member of the 2017 Industry class at Forbes 30 under 30. His main interests are related with the synthesis and characterization of known and novel materials. He is now leading the way in adding to the unit to produce other forms of graphene, GO, and rGO, as well as the production of graphene-based materials.

Maria Filomena Botelho
Full Professor
Faculty of Medicine, University of Coimbra

Maria Filomena Botelho, MD, Ph.D., Full Professor of Biophysics at the Faculty of Medicine, University of Coimbra.
Biophysics, Radiobiology and Animal Models in cancer are some of her scientific interests.

Nuno Castro
Professor
School of Sciences, University of Minho

Nuno Castro is a Professor at the University of Minho and Director of Laboratório de Instrumentação e Física Experimental de Partículas (LIP). He is a member of the ATLAS Collaboration at CERN, using advanced data analysis techniques to search for new physics phenomena.

Teresa Mendes
Area Director of Technology Innovation
and Entrepreneurship (Portugal)
UT Austin Portugal Program

Teresa Mendes is a Full Professor at the Faculty of Science and Technology of the University of Coimbra. She has been Vice-Rector of the University of Coimbra and is currently President of Instituto Pedro Nunes (IPN), a non-profit association for Innovation and Technology Transfer and Business Incubation. IPN transfers technology for local, national and international companies and its Incubator hosts innovative technology-based companies, mainly spin-offs from the University of Coimbra.

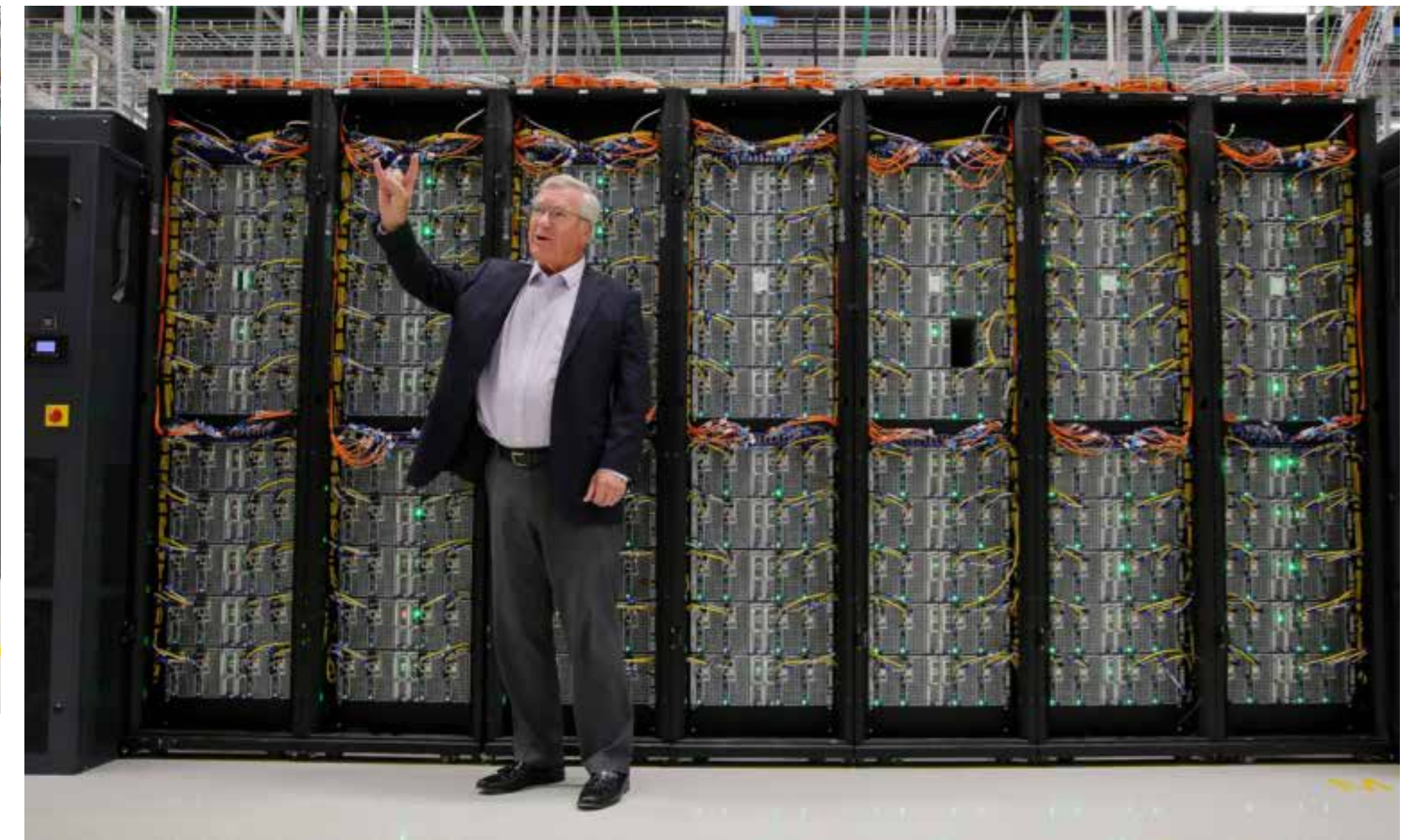
Vasco Mantas
Biologist
University of Coimbra

Vasco Mantas (University of Coimbra) is a biologist with a Ph.D. in Geology and a focus on the use of satellite data to study ecosystems around the world. He is the PI of Project FOCUS (Horizon 2020) and other initiatives addressing the use of emerging technologies to solve societal challenges.



UT Austin delegation's visit to MACC

An American entourage was welcomed to MACC at Riba d'Ave on September 19 in the leading to the unveiling of a plaque in honour of Robert A. Peterson (Associate Dean for Research in the McCombs School of Business at The University of Texas at Austin and former PI of the Program), who was the mastermind behind the installation in Minho of Portugal's first supercomputer, known as BOB, as a reference to Robert himself, who was also there during this visit alongside the leadership of the Program (José Manuel Mendonça, National Director; Rui Oliveira, National Co-Director; John Ekerdt, Principal Investigator at Austin), together with Dan Stanzione, Executive Director of TACC; Nuno Feixa Rodrigues, Member of the Board of Directors of FCT; António Cunha, former Rector of the University of Minho and President of DTX – Digital Transformation Lab of UMinho and Deji Akinwande and Jonathan Wells both from UT Austin and speakers at the Conference on the following day.





UT Austin Portugal Program's 2019 Conference - Create Knowledge, Foster Change: Towards a New Decade of Joint Achievements

Being the first Annual Conference since the start of Phase 3, this one-day event, hosted in the city of Braga, with the support of IB-S and the School of Economics and Management of University of Minho, was designed to attract people from diverse sectors and potential beneficiaries of the Program's initiatives, for a whole day of sharing, networking and intensive learning.

Looking back on the 10-year journey of the international partnership, but embracing the great challenges that lie ahead of the Program, a rich agenda was put together, featuring three key moments:

- Morning session with Keynote Speech by Professor Robert A. Peterson, UT Austin, preceded by the official launch of the Program's promotional video;
- Poster Exhibition, which displayed 30 posters of the 32 selected at the end of July by the Program with the support of the Area Directors. The posters highlighted research results, or research in progress, driven either by more fundamental academic goals or by the needs of certain applications sectors, from all the knowledge areas of the Program. The exhibition took place during the Conference's networking lunch;
- Masterclasses on Quantum Computing and on Wearables and Advanced Textiles.



NANOTECHNOLOGIES

Self-organized binary nanocrystal superlattices for next generation thermoelectrics

Background

This work is a part of ongoing UT Austin-Portugal project "Self-Organized Binary Nanocrystal Superlattices". The proposed work compares the objectives of understanding the thermal and electrical transport in highly ordered and stable nanocrystals (NCs) ensembles for high thermoelectric figure of merit attained via controlled structure and compositions.

Methodology

The chalcogenide quantum dots are synthesized using hot injection method as shown in Fig. C by using suitable precursors. The binary nanocrystal superlattices, as shown in Fig. D, is fabricated by spin coating the QCD solution over the resulting SiO₂ layered Si substrate and performing the ligand exchange repeatedly every layer deposition. The samples will then be examined for thermoelectric measurements to determine the ZT.

Preliminary Results

Figure E shows PbTe and Au QCDs solutions along with their microstructural TEM characterization. Fig. F shows synthesized PbTe and PbTe-5 mol% Au films prepared by two different ligand exchange solution for thermoelectric measurements. The saturated solutions comprises S1 (Pb(NO₂)₂ in MeCOAc) and S2 (Empylene diamine, Acetonitrile).

Conclusions

Self-organized binary nanocrystal superlattices (BNSLs) based on semiconducting colloidal nanocrystals addresses the prevailing needs in thermoelectric research for facile fabrication which is solution-processable, and transport property optimization for high conversion efficiency.

The unique combination of transport properties attained by proximal interaction, ligand engineering and nanostructuring in synthesized nanocrystal ensembles will provide fundamental breakthrough for simple, scalable and low-cost processing of high performance thermoelectric devices for practical applicability as energy harvesting device, particularly in rapidly growing wearable electronics market.

MEDICAL PHYSICS

Optimization meets Medical Physics for improved Arc-Therapy treatments delivery

Background

The latest generation of linear accelerators for radiotherapy treatment allows the simultaneous motion of gantry and couch leading to highly noncoplanar arc trajectories as illustrated in Fig. 1. The use of noncoplanar trajectories in arc radiotherapy combines the benefits of arc treatment plans, such as short treatment times, with the benefits of step-and-shoot noncoplanar intensity-modulated radiation therapy (IMRT) treatment plans, such as improved organ sparing.

Methodology

A two-step approach, illustrated in Fig. 2, is proposed and tested considering a nasopharyngeal tumor case. In the first step, a set of noncoplanar beam directions is calculated resorting to beam angle optimization (BAO). In the second step, anchored in the points calculated in the first step, more anchor points are iteratively calculated, considering the dosimetric criteria used for the noncoplanar BAO search rather than geometric or time criteria commonly used.

Results

Computational tests depicted in Tables 1-3 show that the resulting noncoplanar arc therapy plan has undoubtedly greater overall quality compared to both the coplanar arc therapy plan and the typically used coplanar equidistant step-and-shoot IMRT plan. It is possible to achieve a proper coverage of the volume to treat, being able to obtain a better sparing of the organs at risk. More tests are needed, in an enlarged set of patients.

Conclusions

In this approach, we take advantage of all the quality work already produced for the noncoplanar BAO problem and propose an optimization strategy anchored on the solution calculated by the BAO problem, that also considers dose metrics to guide the optimization procedure but simultaneously embeds the goal of obtaining an efficient dose delivery time, which is one of the main features of rotational treatments.

Better treatment plans will lead to better overall survival probabilities, and less complications induced by radiotherapy treatments. This will have an enormous impact at the patient's level, their families but also a significant positive impact to society. Furthermore, the developed methodologies can also be applied to new treatment modalities, like the use of protons.

30 POSTERS EXHIBITED AT THE CONFERENCE

2 **2** **5** **6** **15**

Nanotechnologies

Space-Earth Interactions

Advanced Computing

Medical Physics

UTEN

SPACE-EARTH INTERACTIONS

I SEA – Virtual reality to evaluate audience attitudes about science communication

Background

Evaluation has moved up the agenda in Science Communication. However, some procedures, while available, may be too obtrusive to use recurrently in science centers and/or conflict with visitors' agendas. Our idea is to develop a non-obtrusive, valid and replicable method to evaluate audience attitudes about science communication projects through an immersive virtual reality environment (VRE) that can improve exhibitions while educating and empowering citizens. The VRE will have two modalities: for one person (individual condition) and for a group of individuals (collective condition). It will be supported by a transformational play framework and multilinear storytelling. In this communication, we will report on the development of the individual condition.

Methodology

Feedback on the deep-sea content was collected from experts. The game narrative was shaped by iterations within the multidisciplinary team. We conducted field studies and interviews at the science centers that will host the module, and focus groups with non-experts. The usability of the prototype was tested. To develop a comparative framework, we will run experiments to validate the method. For testing its concurrent validity, a questionnaire is being developed.

Results

The VRE consists of a capsule with head-mounted displays and headphones to provide an immersive experience that takes visitors into extreme deep-sea conditions, scaffolded according to three levels – awareness, understanding and engagement – regarding science. Given the scientific content provided, visitors will face and decide on several dilemmas, impacting the context of the game. In the end, visitors receive a deep-sea program, a summary of their path through the game.

Impact

This project not only contributes to greater audience awareness, understanding and engagement with deep-sea ecosystems but also provides conceptual innovations and empirical support to the integration of virtual reality as a means of communicating and evaluating science communication in non-formal spaces of education, such as science centers.

ADVANCED COMPUTING

HPC method for steady state 2D convection-diffusion equation on complex geometries

Background

High Performance Computing is efficient when the algorithms take advantage of the hardware and compiler architecture. Well structured data combined with independent routines can lead to optimal parallelization and performance scaling. Consequently, finite volume or difference on Cartesian grid is still the best choice for numerical simulation of physical processes. The most popular methods involve unstructured meshes due to the geometry constraints but we propose a new method that uses structured meshes.

Methodology

Real domain Ω is substituted by the computational domain Ω_c composed of grid cells (Fig. a - yellow) surrounded with ghost cells (Fig. a - grey). RCD technique is used to approximate solution ϕ at the centroid M , using 2 points of the collar (Fig. b - A, B) and data associated to a stencil (Fig. b - dashed cells). Alternate Direction Implicit (informed c) splits the 2D problem into N independent 1D problems. This is highly parallelizable and provides an efficient way to perform computation with many-cores.

Results

We considered a grid $10,210 \times 21$ with NxN cells with the physical domain $\Omega = [0, 1] \times [0, 1]$ and exact solution $\phi(x, y) = \exp(-x^2 - y^2)$. We performed tests using 2 Xeon ES-2650v2 2.6GHz, 20MB L3 and 16 cores (UMinho, D. SEARCA Cluster). Table a shows the results of solving the problem with ADI for different grid sizes while table b shows the scaling/upsized up using a parallel code.

Impact/Conclusions

We developed a first class of numerical methods based on the ADI coupling with the RCD method to provide very high order approximations for the 2D convection-diffusion problem. We obtain very good speed-up while the optimal order is preserved. We expect to briefly adapt the technique to the Navier-Stokes equations and demonstrate the efficiency of the method. Applications in aeronautics (plane), aerospace (aircraft), and energy (heat transfer) are the main opportunities in future developments.

- Inverse paradigm: think the numerical scheme in function of the hardware, not the contrary.
- RCD technology enables structured grid even with complex geometries and provide efficient hardware usage.
- Good overall performance with potential to improve the scalability.

TECHNOLOGY INNOVATION AND ENTREPRENEURSHIP

Understanding Bio Health Technologies Entrepreneurial Ecosystems: An Intellectual Capital Approach

Background

Identify the role played by intellectual capital in fostering the sustainable success of the entrepreneurial ecosystem: understand how the incubator/accelerator and their stakeholders can influence the ecosystem's performance. Entrepreneurial Ecosystems: Group of interacting actors, firms and institutions that interdepend on each other. This implies a shared location provided by science parks, incubators, offering opportunities for knowledge transfer between incubables (Berger & Norman, 2009), shared culture, institutions and networks within a region (Stam & Spigel, 2008).

Methodology

First attempt to explore a growing bio health technologies entrepreneurial ecosystem. Supported by the theoretical background. Methodology: (i) Case description and process; (ii) Factors of success; (iii) Clustering of nodes; (iv) Data observation; (v) Interviews execution; (vi) Analysis of the data collection; and (vii) Contrast with previous theories. Semi-structured interviews were performed face-to-face and through e-mail, in the April-May 2019 period. Interviews include incubated startups and staff of the incubators.

Results

IC's dimensions for performance: Incubated companies' perspectives on most important IC's dimensions for performance. Structural capital: Planning policy; Full-time and specialized jobs; Physical infrastructures for networking and meeting; Incubator services (business, grants writing, lab services, business planning, internationalization, IP, liaison with entrepreneurial stakeholders - investors, banks, local power companies, co-creation support, etc.). Relational capital: Network of partners; Connector with local/regional powers; Connector with the university; R&D joint projects. Human capital: Qualification and dynamism of the incubator's team; Qualification of the incubator's human resources. Incubated companies' perspectives on most important IC's dimensions for performance: Incubator services (business, grants writing, lab services, business planning, accounting, internationalization, IP, liaison with entrepreneurial stakeholders - investors, banks, local power companies, co-creation support); Physical conditions (data, meeting and networking space, communications); Dynamic and proactive staff; Promotion of interactions and entrepreneurial environment; Networking activities; Connection with customers/investors/academia through projects and contracts; Promotional events of startups in bars/congresses/meetings with external firms; Organization of seminars, webinars and trainings; Dynamic staff (e.g. human resources from the incubator team and companies) with relevant expertise; Importance of prior experience acquired by staff of the incubable companies with relevant entrepreneurial experience of the incubator staff.

Conclusions

IC's dimensions considered as more crucial for the success of the bio health technologies entrepreneurial ecosystems are: structural capital, and relational capital. Physical structures, level of professionalism, as well as the personal connections of the management team, and supporting services tend to be highly valued in terms of structural capital. Access to networks involving potential clients and also potential partners in R&D projects, as well as co-creation schemes, are of utmost importance for the relational capital. Human capital is perceived as a basic prerequisite for fostering the entrepreneurial ecosystem's performance. Working conditions, wellness, nontoxic relationships, cooperation and motivation are highly valued for fostering an innovative and entrepreneurial environment, in collective terms.

The Conference attracted more than 100 attendees providing them with a stage to showcase their research work and a unique opportunity to not also participate in Masterclasses led by first-class experts in research areas of the Program but also be inspired by Professor Robert A. Peterson's Keynote Speech on the challenges of innovation commercialization and entrepreneurship. The enthusiastic and passionate speech delivered by Peterson filled the morning session's venue. It featured 14 invited speakers from UT Austin, Portugal and Germany and received the highest support from the Ministry of Higher Education, Science and Technology, from the Board of Directors of FCT and the Rectorate of University of Minho, who alongside the Portuguese and American Leadership of the Program, addressed the audience during the Conference's Opening Session to highlight the role of the joint venture in developing and strengthening Science and Technology capabilities in emerging areas of knowledge of utmost relevance for cracking down some of the most pressing societal challenges in the frame of national initiatives and international cooperation.

The Conference also offered the right setting to pay tribute to Professor Robert. A Peterson for his commitment and dedication to the Portuguese scientific community while at the helm of the UT Austin Portugal Program between 2007 and 2017, which culminated with the transfer of TACC's supercomputer Stampede 1 - renamed BOB after Peterson - to MACC this year. Manuel Heitor, the Portuguese Minister of Higher Education, Science and Technology, took the occasion to announce Portugal's next supercomputer, Deucalion, one of eight European supercomputers of the EuroHPC network, to be installed in MACC in 2020 and fully operational by 2021.

Although condensed to a single day, the agenda was extremely diversified and with several topics of interest, therefore catering for a diversified audience, which was one of the goals the Conference's organizing team set itself right from the beginning. Indeed, the team wanted to bring together not only researchers from academia but also professionals from industrial/ business sectors that were looking

for scientific-based knowledge in the areas that were covered by the event.

To this end, besides mass communication, the Program sent out targeted and tailored e-mail messages promoting the event among specialists from companies potentially interested in the event and, in particular, in the Masterclasses. Despite having received 15 registrations from companies, the no-show up rate of these participants still represented 93%, which is something to be carefully examined.

According to the post-conference evaluation form, 96% of the respondents (a total of 24, representing 1/5 of the attendees) stated the Conference was either Excellent or Good, able to meet their initial expectations and 92% stated they would apply the information shared in their work/research/studies.

The Communication team was in charge of raising the profile of the event in the media and reach more people beyond attendees. Besides developing a quiz to test participants' wits on the Program and Texas trivia, accessed through a QR code, the team then selected the 3 winners using as criteria the number of correct answers in the shortest time. A hashtag was also created, being used by several participants on social media. The Conference page on the Program's website, including its Call for Posters, was one of the most visited pages in the website in 2019, reaching over 2000 views.

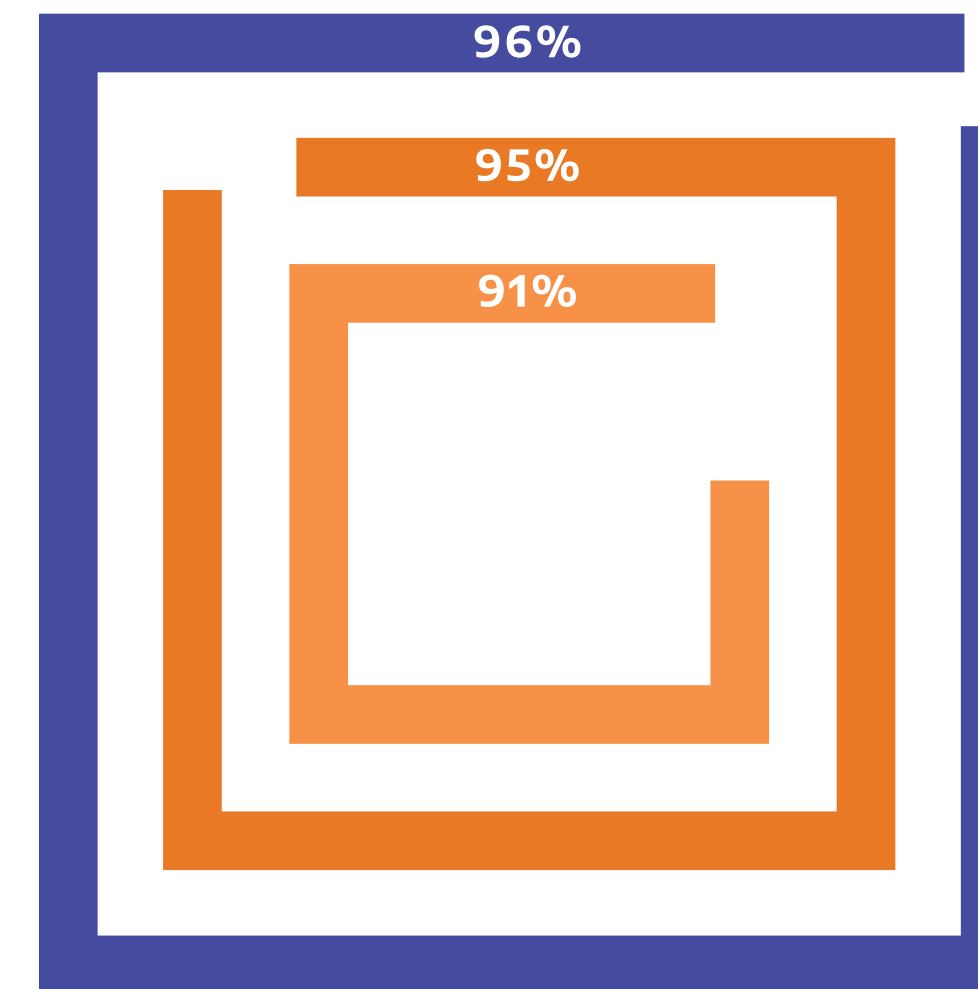
Aerospace Engineering – Future Challenges on Education and Research

The UT Austin Portugal Program was invited by MIT Portugal to attend this session on 14 October 2019 which was held at University of Minho's Campus Azurém in Guimarães, where the future challenges on Aerospace education and research were discussed. This event also marked the signing of the memorandum of understanding between the Aeronautical Technology Institute of Brazil and the University of Minho to prepare and offer short courses in aeronautical and aerospace engineering. Rui Oliveira, as the Program's National Co-Director, was invited to speak at the Opening Ceremony stressing the importance of the Space-Earth Interactions area within the UT Austin Portugal Program and also across several other scientific areas such as Advanced Computing and Nanotechnologies.

International Missions

In order to foster the engagement and visibility of the Program among other initiatives, organizations and networks at international level and capitalize, for the benefit of the Program and its key stakeholders, the knowledge and contacts resulting from its exposure to the international research and innovation landscape, several international missions throughout the globe were supported, involving either the Area Directors or the Program's Leadership - see map "International Missions' Destination Countries".

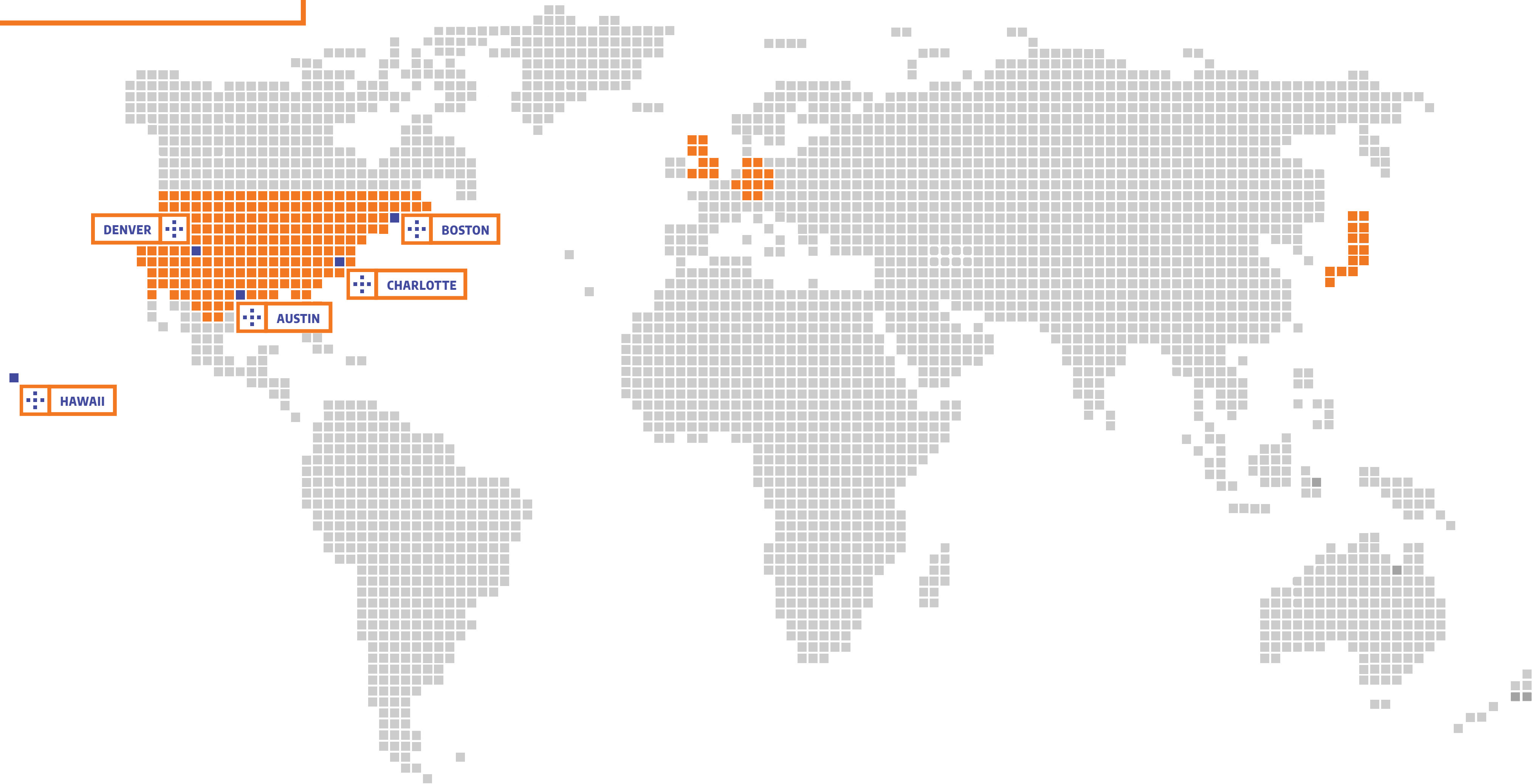
CONFERENCE EVALUATION



- Positive Overall Assessment
- Conference Expectations Met
- Training Useful in Work/Research/Study



International Missions' Destination Countries



Luísa Bastos

Atlantic from Space Workshop

22-25 January 2019, Southampton, UK

Scientific Area: Space-Earth Interactions

Luísa Bastos attended the Atlantic from Space Workshop 2019 to assess opportunities for Earth Observation research and development, downstream activities and ICT evolution, with a specific focus on the Atlantic region, addressing key information needs of this important area in the context of the ESA EO Atlantic Regional Initiative, which itself feeds into the UT Austin Portugal Program strategy in the knowledge area of Space-Earth Interactions. Luísa gave a speech in the Session Protecting the Ocean, discussing a paper co-written with fellow area directors Pedro Camanho and Patrick Heimback.

The workshop was useful to frame challenges and opportunities to foster emerging research in Earth science, develop novel EO applications, test innovative information services and implement upgrades to existing capabilities to manage and manipulate large data volumes.



Rui Oliveira

Meetings at R-CCS and AIST

30 July-2 August 2019, Kobe and Tokyo, Japan

Scientific Area: Advanced Computing

Rui Oliveira attended several meetings during this visit to Japan as the Program's Area Director for Advanced Computing. He met with the Director of the Riken Center for Computational Science (R-CCS) and other researchers of the supercomputing centre at Kobe. Alongside FCT's Nuno Feixa Rodrigues, he also met with the Vice-President and Director of the Department of Information Technology and Human Factors and Department of International Collaborations of the National Institute of Advanced Industrial Science and Technology (AIST), in Tokyo.



Rui Oliveira and Marco Bravo

2019 Southeast International Innovation & Commerce Summit

10-11 September 2019, Charlotte, USA

PT and US Leadership of the Program

Rui Oliveira, National Co-Director of the UT Austin Portugal Program, and Marco Bravo, Executive Director of the Program at Austin, were the Program's representatives who attended this event on Energy, Ocean Economy and Sustainable Development.

The purpose of the event was to promote discussion about several challenges in the areas of renewable energies, climate change and management of natural resources, which may affect innovation and commerce activities not only in the US but also in many other regions of the globe. The initiative was, therefore, particularly relevant to the objectives of the AIR Centre - bearing in mind the potential creation of an AIR Centre hub in southeast U.S. - and in close relation to the Program's Space-Earth Interactions area. Other continuity initiatives were also scheduled for Austin and State College (Penn State University).

The Summit welcomed notable keynote speakers such as Manuel Heitor, the Portuguese Minister for Science, Technology and Higher Education, José Paulo Esperanca, FCT's Vice-President, represented by José Moutinho from AIR Centre, Jerry Miller, former Assistant Director for Ocean Sciences at the White House, and Lori Collins, Consultant to the N.C. Department of Environmental Quality.

Rui Oliveira

Arm Research Summit 2019

15-18 September 2019, Austin, USA

Scientific Area: Advanced Computing

The fourth annual Arm Research Summit, held in Austin, enabled the creation of a collaborative space for academics, researchers and industry experts globally to discuss complex computing challenges in the future landscape. The event attended by Rui Oliveira was filled with discussion and networking moments, which enabled the discovery of new developments, opportunities and connections that could lead to further developments in the Advanced Computing knowledge area of the UT Austin Portugal Program.

Luísa Bastos

OceanObs'19

16-20 September 2019, Honolulu, USA

Scientific Area: Space-Earth Interactions

Luísa Bastos participated in one of the major conferences in Ocean Observations, which convened participants from all over the planet to present the decadal progress of ocean observing networks and to chart innovative solutions to society's growing needs for ocean information in the coming decade. Taking place every 10 years, this conference represented an unique opportunity to get insights into the latest developments in ocean observing technologies and methodologies, that are aligned with the UT Austin Portugal Program Space-Earth Interactions area objectives, namely exploiting the potential of integrating spaceborne, airborne, marineborne, along with underwater, data, towards a better understanding of the ocean.

On the day before the start of the Conference, Luísa Bastos participated in the Deep Ocean Observing Strategy (DOOS) Meeting, upon invitation of Patrick Heimback, Co-Chair of DOOS Steering Committee and also Director for the Program's Area of Space-Earth Interactions at UT Austin. This closed-door meeting was an opportunity to not only get to learn about the latest trends in observation methodologies but also to have a say in the design of future strategies for deep ocean observation.



Paulo Ferreira

Meetings at UT Austin

21-24 October 2019, Austin, USA

Scientific Area: Nanotechnologies

Paulo Ferreira, in his capacity as Area Director of Nanotechnologies in Portugal, attended several business meetings at the University of Austin during this period, with several scientific and technological players in the nanomaterials and nanotechnology area, mechanical and electrical engineering, as well as aerospace engineering.

João Claro

Tough Tech Summit 2019

21-22 October, Boston USA

Scientific Area: Technology Innovation and Entrepreneurship

João Claro received an invitation to attend the Tough Tech Summit 2019 which is an invite-only conference of founders, entrepreneurs, investors, academics, and business leaders to explore the challenges of bringing Tough Tech to market, and how the Tough Tech ecosystem can work together to accelerate commercial success of world-changing technologies. Tough Tech is transformative technology that takes the long view, solving the world's important challenges through the convergence of breakthrough science, engineering, and leadership. The participation in the event was an opportunity to learn about state-of-the-art practices and develop contacts with key people and institutions globally that can contribute to strengthening the support that the UT Austin Portugal Program can provide to the engagement of technology firms and new entrepreneurial initiatives to prepare Portuguese researchers and innovators for scientific readiness for commercialization success.

Carla Silva

European Bio-Based Coatings Technology Forum

22-23 October 2019, Berlin, Germany

Scientific Area: Nanotechnologies

Carla Silva attended this Forum remotely in order to explore the potential of nanotechnologies to contribute to the development of bio-based coatings and nanomaterials, by updating the ongoing research in this field and discover new bio-based sources. The Forum was hosted by European Coatings, which operates the foremost surface technology network, providing cutting edge technical expertise.

Rui Oliveira

Super Computing 2019

18-21 November 2019, Denver, USA

Scientific Area: Advanced Computing

Rui Oliveira, as the Area Director for Advanced Computing, attended the Super Computing Conference 2019, that gathered in Denver the leading professionals in the High-Performance Computing (HPC) community, to share best practices and learn about latest trends on how organizations are adopting and embracing HPC and how it is improving their businesses.

The world is in the midst of a technological revolution. The emergence and sophistication of machine learning, artificial intelligence, the Internet of Things, and smart data are pushing the limits for making what was once impossible, possible, making this subject even more pressing and relevant, hence its inclusion as one of the five key knowledge areas of the UT Austin Portugal Program.



4.4 Communication and Outreach

The area of Communications is accountable for developing and implementing a communication and branding strategy that contributes to conveying the Program’s mission, vision and initiatives to its stakeholders, generating commitment and awareness.

In order to deliver on its main value proposition, the area relies on Integrated Marketing Communications, a holistic management system, using a mix of tools ranging from Public Relations, through Digital Marketing, to Institutional Publicity. Such an approach proves to be effective for consistent and integrated communication as well as for getting an overarching view of communication impact through time.

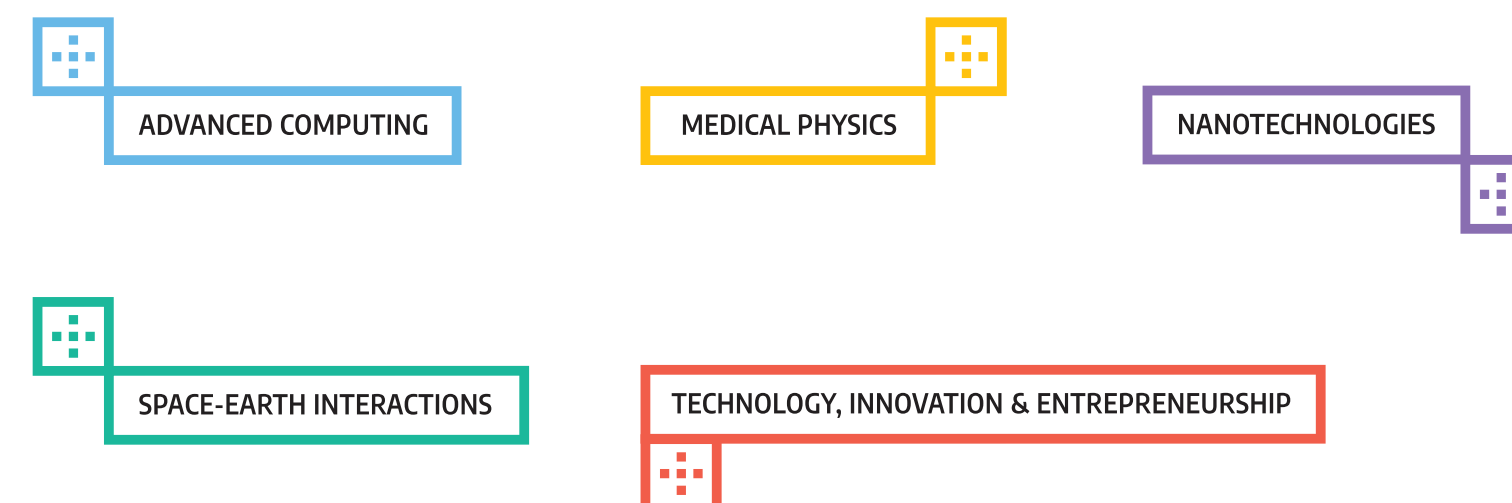
The communication of the UT Austin Portugal Program has been a continuous process, and not strict to simple one-time efforts. The overall strategy started at the beginning of the year with a brand new institutional image and evolved since then with fast-coming newsletters, the launch of the new website in May, the growing online social presence and outreach, the organization of a handful of events and with the diversification of visual (e.g.: infographics) and audiovisual contents (e.g.: institutional video, videos of events).

As the Program gathered pace, communication outputs increased and improved. This perception is evidence-based, as the team is more committed than ever to measure the impact of its activities in several different ways (See “Communication in Figures”).

In order to build a stronger brand, a new logo and visual identity were introduced in the end of 2018. To develop the identity of the UT Austin Portugal Program, two main concepts were used:

- The concept of exploring new territory, learning / researching / achieving / building / experiencing / creating new paths;
- The formal concept itself, based on the square as an analogy of the material and immaterial territory in its creative and innovative form.

The new logo is versatile in a variety of supports, capable of combining itself in order to produce new, expressive and dynamic ways. Additionally, the logo has two institutional colors: orange and blue - the orange from the UT Austin University logo and the blue from the five corners of the Portuguese flag. This new identity is now fully present in all the Program’s communication materials created throughout the year, with no trace of the one previously used.



Communication In Figures – A refreshed strategy

A new website, a new digital experience

- New website attracted more than 1/3 of visitors than the former version
- 51% users in Portugal; remaining 49% accessing from other parts of the world
- 68 visitors per day = 928 hours / year
- 12% of users visited the Program website in 2019 through social channels (against 1,8% of users in the past)

Newsletter and Mailchimp campaign

- 6 Newsletter issues released
- 21 Mailchimp campaigns
- Average number of people reached per campaign: 1506
- Open rates that are twice as high than the industry average
- Subscription rate grew over 15%

Social media

- Followers: 1749 (Twitter), 357 (Facebook), 282 (LinkedIn), 18 (Youtube)
- Twitter: reached over 180,000 users
- Facebook: 276% increase in number of followers
- Audience: Twitter - 49% in Portugal, 25% in the USA; Facebook - 89% in Portugal

Media coverage

- 75 news mentioning the UT Austin Portugal Program secured — 57 news pieces online (76%), 16 in newspapers (21%), 1 on television (1%) and 1 on the radio (1%).
- 2 press releases
- Automatic Advertising Value: 477,025 euros. In public relations, AAV refers to automatic advertising value, which is equivalent to the space occupied by the news.

This value is calculated automatically from the cost of a page without color in the press, from 1 second on television or radio and from CPM (cost per thousand contacts) in the online media.

More recently, additional efforts have been made by the team to get to know better the Program's audience and very actionable insights about the people the international partnership is reaching have been gathered and will be reflected in the communication plan for the next year.

Dissemination activities have shifted towards the increasing usage of social media, and the Program has an online presence in 4 of them: Twitter, LinkedIn, Facebook and YouTube. The longest standing social media channel, and the one that amasses the greatest number of followers is Twitter (1749), followed by Facebook, which was established in 2018 (357) and LinkedIn (282), with YouTube having a very modest presence with 18 subscribers. The Program publishes posts on a regular basis, that are platform-specific, however the interactions have not reached a 2-digit figure yet, if assessed individually. The most popular posts, both in the United States and in Portugal, were those relating to the Annual Conference and the supercomputer BOB.

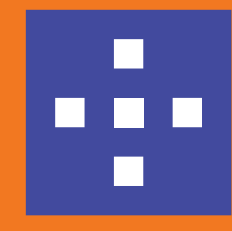
However, as much as social media channels allow a campaign-style approach, one of the learnings the team carries into 2020 is that mass communication must be complemented with messages tailored to specific audiences.

In order to amplify and multiply the Program's message, dissemination channels of external stakeholders (e.g.: Portuguese Universities and Research Centers) were used at national level. At an international level, the area of Communications teamed up for the first time with TACC's Communications, Media and Design area to showcase the participation of researchers admitted to the Advanced Computing Training Program. Regular contacts were established in the course of the year for joint communication of the arrival of ACTP participants to

TACC/ UT Austin. This collaborative approach resulted in the posting of 6 arrival announcements. After the return of the participants and the publication of written interviews highlighting their experience at TACC / UT Austin, social media posts were also shared by both teams in their own channels. The Communication team in Portugal is working on a video, reporting the day-to-day life of a Portuguese researcher at Austin/TACC, once again with the support of TACC's Communication team. This content is expected to be published soon.

Another key partner the Program got on board was the Cockrell School of Engineering's Communications and Marketing team, with the purpose of increasing awareness about the international partnership on the American side. Both communication teams worked closely in the creation of an article to be published in the Texas Engineer Magazine, an annual publication of the Cockrell School of Engineering. The 2019-2020 issue was released in January 2020. Communication teams at TACC and the Cockrell School of Engineering also kindly provided the team in Portugal with footage from their facilities which was used to help produce the UT Austin Portugal's institutional video.





Final Considerations and Outlook

05

05.

Final Considerations and Outlook

After a slow take off in 2018, looking back to the past 12 months of activity, it is undeniable that the Program has gathered pace, despite some constraints encountered along the way. Indeed, the Program was able to support and implement activities in the frame of 2 of the 3 existing lines of lines of action: Research and Education.

As regards line of action Research, the Program secured in 2019, and through the opening of calls managed by COMPETE 2020 and FCT, competitive funding for both exploratory and industry-driven collaborative research projects oriented towards pre-defined research and innovation agendas.

Looking ahead

The newly awarded projects will start in the course of 2020 and the 2017 Exploratory Research Projects will be finishing whereas a new edition of this funding scheme shall be opening again in the very last quarter of the year. The Program has been working to have a monitoring system in place that shall track relevant scientific and innovation outcomes deriving from funded projects and ultimately allow for impact measurement - yet bearing in mind the sometimes rather long gap between R&D activities and innovation. Governing Boards, taking place on an annual basis and ERC meetings, to be organized, at least, twice until 2023, shall be informed by reports resulting from the implementation of this system.

As per line of action Education, the program supported the full implementation of the pilot training program ACTP, with the Portuguese office working very closely with TACC to ensure that mobility processes ran as smoothly and trouble-free as possible from J-1 application, to induction of participants at UT Austin all the way to their return to Portugal. Additionally, and in order to meet the targets laid down in the partnership's Technical Annex for Phase 3, the Program planned to open, in the course of 2019, a call for research exchanges, this time covering 4 of its 5 scientific areas. The intent, however, had to be put on hold given the transition, in the last quarter of 2019, to the new FCT's Research Fellowship Holder Statute - which no longer foresaw the mobility instrument used by the Program to support immersion of researchers in UT Austin.

Looking ahead – Mobility Fellowships and Research Exchange Schemes

Commitment to metrics agreed by the international partnership regarding mobility of researchers in Portugal to Austin calls for specific provisions under which the granting of mobility fellowships can be considered an eligible expenditure as it was in the past. FCT is very close to deliver a new framework that will fill in the void left by the former Research Fellowship Holder's Statute as far as mobility fellowships in the frame of the International Partnerships' initiative is concerned.

Another aspect worthy of attention in the future is that of activity planning and implementation. This is particularly important in the case of research exchanges. The process behind the implementation of the full-life cycle of a mobility fellowship under the Program is a lengthy one: it may well take about 8 months between the opening of a competitive

call for selection of candidates to the start of a 4-month exchange in Austin all the way up to the candidate's return to Portugal. With funding streams being granted on an annual basis to the Program, it is of utmost importance to ensure that they are negotiated and approved the year prior to their real execution, so that the partnership's signatories and the organizations' responsible for coordinating and managing the partnership's annual work program are able to not only plan it ahead of time but also fully implement planned activities within a year timeframe. This should also contribute towards a budget execution rate as close as possible to 100% of the approved budget. **In 2020, time-to-funding was significantly reduced, reflecting FCT's efforts to get the Program's annual work plan moving forward.**

Throughout 2019, the Program offered short-term training actions, which gave attendees the chance to gain valuable insights on the start-of-the-art of a range of transformative science-based topics and even benefit from hands-on learning. These actions convened notable speakers from UT Austin and Portugal as well as from other organizations outside the geographic scope of the Program and provided very often a setting for speakers and attendees to identify avenues for joint collaboration in the frame of the Program.

Looking ahead

In order to foster impactful change, the Program plans to diversify over 2020 and the years to come its portfolio of educational activities, combining short-term training with in-depth learning activities and bringing more participants from the industrial and business sectors on board, thus amplifying knowledge sharing opportunities between multiple actors.

As per line of action Innovation, in 2019, the Program as started discussions with its main sponsor to understand the best way to implement in Portugal first-of-a-kind initiatives such as I-Corps TM.

I-CorpsTM is a US National Science Foundation's program which "uses experiential education to help researchers gain valuable insight into entrepreneurship, starting a business or industry requirements and challenges". The main goal of PT Corps (the equivalent in Portugal to I-CorpsTM) would be to prepare Portuguese researchers and innovators for scientific readiness for commercialization success, with customer discovery activities being highly important for teams to assess the market potential of their R&D results.

Looking ahead

In order to bring this initiative to action, interested parties should work together to develop or identify an adequate body of rules (including funding rules) to support in Portugal the different types of activities that make NSF's I-Corps TM so distinctive and successful.

Moreover, with the 2019 exploratory and strategic research projects kicking off in 2020 and with the 2017 exploratory projects coming to an end, support to innovation-oriented activities is the next natural step, thus completing the Program's approach to the knowledge-to-value chain.

Although it is too early to measure the impact of Phase 3 of the Program, as activities which are likely to create public benefit are still taking place or should only start throughout 2020 only, being a publicly-funded partnership, the Program aims at steadily increasing the proportion of reporting related to impact. To this end, it will make all the possible efforts to go on nurturing a close relationship with its direct beneficiaries and key stakeholders and developing the right monitoring tools to collect evidence-based data that should be feeding into success stories illustrating what the impact of the Program really means.

¹ https://www.nsf.gov/news/special_reports/i-corps/