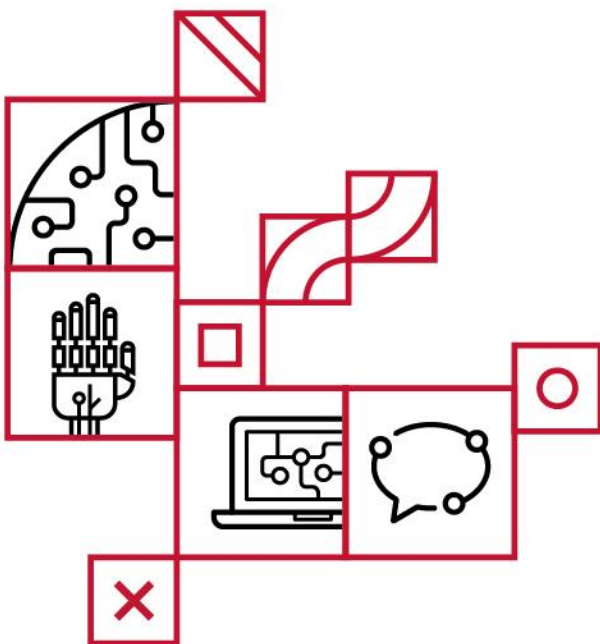
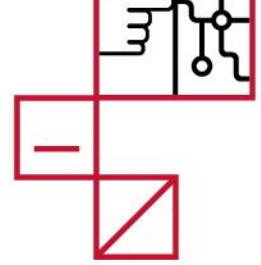


Executive Summary

CMU Portugal
Executive Summary to
the External Review
Committee on
January 2021



**Carnegie
Mellon**
Portugal



CMU Portugal at a glance

The Carnegie Mellon Portugal Program (CMU Portugal) is a platform for education, research, and innovation that brings together [Carnegie Mellon University](#) (CMU) and several Portuguese universities, research institutions, and companies. Its mission is to place Portugal at the forefront of research and technological development in the area of **Information and Communication Technologies (ICT)**, with a particular focus on the areas that have a direct impact on the data economy and foster interdisciplinary collaboration between industry and academia across different levels of the “big data” development stack. To achieve this goal, CMU Portugal works towards promoting an innovation ecosystem with a tight coupling between cutting-edge research, world-class graduate education, and highly innovative companies in the data-driven economy. The [Fundação para a Ciência e a Tecnologia](#) (FCT - the Portuguese Foundation for Science and Technology) supports the Program’s activities, which are also sponsored by the [Conselho de Reitores das Universidades Portuguesas](#) (CRUP) and co-financed by industry partners and by Carnegie Mellon University.

This partnership was launched in 2006 and is currently in its 3rd phase, which started in 2018 and will continue through 2030. The previous two phases, comprising the first 11 years of the Program, successfully promoted the development of talent and the internationalization of Portuguese Universities and fostered cooperation among Universities and University researchers with Portuguese companies, some of which emerged from this Program with a strong focus on entrepreneurship.

In this new phase, the goal is to focus on high-impact science and technology that takes advantage of the data economy's extraordinary opportunities as drivers of growth and change.

Leaning on Carnegie Mellon's experience as a dynamic economic engine in the Pittsburgh region, CMU Portugal aims to foster in Portugal a flexible talent-rich labor market; a vibrant private sector catalyzed by the entrepreneurial spirit; strategic government investments in research and education; and implement an infrastructure that fosters collaboration across traditional boundaries.

The overarching mission of the 3rd phase is to foster industry-science relationships as agents of change with a focus on data economy and research for social and economic impact. Addressing these mission statements requires interdisciplinary efforts, both within ICT areas and also across disciplinary boundaries.

On its 3rd phase, the collaborative network of CMU Portugal extends across the Portuguese universities, represented by CRUP, Associate Laboratories in the area of ICT, and many other research institutions in Portugal, 11 CMU Departments, nearly 150 companies, and over 400 faculty and senior researchers in Portugal and at CMU. CMU Portugal has also established collaboration agreements with 15 new industrial affiliates, ICT leaders in Portugal and worldwide.

Principal Instruments of the Carnegie Mellon Portugal Program

Talent Development

In the scope of the CMU Portugal Program, Portuguese universities and Carnegie Mellon University offer **Dual-Degree Doctoral Programs** in the following areas: **Computer Science, Electrical and Computer Engineering, Engineering and Public Policy; Human-Computer Interaction; Language Technologies; Robotics; Software Engineering**. Successful candidates to the CMU Portugal Dual-Degree Ph.D. Programs spend up to two years at CMU and up to three years at a University in Portugal. They are awarded two Ph.D. degrees, one by CMU and the other by the partner University in Portugal. Between 2018-2020, **three calls for Dual-Degree scholarships** were open under the CMU Portugal framework, and **14 scholarships** were awarded to candidates in Computer Science, Electrical and Computer Engineering, Engineering and Public Policy, Language Technologies, and Software Engineering. These scholarships include a monthly stipend and cover tuition fees in Portugal and at CMU. Since 2006, **133 doctoral students** and **247 master's students** have participated in the CMU

Portugal Program. In addition to Dual-Degree Ph.D. students, the Program's Entrepreneurial Research Initiatives (ERIs) have directly funded 35 Ph.D. students, for a total of **168 Ph.D. students** directly supported by the Program. The Program also included five **Dual-Degree Professional Masters** in Entertainment Technology, Human-Computer Interaction, Science Information Networking, Information Technology - Information Security, Software Engineering, and one Dual-Degree Professional Master/ MBA in Electrical and Computer Engineering.

Of our **Dual-Degree graduates**, 80% and 54 of Masters and Ph.D. alumni, respectively, have become part of **leading organizations and companies**. 5% of Master alumni and 39% of Ph.D. alumni are currently working for **renowned universities and research centers worldwide**. Altogether, CMU Portugal alumni are agents of change, ambassadors for the excellence of the Program's activities, and facilitators of Portugal's embedment in international knowledge and business networks.

CMU Portugal Mobility Programs support faculty, doctoral, and Master students through an intensive immersion period at CMU to experience its educational, research, and cultural environment. **The Visiting Faculty and Researchers Program** in the 3rd phase was built upon the success of the Faculty Exchange Program of the first two phases and is targeted to researchers that hold a doctoral degree. This initiative supports an extended exposure to research and education best practices at a global level at Carnegie Mellon University. It fosters the integration of faculty from Portuguese universities in international knowledge networks. **The Visiting Students Program**, an evolution from the previous Undergraduate Internship Program, provides an opportunity for talented Master students to immerse themselves in a research project at Carnegie Mellon for up to 6 months. During this time, they have a chance to develop their knowledge and skills as researchers and explore new perspectives for graduate studies and career opportunities in cutting-edge ICT areas. Since 2018, CMU Portugal has opened **two Calls for visiting faculty and one Call for visiting students**, which have awarded mobility scholarships to seventeen faculty and nine Master students from eight different Portuguese institutions. Due to travel and health constraints in place for most of 2020, the six faculty and nine students have not been able to conduct their research projects at CMU, as expected. The mobility programs are anticipated to resume in 2021 as soon as the restrictions are no longer in place.

Overall, CMU Portugal, through its Mobility Programs, has already admitted **85 faculty and 49 students** that have or will experience life at CMU in all its components: learning, teaching, researching, and fully participating in its academic life. Besides these structured semesters long stays at CMU, the Program has organized and sponsored numerous visits from CMU researchers to Portugal and from Portugal to CMU.

Building on the success of the Dual-Degree Master programs, which were active during the 1st and 2nd phases, the Program has been working in close collaboration with Universities in Portugal, CMU departments, and industry partners to establish a new education instrument through **Advanced Training Programs in Data Science & Machine Learning and User Experience Design**. Both programs are expected to start in 2021.

In early 2021, the Program will also launch a new initiative for doctoral degrees: the **CMU Portugal Affiliated Ph.D. Programs**. The Affiliated Ph.D. Programs initiative has the objective of strengthening the collaboration between the Portuguese higher education institutions and Portuguese companies through a strong partnership with Carnegie Mellon University. After the successful conclusion of the Ph.D. Program under the framework of this initiative, the candidates will be awarded a Ph.D. degree by the host Portuguese university, and will have the unique opportunity of visiting CMU for a period of up to twelve months to develop their Ph.D. research. Another key aspect of this initiative is the collaboration with industry, since candidates are encouraged to develop part of their Ph.D. work plan with the support of a Portuguese ICT company.

Knowledge Creation

CMU Portugal supports research projects on the broad area of Information and Communication Technologies (ICT), with a particular focus on the areas that directly impact the data economy and

foster interdisciplinary collaboration between industry and academia across different levels of the “big data” development stack.

This includes research topics spanning from **data science and engineering for large-scale data sets, to artificial intelligence, robotics, and machine learning** that enable extracting value from data, or the sociotechnical systems and applications catalyzed through these technologies. In 2018 and 2019, twenty CMU Portugal projects, **twelve Entrepreneurial Research Initiatives (ERIs) with a duration of three years**, and **eight Exploratory Projects (ERPs) of one year**, were supported across multiple Portuguese research institutions and CMU departments, strengthening an international collaborative effort across institutions and in close collaboration with industry partners. This commitment was further enhanced through the launch of **two new calls for projects in 2019**: a Call for **Exploratory Research Projects** and a Call for **Large-Scale Collaborative Research Projects**, representing the largest public and private investment to date in research and technological development under the scope of the CMU Portugal Program.

Entrepreneurial Research Initiatives (ERIs) are science, engineering, management, and policy projects that jointly combine research, innovation, and advanced training initiatives, in collaboration with companies, emphasizing the commercialization of technology with an economic and societal impact. The projects have a maximum duration of 48 months and are managed by a consortium of research teams from two Portuguese universities, one from Carnegie Mellon University, and at least one partner company. The 2013 and 2014 calls awarded twelve new grants with an overall private funding of **10.8M€ public and 2.6M€ through private companies’** investment. Of these, five projects ended in 2018, two in 2019 and in 2020, three were still active in early 2021.

The impact of these ERIs on the economy and society can be translated into **ten patents**, the development of **92 prototypes, 448 peer-review publications, 40 Ph.D. thesis, 159 Master thesis**, and support funding for **204 researchers**. ERIs have established collaborations extending to **26 Portuguese research institutions, 46 companies, and 11 CMU Departments**.

All projects supported by the CMU Portugal Program are selected through **competitive calls** by **international committees** of experts that evaluate the proposals submitted and meet as a panel in Portugal for their final evaluation, ranking, and recommendation for funding. The Program has also carried out a mid-and final-term review of the progress of these projects. For example, in 2019, CMU Portugal held a project review evaluation by an independent international panel of experts to analyze the progress of all the twelve large research projects and conducted a mid-term and final assessment of the remaining group of projects. The independent committee awarded the classification A (maximum) to four out of the five projects that reached completion.

During **2018 and 2019, CMU Portugal supported eight Exploratory Research Projects (ERPs)**. ERPs encourage new initiatives, with high impact potential, with the primary objective of promoting Information and Communication Technologies projects in strategic emerging areas: Integrative research based in the context of the AIR Center, Data Science and Engineering, Computer Science, Electrical and Computer Engineering, Applied Mathematics and Technology, Management, and Policy. The ERP call, launched in 2017 recommended **eight one-year projects for funding**, for an **overall commitment of 1 430 000€**. The ERPs - that were running during the 3rd phase of the CMU Portugal in 2018 and 2019, have supported **28 researchers** and resulted in **4 prototypes, 54 publications, 11 Master thesis** and involved **15 Portuguese research institutions and 4 CMU departments**.

A **new call for ERPs was launched in 2019** to assist teams of researchers from Portuguese institutions, Carnegie Mellon University, and industry partners to bootstrap high-impact potential research activities of strategic relevance for the CMU Portugal Program.

The overall funding of **820 000 €** will support **seven new projects**, out of 36 submissions, across **8 Portuguese** research institutions and **4 CMU Departments**. Of these, three projects began in 2020, and four projects start in early 2021.

In 2019, the most ambitious Call for research projects was launched under the CMU Portugal Program. For the first time, the research projects are led by Portuguese companies and carried out in partnership between companies and non-corporate entities of the R&D System and research groups at Carnegie Mellon. The **Call for Large-Scale Collaborative Research Projects (LSCR)** was launched in May 2019 by ANI - Agência Nacional de Inovação, with initial funding available for three to four projects. Due to the

high quality of the seventeen proposals submitted, the evaluation panel recommended the funding of ten projects in early 2020. After appeal, two other projects were also recommended for funding for the next three years. Therefore, **twelve new projects started in 2020** led by top national ICT companies, including the CMU Portugal Program startups **Feedzai** and **Unbabel** - which are now reinvesting in R&D, **Altran Portugal, Compta, DST Solar, Farfetch, First Solutions, Glintt, GLSMED Learning Health, Ingeniarius, Mobileum and Outsystems**.

In addition to these 12 companies, the projects will involve **27 other Portuguese Institutions**, from Universities to Research Labs, Hospitals, and Companies plus **eight different CMU Departments** (Civil and Environmental Engineering, Computer Science, Engineering Research Accelerator, Heinz College of Information Systems and Public Policy, Institute for Software Research, Language Technologies Institute, Mechanical Engineering, Robotics Institute). Overall, the Call represents a commitment of **25M€ from public funding** (PT2020 and FCT) and companies' investment into ICT R&D (**4,2M€**), representing the most significant public and private financial commitment to date under the scope of the CMU Portugal Program.

In summary, since 2006, the CMU Portugal Program has launched nine calls and has supported **74 research projects**. The **19 new projects that started in 2020 and early 2021** will further support CMU Portugal's mission to place Portugal at the forefront of research and technological development in ICT. Throughout 2021, a new call for Exploratory Projects will fund up to eight projects in ICT, focusing on the data economy's opportunities as a driver of growth and change.

Innovation and Entrepreneurship

The 3rd Phase of the CMU Portugal Program aims at promoting an ecosystem of innovation in Portugal, benefiting from Carnegie Mellon's experience as a dynamic economic engine in the Pittsburgh region and also the collaborative opportunities at the campus in Silicon Valley.

The CMU Portugal Program has been working to establish a very close relationship with the Portuguese industry, namely through the companies that are part of its Industrial Affiliates Program. Since 2018, **15 CMU Portugal Industrial Affiliates** have committed to actively contribute to the advanced education and research programs of the partnership and also to increase their competitiveness by investing in R&D, in advanced training of human resources, and in building a highly-skilled workforce dedicated to innovation activities. CMU Portugal Industry Affiliates includes **three Portuguese unicorn companies** ([Farfetch](#), [Talkdesk](#), and [Outsystems](#)), **three CMU Portugal startups** ([Feedzai](#), [Unbabel](#), and [Veniam](#)), and **ICT leaders** ([Accenture](#), [Altice](#), [CEiiA](#), [NOS](#), [Priberam](#), [REN](#), [Remote](#), [Tekever](#), [Thales](#), and [Uniplaces](#)). Furthermore, Farfetch, Feedzai, Outsystems, and Unbabel reinforced their commitment to the Program by leading four out of the twelve CMU Portugal Large-Scale Projects that have started in 2020.

CMU Portugal has also been a hub for faculty members, students, and alumni to launch their entrepreneurial initiatives. The Program has supported the creation and development of twelve startups: [Dognaedis](#), [Feedzai](#), [Geolink](#), [Mambu](#), [Orange Bird](#), [Prsma](#), [Red Light](#), [Sentilant](#), [Streambolico](#), [Veniam](#), Virtual Traffic Lights and [Unbabel](#). Together these companies have created over 1,000 highly skilled jobs and are already a reference in their activity sector, such as **Feedzai**, who is also part of the CMU Portugal Industry Affiliates, and **Veniam**. In January 2021, **Mambu**, a startup company established by three alumni of the CMU Portugal Master in HCI. Mambu, based in Germany, became the 1st Unicorn Company launched under the CMU Portugal program. The company is the market-leading SaaS banking platform, and the latest round of investment in early 2021 raised the company's valuation to over €1.7 billion.

During CMU Portugal's 2nd phase, the Program supported 14 teams through the **Entrepreneurship in Residence Program** (inRes), a business acceleration program for entrepreneurial teams in the area of ICT. Some of these teams have developed into successful startups such as AddVolt, whose founders have been nominated on the prestigious list Forbes 30 under 30 in Manufacturing & Industry.

Since 2006, nearly **150 companies** have been partners at CMU Portugal promoted projects. In this 3rd phase, CMU Portugal continues to strengthen the relationship between academia and industry. Leading

ICT companies are now also promoters of research initiatives, and they have also positioned themselves as funding bodies of the projects, **investing 4.2 M€** in the Large-Scale Projects of the Program.

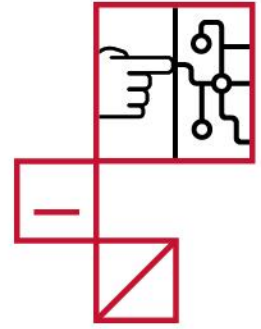
Communication and Outreach

CMU Portugal's communication strategy supports the Program's mission and the goals outlined for this new phase while recognizing the past outcomes.

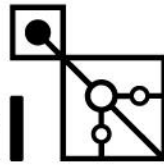
In 2018, CMU Portugal unveiled a new graphic image and website that involved restructuring the website, rethinking its navigation, usage, and cross platform support. By the end of the year, the Program also launched its first bi-monthly digital newsletter, "[News from the Fence](#)", to promote its initiatives, including news, events, and CMU Portugal publications. In 2020, the Program launched its [3rd phase Institutional Video](#) and is planning on launching in 2021 a promotional video with a summary of the 12 new Large Scale Collaborative Projects.

The Program's communication is strongly focused on online activities beyond its website, such as **social media networks** ([Facebook](#) | [Twitter](#) | [LinkedIn](#) | [Youtube](#)) and press and media activities through **press releases** highlighting the Program's research outputs and also faculty, students, and alumni achievements. In between newsletters, **targeted e-mail messages** for specific audiences are used to send invitations to events, announce calls, and other relevant pieces of information.

In the past three years, the CMU Portugal Program organized several **events** to bring together academic and industry communities involved in the Program and raise awareness about its initiatives among new stakeholders and audiences. The showcasing of the Program outcomes continues to be a strong feature of these events and addresses broad questions in ICT, such as workshops on gender balance and distinguished lectures on Artificial Intelligence and User-Centered Design. CMU Portugal also took part in **outreach events** (such as the annual event "Encontro Ciência" and InCode) to interact with a broad public to disclose and promote the Program's initiatives and activities in 2018, 2019, and early 2020. Some of these initiatives were conducted with other **institutional partners** such as Fundação para a Ciência e a Tecnologia, Fundação Luso-Americana para o Desenvolvimento ([FLAD](#)) and [Fulbright Portugal](#). From March onwards, the Program started to participate and organize outreach and engagement events online, such as the [information sessions for dual-degree Ph.D. scholarships](#) (with over 130 online participants) and [Encontro Ciência 2020](#) in a mixed format of online and restricted presential attendance. Additionally, the Program organized **high profile events** to reach out to strategic stakeholders and entities, including members from the Portuguese Government, Ministry of Science, Technology and Higher Education, Fundação para a Ciência e Tecnologia (FCT), Carnegie Mellon University and CMU Portugal Governance among others.



Carnegie Mellon Portugal



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