

ASSOCIAÇÃO FRAUNHOFER PORTUGAL RESEARCH

ANNUAL REPORT 2025

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Associação Fraunhofer Portugal Research
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Letter from the President

2025 was a year of structural change and adjustment for Fraunhofer Portugal. The external environment became more complex, funding frameworks entered a period of transition, and institutional planning required increased coordination and discipline.

In this context, our priority remained clear: rigorous applied research translated into concrete value for industry and society.

Both FhP-AICOS and FhP-AWAM demonstrated, in complementary ways, the strength of sustained scientific work. The first licensing revenues in Digital Health, the structured consolidation of AI governance capabilities, and continued advances in sustainable water, energy and resource management are not isolated outcomes. They reflect long-term investment in competence, partnerships and institutional consistency.

The progressive conclusion of the Recovery and Resilience Plan and the transition between European funding cycles signal that 2026 will present a more demanding environment for project acquisition and competitive positioning. These transitions are structural and require anticipation, diversification and financial prudence - but they also reinforce the importance of clear strategy and strong industrial partnerships.

Fraunhofer Portugal approaches this period with realism and confidence. Digital transformation, sustainability and industrial modernization increasingly intersect. The articulation between AICOS and AWAM strengthens our capacity to respond to integrated challenges with solutions that are technologically robust, economically viable and systemically relevant.

Beyond funding cycles, Portugal's international visibility in science and innovation continues to grow. Building institutions that offer stability, credible long-term perspectives and meaningful professional trajectories is therefore central to sustained competitiveness.

I see our responsibility not only in ensuring operational continuity, but in reinforcing the institutional foundations that allow excellence to endure through cycles of expansion and contraction. Growth must be sustainable. Ambition must be disciplined. And innovation must remain aligned not only with societal needs, but also with market realities and the competitiveness of the industries we serve.

Fraunhofer Portugal enters the coming year aware of the challenges ahead, yet confident in the strength of its people, the solidity of its partnerships and the relevance of its contribution to Portugal's innovation ecosystem.

Liliana Ferreira

President of the Executive Board

Carta da Presidente

2025 foi um ano de mudança estrutural e ajustamento para a Fraunhofer Portugal. O contexto externo tornou-se mais complexo, os enquadramentos de financiamento entraram numa fase de transição e o planeamento institucional exigiu maior coordenação e disciplina.

Neste contexto, preservámos uma prioridade clara: investigação aplicada rigorosa, traduzida em valor concreto para a indústria e para a sociedade.

O FhP-AICOS e o FhP-AWAM demonstraram, de forma complementar, a consistência do seu trabalho científico. As primeiras receitas de licenciamento na área da Saúde Digital, a consolidação de competências em governação de Inteligência Artificial e os progressos na gestão sustentável da água, energia e recursos refletem um investimento continuado em competências, parcerias e capacidade institucional.

A conclusão progressiva do Plano de Recuperação e Resiliência e a transição entre ciclos de financiamento europeu indicam que 2026 será mais exigente em termos de aquisição de projetos e posicionamento competitivo. Estas mudanças são estruturais e exigem antecipação, diversificação e prudência financeira, mas também reforçam a importância de uma estratégia clara e de relações industriais sólidas.

A Fraunhofer Portugal encara este período com realismo e confiança. A transformação digital, a sustentabilidade e a modernização industrial estão cada vez mais interligadas. A articulação entre o AICOS e o AWAM reforça a nossa capacidade de responder a desafios integrados com soluções tecnologicamente sólidas e economicamente viáveis.

Para além dos ciclos de financiamento, a visibilidade internacional de Portugal na ciência e na inovação continua a crescer. Construir uma organização estável, com perspetivas de longo prazo e trajetórias profissionais consistentes, é, por isso, essencial para uma competitividade sustentada.

A nossa responsabilidade não se limita a assegurar a continuidade operacional, mas também a reforçar as bases institucionais que permitem que a excelência perdure ao longo do tempo. O crescimento deve ser sustentável. A ambição deve ser disciplinada. E a inovação deve manter-se alinhada com as necessidades da sociedade e com a competitividade das indústrias que servimos.

A Fraunhofer Portugal entra no próximo ano consciente dos desafios, mas confiante nas suas pessoas, nas suas parcerias e na relevância do seu contributo para o ecossistema de inovação em Portugal

Liliana Ferreira

Presidente da Direção



2.1

Overview of Fraunhofer Portugal

Founded in 2008 by the Fraunhofer-Gesellschaft and the German-Portuguese Chamber of Commerce and Industry (CCILA) – within the framework of a long-term Portuguese-German collaboration to explore mutual interests in science and technology – Fraunhofer Portugal has the mission to undertake applied research of direct utility to private and public enterprises and of wide benefit to society.

Fraunhofer Portugal operates under the Fraunhofer model of mission-oriented applied research, undertaking research and innovation activities of direct relevance to private and public organizations, while generating sustainable value for society.

Founded in 2008 by the Fraunhofer-Gesellschaft and the German-Portuguese Chamber of Commerce and Industry (CCILA), within the framework of a long-term Portuguese-German collaboration in science and technology, Fraunhofer Portugal was established to strengthen applied research cooperation between both countries and to contribute to industrial competitiveness and societal development.

Fraunhofer Portugal currently materialises itself through its two centers: the Fraunhofer Portugal Research Center for Assistive Information and Communication Solutions (FhP-AICOS), located in Porto and Lisbon, founded in 2009 following a partnership between the Fraunhofer-Gesellschaft, the Foundation for Science and Technology (FCT) and the University of Porto (UP), and the Fraunhofer Centre for Advanced Water, Energy and Resource Management (FhP-AWAM), founded in 2019 in partnership between Fraunhofer-Gesellschaft, Fraunhofer Portugal, the Foundation for Science and Technology (FCT), the University of Trás-os-Montes e Alto Douro (UTAD) and the University of Évora (UÉ), located in Vila Real and Évora.



Fig. 01 Fraunhofer Portugal Institutional Background

2.1.1

Vision – A Driving Force in Innovation

Fraunhofer Portugal contributes to a transformative approach to technological innovation in Portugal, fostering close collaboration between scientific institutions, industry and public stakeholders. Through mission-oriented applied research, it generates scientific and technological knowledge that creates measurable value for its clients and partners, while supporting economic growth, societal well-being and improvements in quality of life.

2.1.2

Mission – Applied Research of Direct Utility

Fraunhofer Portugal promotes applied research of direct utility to private and public institutions and of broad benefit to society, by managing and coordinating the cooperation of its research centers with:

- **Research Institutions** – including universities and research institutions, as well as Fraunhofer Institutes and other research centers integrated in the Fraunhofer-Gesellschaft knowledge network, fostering scientific excellence, knowledge exchange and long-term collaboration.
- **Industry Partners** – our primary client group, through partnerships and cooperation agreements with private and public enterprises, as well as participating in business associations;
- **Institutional and Governmental Partners** – national and international public bodies and funding agencies that support research and innovation policy frameworks, enabling the translation of scientific knowledge into societal and economic value

2.1.3

Funding Model

Fraunhofer Portugal operates under a tripartite funding model agreed between the Fraunhofer-Gesellschaft and the Foundation for Science and Technology (FCT), mirroring the funding principles applied across the Fraunhofer-Gesellschaft. This model combines:

- **Institutional funding** – provided by Fraunhofer-Gesellschaft and FCT, ensuring strategic stability, long-term capability development and scientific excellence; and
- **External revenue** – generated through competitive research and development projects, contract research with industry and public entities, and the licensing and commercial exploitation of intellectual property arising from Fraunhofer Portugal's R&D activities.

External revenue is secured through participation in national and international funded projects, direct contracts with third parties within Fraunhofer Portugal's areas of expertise, and technology transfer activities, reinforcing the organization's market orientation and performance-driven culture.

This balanced funding structure promotes financial sustainability, encourages market relevance and ensures that institutional support is leveraged to generate measurable economic and societal impact.

2.1.3.1 Fraunhofer-Gesellschaft

Research of practical utility lies at the core of the mission of the Fraunhofer-Gesellschaft. Founded in 1949, the organization is Europe's leading applied research institution, driving technological innovation, economic development and societal benefit through contract research and strategic capability development.

Fraunhofer-Gesellschaft's research activities are conducted by 75 institutes and research units at locations throughout Germany. The majority of the more than 31,000 staff are qualified scientists and engineers, who work with an annual research budget of 3.6 billion euros. Contract research accounted for 88 percent of this sum (€3.1 billion) and represents the organization's core activity. Around one-third of contract research funding is provided by base funding from the German federal and state governments, enabling the institutes to work ahead on solutions to problems that will not become acutely relevant to industry and society until five or ten years from now.

Through international collaborations with leading research institutions and innovative companies worldwide, Fraunhofer-Gesellschaft ensures direct access to key regions of scientific and technological advancement, reinforcing its role in the German and European innovation ecosystem.

Within this framework, Fraunhofer institutes contribute not only to immediate customer value but also to long-term competitiveness, technological sovereignty and the development of highly qualified talent for industry, academia and public institutions.

Fraunhofer Portugal operates as part of this international network, applying the same principles of mission-oriented applied research, financial discipline and market relevance within the Portuguese innovation landscape.

2.1.3.2 German-Portuguese Chamber for Industry and Commerce (CCILA)

The German-Portuguese Chamber of Commerce and Industry (CCILA) is one of the largest bilateral chambers operating in Portugal, with over 1,000 member companies in Portugal and Germany. It plays a key role in strengthening economic relations between the two countries, supporting trade, investment and business cooperation across sectors.

As a founding partner of Fraunhofer Portugal, CCILA contributes to reinforcing the link between applied research and industry, fostering connections with the German-Portuguese business community and supporting the transfer of technological innovation into market applications.

2.1.4 Business Model

Fraunhofer institutes and centers operate with a high degree of scientific and financial autonomy within the research market, under the umbrella of their respective national legal entities. Each institute is responsible for its own budget and performance, requiring the continuous transfer of competencies into market-relevant solutions.

Generally, the financing of Fraunhofer institutes comprises three core elements:

1. Institutional funding from governmental sources (in Portugal provided by FCT and Fraunhofer-Gesellschaft) to conduct pre-competitive research in selected strategic fields;
2. Project funding from public sources linked to specific projects within the context of public programs from the EU or national governments. These grants are acquired in competition with other research facilities and industry;
3. Industrial revenues from contract research reflecting direct market demand for applied research and innovation services.

The model combines institutional stability with strong market orientation. Across the Fraunhofer-Gesellschaft, approximately 70% of contract research revenue derives from industry contracts and publicly financed research projects, while around 30% is contributed through base funding from the German federal and state governments. This balanced distribution ensures both financial sustainability and the capacity to anticipate emerging technological challenges five to ten years ahead of market maturity.

A defining feature of the Fraunhofer model is the high degree of decentralized responsibility combined with strong internal networking across institutes, as well as active collaboration with national and international academic and industrial partners. This structure fosters agility, accountability and strategic coherence.

Fraunhofer Portugal operates according to these same principles, adapting them to the Portuguese research and innovation ecosystem while maintaining alignment with the broader international Fraunhofer network.

Beyond Germany, legally independent Fraunhofer-affiliated entities have been established in countries including the United States, Austria, Italy, Sweden, Chile, the United Kingdom and Singapore. While operating under shared principles of applied, market-driven research, these centers are designed to respond to local research priorities and industrial contexts.

2.2 Governance & Management

2.2.1 Governance Structure

Fig. 02 Governance Structure Diagram



Fraunhofer Portugal seeks to follow the best practices in every area of the Association’s governance by reflecting such practices in its statutes and principles and the subsequent transparency of its internal organization. The associative structure of Fraunhofer Portugal clearly distributes functions, duties, and responsibilities among its governing boards.

2.2.2 Management

Fraunhofer Portugal’s management is a shared responsibility of both the Executive Board (responsible for daily management and current management actions) and the Supervisory Board (with broad assessment powers).

2.2.2.1 Supervisory Board

President Katja Seidel Acting Head of the Directorate for Research Fraunhofer-Gesellschaft	
Vice-President João Paulo Oliveira CEO Triangle’s	Member Alexander Michaelis Institute Director Fraunhofer IKTS
Member Paulo Simões Chief Financial Officer Worten Portugal	Member Maria Isolina Mesquita Vice-President Bluepharma Group

2.2.2.2 Executive Board



President
Liliana Ferreira 1
FhP-AICOS' Director



Member
Marisa Rio 2
FhP-AWAM's Director



Member
Ulrich Meissen 3
FhP-AICOS's FhG Advisor



Member
Thomas Härtling 4
FhP-AWAM's FhG Advisor

With an academic and professional career focused on research in the areas of Health Informatics, Human Language Technologies and Artificial Intelligence, Liliana Ferreira holds a Ph.D. in Informatics Engineering and a M.Sc. in Electronics and Telecommunication Engineering, by the University of Aveiro, complemented with a strong research background developed in several industry and R&D organizations across Europe (Portugal, Germany and the Netherlands).

With a research background in biosensing technologies, primarily for environmental applications, both in Germany and Portugal, Marisa Rio holds a Ph.D. in Microsystems Technology from the Technische Universität Dresden, Germany, and an M.Sc. in Micro- and Nanotechnologies from the University of Minho, Portugal.

With a research career and extensive experience in information logistics and warning systems, Ulrich Meissen holds a master's degree in industrial engineering and a Ph.D. on Targeted Alerting in Early Warning Systems. Since the beginning of his career at Fraunhofer, he implemented several early warning systems at a local and global level. Ulrich Meissen is currently heading the Business unit "ESPRI – Electronics Safety and Security Systems for the Public and Industries" at Fraunhofer FOKUS.

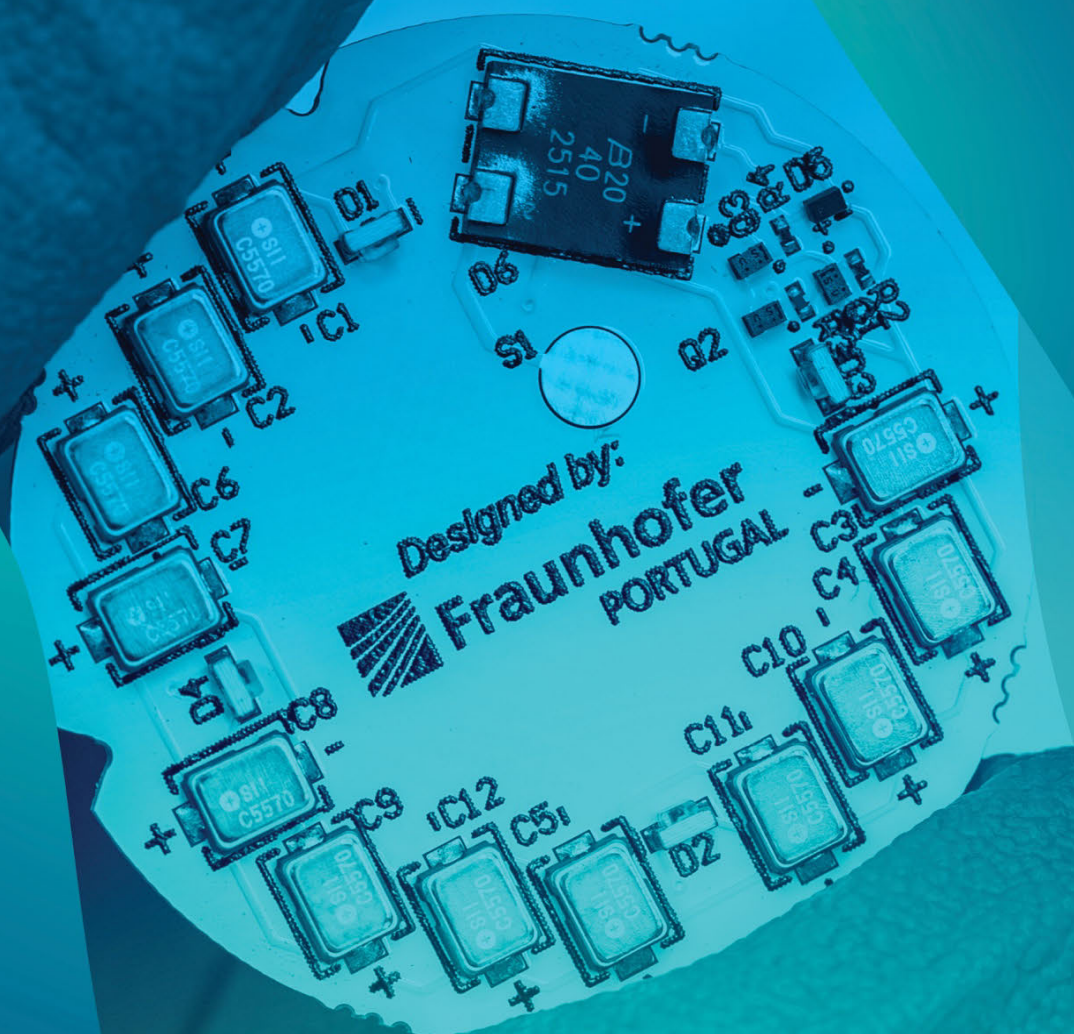
With a career focused on exploring nanoscale materials for measurement technologies applied to biotechnology, environmental technology and agriculture, Thomas Härtling holds a Diploma and Ph.D. in physics from the Technische Universität Dresden, Germany, where he built a solid experience in sensors technology based on nanomaterials. Thomas Härtling is Group Leader of Optical Testing and Nanosensors at Fraunhofer IKTS.

The Executive Board including former Executive Board member Pedro Almeida was appointed by the General Assembly on September 23, 2025. Pedro Almeida resigned from office on October 30, 2025.

2.3 Fraunhofer Portugal in Numbers

Fraunhofer Portugal





3

Research by Fraunhofer Portugal

Fraunhofer Portugal conducts its research activities through its two centers – FhP-AICOS and FhP-AWAM – which operationalize the organization’s mission of mission-oriented applied research and technological innovation of direct societal and economic relevance.

Each center contributes with distinct scientific and technological competencies, aligned with national and European priorities, while sharing the common objective of translating research excellence into measurable impact for industry, public institutions and society at large.

The following sections present the strategic focus, activities and results of FhP-AICOS and FhP-AWAM during the reporting period.

3.1

FhP-AICOS



Fig. 03 FhP-AICOS Scientific Competences

Fraunhofer Portugal Assistive Information and Communication Solutions (AICOS) founded in 2009 in partnership with the Foundation for Science and Technology (FCT) and the University of Porto, is the pioneering research center of Fraunhofer Portugal.

FhP-AICOS conducts mission-oriented applied research in digital technologies that enhance living and working conditions. Learning and advancing knowledge for the benefit of society at large is a core value upheld in all projects and future visions. Its activities focus on the development and deployment of human-centered, intelligent and interconnected systems, combining expertise in Human-Centered Design, Artificial Intelligence and Cyber-Physical Systems.

As a result of its reputable R&D, since 2009, AICOS has been involved in 20 European projects and established partnerships with over 400 organizations in 30-plus countries. Through the unique approach to People-Intelligence-Things, the AICOS team of over 100 researchers commits daily to anticipating, envisioning, and actively exploring and shaping the potential future outcomes (Digital Futures) and impacts of digital technologies in the domains of Health (Digital Health) and Industry (Digital Industry).

With renown evidence in research through design – technology created by people, with people, and for people, AI-based solutions resorting in computer vision, time-series, and natural language processing, and reliable, scalable, and resource-efficient cyber-physical systems, AICOS proposes bold, innovative solutions with an acute

awareness of current and future regulatory and ethical developments and challenges for healthcare and industry.

Embodying the core-values of excellent R&D for the wide benefit of society, FhP-AICOS is committed to assuring that the Future is co-designed and technologically sustainable to enhance lives.

3.1.1 High-level Results

In 2025, Fraunhofer Portugal AICOS strengthened its ability to translate long-term research efforts into structured economic and societal value. Research activities increasingly progressed from scientific development to market deployment and regulatory positioning.

Two complementary milestones illustrate this evolution. The generation of the first licensing revenues from a health-related technology, the Skin Wound Acquisition module, which marks a significant step in the maturation of AICOS' Digital Health research and its capacity to convert sustained R&D investment into commercial outcomes. In parallel, AICOS consolidated AICeBlock its AI governance and compliance initiative, establishing a structured approach to supporting organizations in the responsible and practical implementation of the European AI Act.

Together, these achievements demonstrate AICOS' capacity to combine technological depth, market orientation and regulatory awareness, reinforcing its role as a trusted partner in digital transformation for both industry and public administration.

3.2

FhP-AWAM

Research by Fraunhofer Portugal



The Fraunhofer Portugal Center for Advanced Water, Energy and Resource Management (FhP-AWAM), with branches in Évora and Vila Real, was created in 2019 resulting from a partnership between Fraunhofer-Gesellschaft, the Foundation for Science and Technology (FCT), Fraunhofer Portugal, Universidade de Trás-os-Montes e Alto Douro (UTAD) and Universidade de Évora (UÉ).

FhP-AWAM develops technological solutions for a wide range of sectors such as agriculture, food and beverages production, waste and water treatment, pulp and paper, (bio)energy and (bio)chemical industries.

FhP-AWAM conducts applied research and development with a clear customer focus to provide cutting-edge solutions for a sustainable circular economy in the following innovation areas:

- Water;
- Energy;
- Resource Valorization.

FhP-AWAM proposes new solutions and ideas for evolving products and services, considering the research competences from initial proof of concepts up to full pilot plant implementations.

3.2.1

High-level Results

2025 marked the second year of full operation for the laboratories at Fraunhofer Portugal AWAM. The year was characterized by strategic adjustments within the team, culminating in a stable operational structure by year-end. Building on this foundation, efforts continued to focus on expanding project acquisition, strengthening visibility among key stakeholders, and deepening engagement with industry to ensure that scientific output is increasingly aligned with societal and economic impact.



Key Achievements of the Year

In this section we look back at some of the case studies and partnerships that helped deliver value for our clients and partners, as well as support scientific excellence in both centers.

4.1

Impact Stories

True to its mission, Fraunhofer Portugal (FhP) creates value when it delivers research of practical utility. The 2025 impact stories below evidence how FhP's technology and competence are put at the service of society, improving businesses, people's lives, and allowing FhP's researchers to feel the recognition of their work.

Supporting Workers Supporting Business

The Business Development invited Chief Information Officers to learn about AICOS's technologies and capabilities. Soon after, an important player in the Portuguese steel industry – was bringing a group of workers to AICOS for an AI Ideation workshop. Having understood the potential of AI for their business, the company asked AICOS to help them with processing incoming orders. There are several workers processing incoming client emails and turning them into specifications for budgets and pre-production in standard formats used internally at the company. This is precious time that workers in customer service would prefer to spend interacting with clients and building a relation.

After a proof-of-concept demonstrating how Large Language Models could be effectively used to address the technical problem, there was the need to look at the wider sociotechnical context and build a real-world solution that could fit workers' routines. The three research departments at AICOS were summoned to work together on this challenge: Intelligent Systems continued optimizing the LLMs, Human-Centered Design spend time observing and talking to the workers to understand how technology could be introduced in the process and how the frontend could be best designed, and Connected Things worked on the architecture, backend and frontend implementation.

As agreed, by the end of the project, AICOS had delivered a full-fledged solution for the workers to test. Little did we know that, as soon as they started testing what for AICOS was still a prototype, they never looked back and now the software is supporting workers in supporting better business.

Supporting Workers and Creating a New Business

AICOS has a long-standing partnership with INCM – the Portuguese Mint and Official Printing Office – which began with AICEBLOCK (cf. section *Highlights* below). Their assay offices, which do the marking on metal artefacts, are concerned with illegal production and fabrication of these metals and asked AICOS to help devise unique and unclonable marks in their punch marking process. This could help certify metals' authenticity and thus avoid counterfeiting.

AICOS mobilized their Connected Things and Human-Centered Design teams to build a bespoke device that could deliver these unclonable marks. After studying the process and observing how skilled workers currently do the marking process, AICOS designed a solution that, with the help of embedded electronics, dispenses microscopic diamond

particles along with the stamping process. The diamond particles spread randomly and, therefore, form a unique configuration that is impossible to replicate. INCM workers execute their process manually as they have always done but press a pedal to deposit the diamond particles.

Having been tested in the field, the device – UniqueMark® – received very positive feedback from workers and has won the *European Product Design Award*.

Developing a Business Model for a Mobile Water Treatment System

As part of the Mobilizing Agenda for Vine & Wine in Portugal, AWAM, in collaboration with a technology provider, developed a containerized water treatment solution that offers a flexible, plug-and-play, and cost-efficient system that can operate independently of centralized networks. It enables wineries and cooperatives to treat and reuse their own water safely, thereby reducing operational costs, ensuring compliance with increasingly stricter environmental standards, and enhancing their resilience to drought and water scarcity. AWAM developed a Water Treatment as a Service (WTaaS) business model, grounded in experimental validation and supported by Life Cycle Assessment results, to ensure both environmental and economic viability.

AWAM's analysis demonstrated the system's market relevance by assessing market size, benchmarking against competing technologies, and quantifying cost drivers related to scalability, outlet stream capacity, product pricing, and system maintenance. Ultimately, the resulting business plan clearly articulates the value proposition and provides a solid economic foundation through profit-and-loss projections, sensitivity analyses, and a structured risk assessment, supporting informed investment and deployment decisions.

These results bridge the gap between technical potential and market reality and advance the translation of applied results into the market.

Supporting Biogas Plants Operation

AWAM has established advanced laboratory-scale anaerobic digestion capabilities to accelerate biogas process optimization and support decarbonization initiatives. These state-of-the-art facilities, which combine benchtop digesters with a semi-continuous biogas test rig, have already delivered tangible commercial impact, securing AWAM's first direct industry contract.

These innovative systems are actively supporting ongoing projects with industry and project leads, while also playing a crucial role in advancing applied research through PhD and MSc theses within the Energy Group. Current activities focus on integrated operational strategies to effectively tackle key, well-documented operational challenges identified by the team during onsite research at biogas plant facilities. Collaborative models, including the adoption of co-digestion strategies for treating and valorizing agro-industrial feedstocks relevant to Portugal as well as materials additives, have been a major focus of AWAM's research initiatives.

Proof-of-concept results obtained in collaboration with a partner company have demonstrated the readiness of these materials for intensification of the anaerobic digestion process. This work is now advancing toward scale-up through a co-promotion project, positioning AWAM for continued industry engagement and long-term impact in the bioenergy sector.

FhP Scientific Indicators

Key Achievements of the Year

New European Projects	1
New Industry Direct Contract, National Projects	16
Journal Papers	18
Conference Papers	39
Other Publications (Abstracts, Posters, Demonstrations, Book Chapters, Datasets)	14
Awards	11
Concluded M.Sc. Theses	17

4.2

Joint Initiatives

In research and innovation, we are stronger when we work collaboratively. For FhP, it is important to establish partnerships with companies and clients, to whom we can transfer our knowledge and technology, but also with academia, with whom we can grow our scientific excellence.

In 2025, following a long-standing collaboration with NOVA Medical School in research proposals and projects, AICOS was invited to become part of the Comprehensive Health Research Center (CHRC). CHRC is a research unit composed of a consortium of entities working across the full spectrum of health research – from clinical trials to the support of digital health spinoffs.

Following the invitation, AICOS worked with the CHRC consortium on the research unit's strategy for the next five years and took part in an external evaluation which granted CHRC the maximum possible score – Excellent. This joint initiative promotes AICOS' collaboration with important national and international organizations, increases our visibility and notoriety, promotes joint research projects and opens up opportunities for AICOS's researchers working in the Digital Health space.

4.3

Highlights

From Long-Term Research to Health Innovation: Skin Wound Acquisition

A key milestone in 2025 was the generation of licensing revenues associated with the Skin Wound Acquisition module, contributing to a record year in technology licensing at AICOS. This achievement marks the first revenues from a technology applied in the health domain and reflects the maturation of a research line developed over several years. Initial market adoption has focused on administrative use cases, enabling early validation while laying the foundation for regulated clinical applications. Recent technical advances, particularly in tissue characterization, are part of ongoing research activities aimed at strengthening the clinical relevance of the module over time. Building on the current results.

Advancing Responsible AI: AICeBlock and Strategic Partnerships

AICOS consolidated its role in the field of AI governance and compliance through the continued development of AICeBlock, positioning it as a central initiative supporting the adoption of ethical, transparent, and compliant AI. AICeBlock brings together several complementary activities, ranging from market-oriented pilots to more research-driven efforts, all contributing to a shared vision of responsible AI. Developed through a long-term partnership with INCM, which has supported this vision from the outset, AICeBlock is now further strengthened by the involvement of a law firm, providing essential legal expertise for operationalizing the requirements of the AI Act. An in-depth market and business study conducted in 2025 played a key role in shaping the evolution of AICeBlock, offering valuable insights into market readiness and organizational needs. While confirming strong long-term potential, the study highlighted that many organizations are still in the early stages of addressing the AI Act during the development of AI solutions, leading to a strategic repositioning of AICeBlock towards clearer framing of AI use cases and more practical guidance on regulatory implications.

The relevance of this work is already reflected in concrete collaborations with public administration. In addition, AICOS has actively contributed to high-level working groups and public fora on AI governance, particularly in contexts close to public administration and government, helping shape a shared understanding of compliance challenges and best practices. This positioning is further reinforced through AICOS' involvement with the Center for Responsible AI and its leadership at European level, including the coordination of the ACHILLES project, with national and European initiatives contributing to the continued strengthening of AICeBlock's ecosystem and future market relevance.



5.1

Economic and Political Background

In 2025, Portugal continued a trajectory of moderate but resilient economic expansion within a complex European macroeconomic environment. Following real GDP growth of 1.7% in 2024, projections from the OECD indicate growth of approximately 1.9% in 2025, increasing to 2.2% in 2026 before moderating thereafter as temporary fiscal stimuli and the Recovery and Resilience Plan (PRR, from the Portuguese *Plano de Recuperação e Resiliência*) gradually conclude. Over the 2024–2027 period, Portugal is expected to grow consistently above the euro area average, reflecting improved fiscal conditions, sustained public investment and the continued execution of European funds.

Labor market conditions remained favorable. Employment levels increased, real wages improved and unemployment stabilized at historically low levels. These dynamics supported domestic demand and reinforced economic stability, even as external uncertainties persisted.

Investment activity strengthened during 2025, largely driven by public investment linked to the peak implementation phase of EU-funded programmes. However, the expected gradual conclusion of the PRR introduces a structural inflection point, requiring a transition towards more productivity-driven and innovation-led investment models.

At the same time, geopolitical tensions remained a defining feature of the European landscape. Ongoing conflicts, trade fragmentation and strategic competition continued to affect energy markets, supply chains and key industrial sectors. For research and innovation actors, these dynamics translated into greater emphasis on technological sovereignty, resilience of value chains and the strategic positioning of critical technologies within European policy frameworks. The discourse around reindustrialization and strategic autonomy gained further prominence, shaping funding priorities and regulatory agendas.

From an institutional perspective, 2025 was marked by continued adjustments in Portugal's science and innovation governance framework. The Government approved the merger of the Fundação para a Ciência e a Tecnologia (FCT) and the Agência Nacional de Inovação (ANI) into a new agency responsible for aligning funding instruments across the full research and innovation cycle. For Research and Technology Organizations such as Fraunhofer Portugal, this evolving framework represents both an opportunity for improved strategic coherence and a period of institutional adaptation.

Public investment in research and innovation in 2025 continued to be strongly shaped by the Recovery and Resilience Plan. While PRR-funded initiatives provided substantial support to applied research and business innovation, national monitoring reports – as well as on the field experience – continued to highlight structural challenges, including administrative complexity. Discussions regarding project extensions into 2026 reflected both the scale of ambition and the practical constraints of implementation.

In parallel, the Portugal 2030 framework progressively gained relevance as the medium- to long-term funding instrument. Approval and contracting volumes

increased throughout 2025, reinforcing PT2030 as a central mechanism for continuity beyond the PRR horizon.

Against this scenario, Portugal presents a nuanced picture. The country has strengthened its international recognition in science, technology and innovation, attracting European projects and participating actively in strategic initiatives. Yet structural challenges persist. Despite improvements in research capacity and international visibility, the outflow of highly qualified professionals to other European countries remains significant. The ability to retain and attract talent continues to depend not only on funding volume but on institutional stability, career predictability and competitive innovation ecosystems.

Within this evolving context, Fraunhofer Portugal operates at the intersection of opportunity and responsibility: contributing to applied research and industrial innovation while navigating a funding landscape in transition and a broader European environment marked by both ambition and uncertainty.

5.2 Employees

- FTE 120,29;
- 21% of the Team are Scientists with Ph.D.;
- Peak of 141 Collaborators in November.

Fraunhofer Portugal's success and Human Resources policy is based on respect for human values, merit, pro-activity and compliance, with a clear focus on achieving our goals and building a motivated team united around innovation.

During 2025, we were able to maintain the structure of our team, with an annual average of 100 employees, having observed an increase in the last two months of the year.

With regards to the headcount, during the year of 2025, Fraunhofer Portugal remained an average number of 133 collaborators, and we closed the year with a total headcount of 138 collaborators (106 employees, 4 service providers, 11 grant holders and 17 students).

Also, during 2025, 34 collaborators joined Fraunhofer Portugal, 25 employees under work contract, 11 grant holders, 23 students under university collaboration and 2 research stays. The effort to disseminate Fraunhofer Portugal's career opportunities, nationally and internationally, continues to provide high levels of success, considering that we have hosted to the team people from countries such as Brazil, United Kingdom and the Netherlands.

Aligned with our strategy to offer international research stays to Fraunhofer Portugal's employees, in 2025 FhP supported researcher Ana Barros in a one-month research stay at the Human-Computer Interaction Institute of Carnegie Mellon University, in Pittsburgh, USA. During this period, Ana conducted research on the digital transformation of the workplace.

An important outcome of Fraunhofer Portugal's Human Resources policy is the fact that we are strengthening our capacity to train and develop highly skilled professionals, either to grow our team or to leverage the industry sector in Portugal.

Our recruitment strategy is partly since some of the university students and grant holders we host are later hired by Fraunhofer Portugal. In 2025, 6 former MSc students joined Fraunhofer Portugal on employment contracts, marking their first professional experience.

We closed the year 2025 with a distribution of 77% employees under work contract, 8% grant holders and 15% external collaborators. We run a highly qualified team, as 98% of our collaborators have a university degree, 43% are M.Sc. and 21% have a Ph.D. degree. The peak in the number of collaborators of Fraunhofer Portugal occurred in the last two months of 2025, driven by new employment contracts and the enrolment of MSc students.

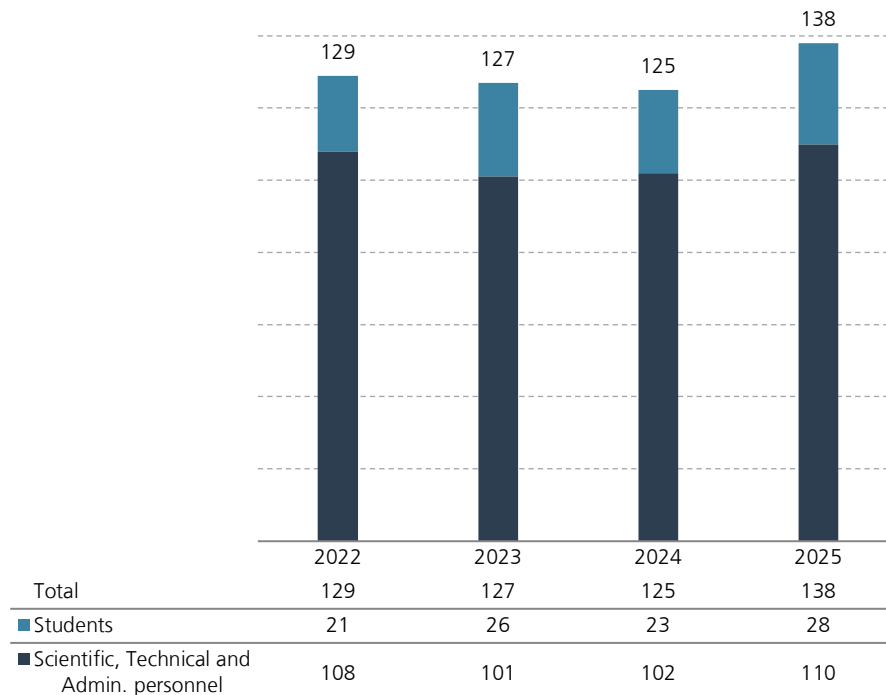


Fig. 04 Fraunhofer Portugal Headcount Evolution.

Along the year of 2025, 17 employees under work contract left Fraunhofer Portugal. The higher salaries offered by the industry sector were one of the reasons behind this change, along with a wish to pursue professional reorientation.

Higher salaries offered by the industrial sector were among the main reasons for these departures, together with a desire for professional reorientation. This outcome is seen as a positive result of the training and technical skills acquired at Fraunhofer Portugal, demonstrating that we are fulfilling our mission to accelerate innovation in the Portuguese economy by contributing to the qualification of highly skilled professionals valued by industry and other sectors and professional fields.

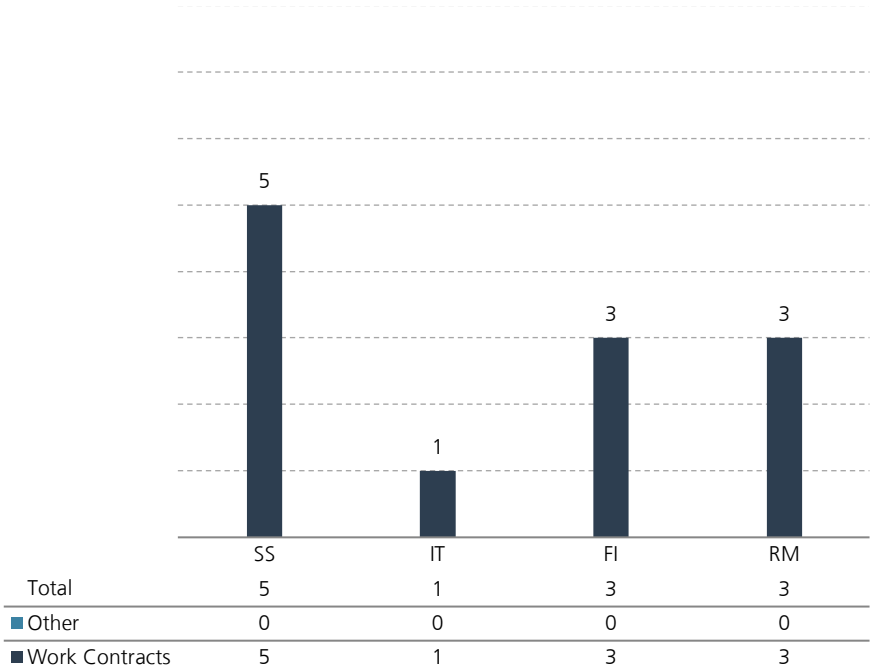
In line with our vision to motivate the team and promote merit and proactivity among all collaborators, we proudly announced the winners of the 2025 Entry Level Excellence Award during the 2025 All Hands Christmas Meeting. This award recognizes young researchers who have achieved outstanding results in previous years. This year's awardees were Fernando Rego, a scientist from the Connected Things Team at FhP-AICOS, and Vanessa Mendes, a scientist from FhP-AWAM. This was the first time the award had been granted to an AWAM collaborator.

Fraunhofer Portugal Headquarters (FhP)

The Headquarters of Fraunhofer Portugal includes following departments:

- Shared Services (SS):
 - Governance;
 - Human Resources;
 - Procurement;
 - Legal;
- Information Technologies (IT);
- Finance (FI);
- Research Management (RM):
 - Projects.

Fig. 05 FhP Headquarters Headcount by Department.



FhP-AICOS

FhP-AICOS includes following departments:

- Governance (GOV);
- Research & Development:
 - Human-Centered Design (HCD);
 - Intelligent Systems (IS);
 - Connected Things (CT);
- Business Development (BD);
- Marketing & Communication (MKT&C);
- Research Management (RM):
 - Information Systems;
- Administrative (ADM).

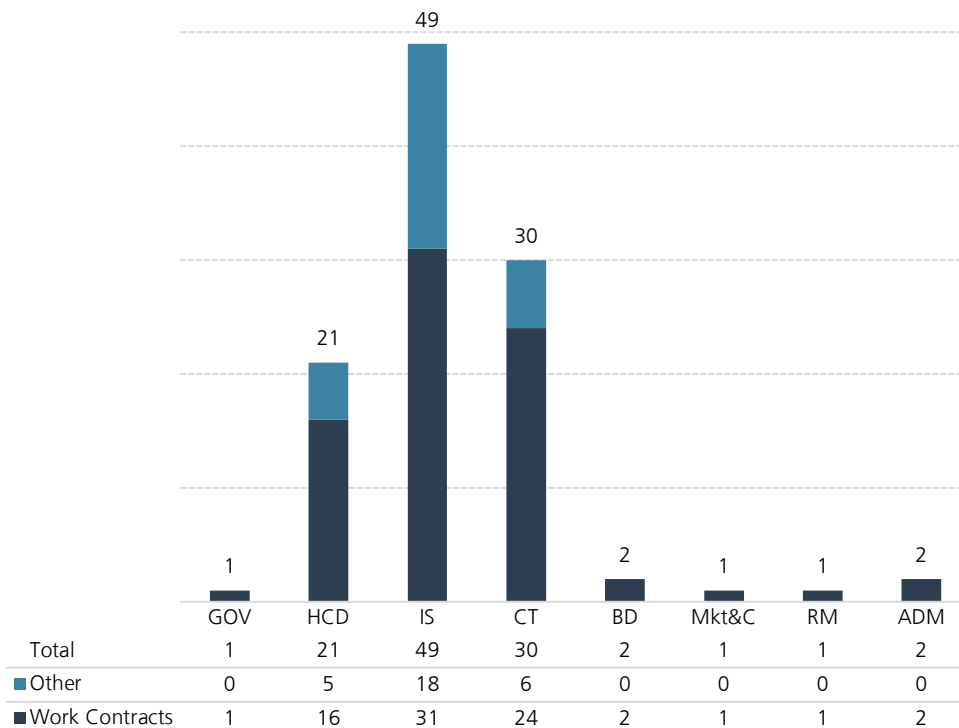


Fig. 06 FhP-AICOS Headcount by Department.

FhP-AWAM

With the continued development of FhP-AWAM's operations in both locations (Évora and Vila Real), 4 new employees were hired for FhP-AWAM's team, 2 senior scientists, 1 scientist and 1 lab assistant, with a work contract. The total number of employees (16) is distributed in two departments, Research & Development (R&D) and Administrative (ADM). AWAM also hosted 2 grant holders, 1 Master student, and 2 Bachelor students during 2025. As in previous years, FhP-AWAM had the support of a senior consultant as server provider.

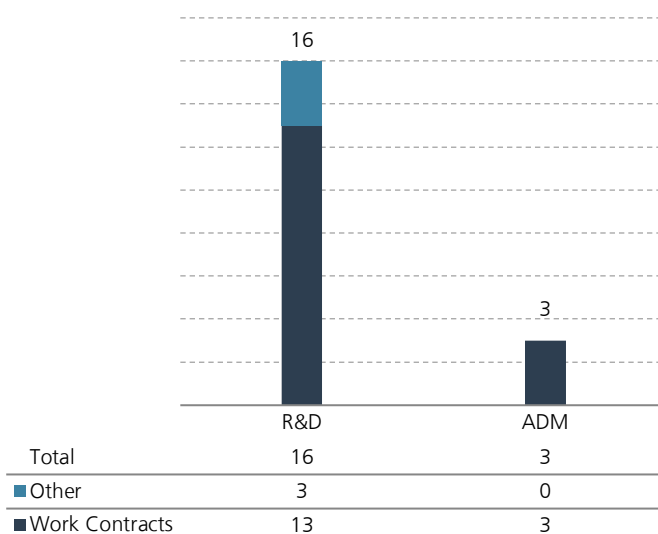


Fig. 07 FhP-AWAM Headcount by Department.

5.3

Risks and Risk Management

Fraunhofer Portugal operates in a dynamic environment characterized by technological complexity, regulatory evolution and competitive funding frameworks. As a Research and Technology Organization engaged in applied research and innovation, the institution assumes responsibility for identifying, assessing and managing the risks inherent to its activities.

Risk management is embedded in Fraunhofer Portugal's governance and operational processes. Through regular monitoring, structured assessment mechanisms and preventive measures, the organization seeks to mitigate potential threats to its financial stability, operational continuity, regulatory compliance and reputation, while preserving the agility required to pursue innovation and strategic growth.

Business Risks

Business risks arise primarily from shifts in the political, regulatory and macroeconomic environment that influence the applied research and innovation landscape.

In 2025, geopolitical tensions continued to represent a structural risk factor. Escalation of ongoing conflicts, trade fragmentation and increased protectionist measures, particularly in major global markets, may affect supply chains, industrial investment cycles and overall economic confidence. Such developments can indirectly impact research and innovation actors by reducing corporate investment appetite and increasing uncertainty in long-term planning.

At national level, the timely operationalization of funding instruments under Portugal 2030 remains critical. Delays in calls or contracting processes may temporarily constrain the capacity of research centers to secure competitively funded R&D projects.

To mitigate these risks, Fraunhofer Portugal pursues a diversified funding strategy, combining participation in European programmes, national funding instruments and direct industry contracts. Particular emphasis is placed on strengthening long-term industrial partnerships and expanding EU-level project participation to reduce dependency on any single funding mechanism.

Financial Risks

Financial risks arise primarily from the funding structure and cash-flow dynamics characteristic of research and technology organizations operating within competitive and publicly funded environments.

Fraunhofer Portugal's revenue model combines institutional funding, competitive public project financing and direct industry contracts. A significant share of project revenues is reimbursed based on cost reporting and milestone validation, which may create timing gaps between expenditure and revenue inflows.

To mitigate these risks, Fraunhofer Portugal maintains rigorous financial monitoring procedures, ensuring close alignment between project execution, contractual milestones and revenue recognition. Payment requests for publicly funded projects are submitted in a timely manner, and milestone-based invoicing is systematically applied in industry contracts. Internal tracking mechanisms monitor invoicing schedules and receivables, enabling proactive financial management.

As a knowledge-intensive organization, Fraunhofer Portugal's cost structure is predominantly composed of highly qualified human resources. Sustained project acquisition and diversification of funding sources are therefore essential to maintaining financial equilibrium, particularly during transitions between major funding programmes.

Institutional funding frameworks play a critical role in ensuring medium-term planning stability. The ongoing discussions regarding the formalization of the next multi-annual Base Funding framework introduce a degree of planning uncertainty. Fraunhofer Portugal remains actively engaged with its institutional partners to secure a stable and predictable funding basis aligned with its strategic objectives.

Through structured financial oversight and active portfolio management, Fraunhofer Portugal seeks to ensure sustainability, resilience and responsible stewardship of public and contractual resources.

Operational Risks

Operational risks arise from potential inadequacies or failures in internal processes, human resources, information systems, or from external events that may affect the organization's ability to perform its activities effectively and in compliance with applicable regulations.

Fraunhofer Portugal mitigates these risks through structured governance and internal control mechanisms. Core processes are subject to regular review and periodic external audits, ensuring alignment with regulatory requirements, funding conditions and institutional best practices. Continuous process improvement is embedded in operational management to enhance reliability, efficiency and compliance.

A formal whistleblowing channel is in place, providing a secure and independent mechanism for reporting irregularities or conduct inconsistent with the organization's ethical standards. This reinforces transparency and accountability across all levels of the institution.

Given the complexity of research funding cycles and project-based revenue structures, operational planning includes active liquidity management measures. As part of prudent financial planning, Fraunhofer Portugal maintains access to external credit facilities to ensure operational continuity in the event of temporary timing mismatches between expenditure and revenue inflows.

Through these mechanisms, Fraunhofer Portugal seeks to maintain institutional resilience, safeguard compliance and ensure uninterrupted delivery of its research and innovation activities.

Overall Assessment

Based on the current assessment, Fraunhofer Portugal's overall risk exposure remains controlled and compatible with the normal operating conditions of a Research and Technology Organization. No material risks have been identified that are expected to endanger the institution's operational continuity in the short term.

Nevertheless, the evolving geo-economic environment, funding framework transitions, particularly the end of the PRR and within the Portugal 2030 programme, and broader regulatory developments require continued monitoring and adaptive management. Fraunhofer Portugal remains attentive to these dynamics and committed to maintaining a balanced, proactive and disciplined approach to risk governance.

5.4 Management Report 2025 – Headquarters

5.4.1 Summary of Key Figures and Ratios

HR KPIs

Staff	2025	2024
Permanent Staff (Headcount) - End of Period	10	10
Temporary Staff (Headcount) - End of Period	2	4
Total Headcount End of Period	12	14
Permanent Staff (FTE) - End of Period	10,0	9,7
Temporary Staff (FTE) - End of Period	2,0	4,0
Total FTE End of Period	12,0	13,7

Financial KPIs

In terms of the Financial KPIs, Fraunhofer Portugal Headquarters had total labor costs of 777K€ and a total of non-personnel costs of 126K€, of which 903K€ were financed through internal cost allocation to FhP-AICOS and FhP-AWAM.

CAPEX expenditures associated to FhP Headquarters are being directly allocated to FhP-AICOS and FhP-AWAM on the same proportion that is used for the OPEX expenditures

5.4.2 Operational Developments

From an operational perspective, the growth of research activity over recent years has increased demands on central administrative functions. Finance, legal and project support structures have experienced higher complexity due to the scale and regulatory requirements of R&D projects. New measures were identified and initiated to reinforce internal processes and assess resource allocation to ensure continued resilience and efficiency of the organization's support functions.

These developments reflect a phase of structural consolidation, in which financial discipline, institutional coordination and administrative capacity remain central to sustaining research excellence and operational continuity.

5.4.3 Profit and Loss Statement

In 2025, the total OPEX of Fraunhofer Portugal Headquarters represented 903K€, which were costs discharged to Fraunhofer Portugal research centers. As detailed in the previous section, in 2025 there were no CAPEX expenditures accounted in Fraunhofer Portugal Headquarters.

5.5

Management Report 2025 – FhP-AICOS

Management Report 2025

5.5.1

Summary of Key Figures and Ratios

FhP-AICOS Business Development	2025 Actual	2024 Actual
Total Business Volume (Operations and Capital Expenditure) ¹	5.448.288 €	5.191.033 €
Contract Research (Total Expenses and Research Cap. Expenditure) ²	5.448.288 €	5.191.033 €
Project Revenue	3.410.581 €	3.262.688 €
Breakdown of Expenditure in % ³		
Personnel Expense Ratio	65%	69%
Non-Personnel Expense Ratio	29%	25%
Capital Expenditure Ratio	6%	6%
Breakdown of Revenue in % ⁴		
Total	68%	67%
Industry	27%	35%
Public Sector (EU + National)	38%	30%
Other	3%	2%
Employees (FTE)	88,5	83,7

HR KPIs

Staff	2025	2024
Permanent Staff (Headcount) – End of Period	50	51
Temporary Staff (Headcount) – End of Period	42	34
Total Headcount End Of Period	92	85
Permanent Staff (FTE) – End of Period	50,0	51,3
Temporary Staff (FTE) – End of Period	38,5	32,4
Total FTE End of Period	88,5	83,7

In 2025, the total headcount of FhP-AICOS reached 92 collaborators at the end of the year, being 50 permanent staff and 42 temporary staff. In terms of Full Time Equivalent (FTE), at the permanent staff represented 50,0 FTE and the temporary staff represented 38,5 FTE, leading to a total amount 88,5 FTE.

¹ Total Business Volume = OPEX+CAPEX

² Contract Research = Total Business Volume - Major Infrastructure Capital Expenditure

³ Breakdown of Expenditure = Expenditure / Total Business Volume

⁴ Breakdown of Revenue = Revenue / OPEX

Financial KPIs

In terms of the Financial KPIs, FhP-AICOS had total labour costs of ~3,5M€ and a total of non-personnel costs of 1,6M€, of which ~925K€ were costs incurred with internal and external R&D, and ~632K€ were internal costs allocation from Fraunhofer Portugal Headquarters. The total operating expenses represented 5,0M€ at year end.

The CAPEX expenditure represented approximately 332K€ in 2025, being mainly costs incurred with R&D activities.

Internal Management KPI	
Rho	68%
Rho Industry	27%
Rho Public	15%
Rho EU	22%

These outcomes allowed FhP-AICOS to reach a global management indicator, Rho, of 68%, a Rho Industry of 27%, a Rho Public of 15% and a Rho EU of 22%.

5.5.2
Business Evolution

- Consolidation of FhP-AICOS Total Business Volume above 5,4M€;
- New record of Projects Revenue, above 3,4M€;
- Industry Revenue above 1,3M€;

In terms of business evolution, in 2025 FhP-AICOS consolidated its total business volume in an amount of approximately 5,4M€. The overall project revenue reached a new record, above 3,4M€, representing the industry revenue 27% of this amount with a value above 1,3M€.

Also noteworthy is the consolidated capacity of FhP-AICOS to demonstrate its continued business know-how, setting up new records in both project revenue, surpassing 3,4M€, and total business volume, above 5,44M€.

Comparing with last year, the combined amount of project revenue increased 5%, surpassing 3,4M€, being the revenue mix composed by 1,3M€ of industry projects, 764K€ of national projects, 1,1M€ of EU projects, and 185K€ of miscellaneous revenue.

5.5.3
Contract Research

FhP-AICOS' revenue reached a new record, above 3,4M€. Since 2011, FhP-AICOS' compound annual growth rate¹ is 14%, which evidences the consistent operational growth. Based on the achieved results, 68% of the operational expenditure could be financed through project revenues.

¹ Compound annual growth rate (CAGR) is a geometric average growth rate over a period of several years.

Industry revenue surpassed 1,3M€, which includes a consolidated volume of direct industry contracts of 375K€, and a strong contribution of the Mobilizing Agendas under the National Recovery and Resilience Plan (PRR). Comparing with FhP-AICOS' revenue, industry revenue accounts for 39% of the total project revenue.

Revenue from national projects reached 764K€, representing 22% of FhP-AICOS' project revenue.

Revenue from EU-funded research projects increased 76% to 1.126K€ and represent 33% of FhP-AICOS' project revenue.

5.6 Management Report 2025 – FhP-AWAM

5.6.1 Summary of Key Figures and Ratios

FhP-AWAM Business Development	2025 Actual	2024 Actual
Total Business Volume (Operations and Capital Expenditure) ²	1.425.273 €	1.723.381 €
Contract Research (Total Expenses and Research Cap. Expenditure) ²	1.425.273 €	1.723.381 €
Project Revenue	917.214 €	864.444 €
Breakdown of Expenditure in % ³		
Personnel Expense Ratio	47%	36%
Non-Personnel Expense Ratio	39%	48%
Capital Expenditure Ratio	14%	16%
Breakdown of Revenue in % ⁴		
Total	75%	60%
Industry	20%	6%
Public Sector (EU + National)	55%	54%
Other	0%	0%
Employees (FTE)	16,5	15,5

HR KPIs

Staff	2025	2024
Permanent Staff (Headcount) - End of period	6	7
Temporary Staff (Headcount) - End of period	11	9
Total Headcount End of Period	17	16
Permanent Staff (FTE) - End of period	6	7
Temporary Staff (FTE) - End of period	10,5	8,5
Total FTE End of Period	16,5	15,5

In 2025, the total headcount of FhP-AWAM reached 17 collaborators at the end of the year, being 6 permanent staff and 11 temporary staff. In terms of Full Time Equivalent (FTE), the permanent staff represented 6 FTE and the temporary staff represented 10,5 FTE, resulting in a total FTE of 16,5 at the end of 2025.

² Total Business Volume = OPEX+CAPEX

² Contract Research = Total Business Volume - Major Infrastructure Capital Expenditure

³ Breakdown of Expenditure = Expenditure / Total Business Volume

⁴ Breakdown of Revenue = Revenue / OPEX

Financial KPIs

In terms of the Financial KPIs, FhP-AWAM had total labour costs of ~670K€ and a total of non-personnel costs of 555K€, composed by ~284K€ of costs incurred with internal and external R&D and ~271K€ of internal costs allocation from Fraunhofer Portugal Headquarters. The total operating expenses represented 1,2M€ at year end. The CAPEX expenditure represented approximately 201K€ in 2025.

Internal Management KPI	
Rho	75%
Rho Industry	20%
Rho Public	47%
Rho EU	8%

These outcomes allowed FhP-AWAM to reach a global management indicator, Rho, of 75%, being composed by a Rho Industry of 20%, Rho Public of 47%, and a Rho EU of 8%.

5.6.2 Business Evolution

In 2025, the team underwent a comprehensive reorganization and realignment, resulting in an increase of 1 FTE. It is noteworthy to mention the hiring of Professor Eduardo Rosa, who previously held the position of Vice-Rector for Research at UTAD. Professor Rosa brings extensive experience in project acquisition and coordination, as well as a significant professional network. His involvement is expected to substantially enhance FhP-AWAM's visibility and outreach, thereby driving business evolution.

Total external revenues are steadily increasing, as outlined in the 5-year plan, with substantial growth in industry revenues totaling 248k€, representing 20% of external business revenues.

Overall, a total external revenue of 917K€ has been reached by the end of 2025, which includes approximately 577K€ from national projects, 248K€ from industry projects, and 92K€ from European projects.

5.6.3 Contract Research Profit and Loss Statement

Personnel expenses for contract research reached 670K€ and represented 55% of the total operational cost in the financial year of 2025.

Non-personnel costs reached 555K€ and capital expenditure with R&D contract research reached a total amount of 201K€, leading to a Total Business Volume of 1,4M€.

FhP-AWAM's project revenue reached 917K€ in 2025.

5.7

Outlook and Strategic Development

Fraunhofer Portugal enters the coming period in a context marked by structural transition in both funding frameworks and industrial priorities. The progressive conclusion of the Recovery and Resilience Plan, together with the transition between European framework programmes and the operational consolidation of Portugal 2030, signals a more demanding environment for project acquisition in 2026. This shift requires careful planning, portfolio diversification and strengthened industrial engagement.

At the same time, European policy continues to prioritize technological sovereignty, sustainable industrial transformation, responsible digitalization and resilience of critical infrastructures. These evolving priorities create both competitive pressure and strategic opportunity for Research and Technology Organizations operating at the interface of science, industry and public policy.

Within this environment, Fraunhofer Portugal will focus its strategic development on reinforcing institutional stability and cross-center coherence. The complementary positioning of FhP-AICOS and FhP-AWAM - spanning digital technologies, cyber-physical systems, water, energy and resource management - is a structural strength. Increasing strategic articulation between both centers will enable the organization to respond to integrated challenges where digital transformation, sustainability and industrial modernization intersect.

In 2026, particular attention will be given to adapting to the anticipated contraction in national public funding streams by strengthening long-term industrial partnerships, expanding participation in European competitive programmes and enhancing technology transfer pathways. The objective is not merely to maintain activity levels, but to consolidate a resilient funding portfolio capable of withstanding cyclical fluctuations.

Fraunhofer Portugal will also continue investing in institutional robustness. In a context of high international mobility of highly qualified professionals, attracting, developing and retaining talent remains central to sustaining scientific excellence and operational continuity. Strategic clarity, governance stability and meaningful research trajectories will be decisive factors in this regard.

Looking forward, strategic development will be defined by quality, coherence and sustainability: the quality of partnerships established, the coherence between research domains and societal needs, and the sustainability of financial and human capital structures.

Through this balanced and forward-looking approach, Fraunhofer Portugal aims to consolidate its role as a trusted Research and Technology Organization contributing to Portugal's innovation capacity within a European landscape characterized by ambition, structural adjustment and long-term transformation.

Liliana Ferreira

President of the Executive Board

A Fraunhofer Portugal entra no próximo ano num contexto marcado por uma transição estrutural, tanto ao nível das perspetivas de financiamento como das prioridades nacionais e europeias. A conclusão progressiva do Plano de Recuperação e Resiliência, juntamente com a transição entre programas-quadro europeus e a consolidação operacional do Portugal 2030, marca um ambiente mais exigente para a aquisição de projetos em 2026. Esta mudança exige um maior planeamento, bem como diversificação das fontes de financiamento e reforço do envolvimento com a indústria.

Paralelamente, a política europeia continua a dar prioridade à soberania tecnológica, à transformação industrial sustentável, à digitalização responsável e à resiliência de infraestruturas críticas. Estas prioridades em evolução geram simultaneamente maior pressão competitiva e novas oportunidades estratégicas para as organizações de Investigação e Tecnologia que operam na interface entre ciência, indústria e políticas públicas.

Neste enquadramento, a Fraunhofer Portugal orientará o seu desenvolvimento estratégico para o reforço da estabilidade institucional e da coerência entre centros. O posicionamento complementar dos FhP-AICOS e FhP-AWAM - abrangendo tecnologias digitais, sistemas ciberfísicos, água, energia e gestão de recursos - constitui uma força estrutural da organização.

O aprofundamento da articulação estratégica entre ambos permitirá responder de forma integrada a desafios onde convergem transformação digital, sustentabilidade e modernização industrial.

Em 2026, será necessária adaptação à contração expectável de alguns fluxos de financiamento público nacional, através do reforço de parcerias industriais de longo prazo, da ampliação da participação em programas europeus competitivos e da consolidação de mecanismos de transferência de tecnologia. O objetivo não é apenas manter níveis de atividade, mas estruturar uma carteira de financiamento capaz de absorver flutuações cíclicas.

A Fraunhofer Portugal continuará igualmente a investir na robustez institucional. A atração, desenvolvimento e retenção de talento permanecem determinantes para sustentar a excelência científica e a continuidade operacional. Clareza estratégica, estabilidade de governação e percursos de investigação consistentes serão fatores decisivos neste domínio.

O desenvolvimento estratégico futuro será definido pela qualidade, coerência e sustentabilidade: qualidade das parcerias estabelecidas, coerência entre domínios científicos e necessidades sociais, e sustentabilidade das estruturas financeiras e de capital humano.

Através desta abordagem equilibrada e orientada para o futuro, a Fraunhofer Portugal pretende consolidar o seu papel enquanto organização de Investigação e Tecnologia de referência, contribuindo para a capacidade de inovação de Portugal num contexto europeu caracterizado por ambição, ajustamento estrutural e transformação de longo prazo.

Liliana Ferreira

Presidente da Direção



6 Infrastructure

IT Infrastructure

Since 2011, when Fraunhofer Portugal moved to its current premises, IT infrastructure has increased significantly to offer the necessary resources to Fraunhofer Portugal' ever growing team and keep up with the innovations in this domain. Besides the most common IT resources, FhP invested in equipment and software (SW) that allowed for the setup of new R&D Services, namely a:

- **Development Network:** Fraunhofer Portugal Development Network provides connectivity to registered devices, with relaxed policies and limited internal networks access.
- **Deep Learning Platform:** Deep Learning machines are full-fledged physical and virtual machines that feature dedicated Graphical Processing Units (GPUs) to train machine learning models applied to several domains, namely computer vision and signal processing.
- **Internal Cloud Platform:** Fraunhofer Portugal Cloud is built on top of OpenNebula cloud computing platform and offers unmanaged sandboxes to AICOS' scientists, to install, test, and deploy whatever technologies are required, while still benefiting from centralised backup and network security.

Throughout the pandemic, our IT infrastructure, which was already configured to facilitate remote work due to the different locations of the team, was reinforced. A series of measures were implemented to enhance communication support, such as procuring MSFT Teams licenses for the entire workforce and optimizing meeting spaces for seamless remote interactions through this platform. Moreover, we strengthened the remote computing capability and made strategic investments to amplify mobile work capacity. Presently, all team members are equipped to conduct their activities using laptops, highlighting our commitment to flexible and efficient operations.

Support Applications

In order to back up our daily activities, related not only to research and development activities themselves, but also with all the support activities, namely project management, FhP has been developing and integrating third-party applications, such as tools for:

- **Data repository management:** Fraunhofer Portugal Data Repository is a centralised repository for storing datasets, aiming to ease data collection, access and visualization. Authorization and authentication mechanisms ensure proper security when interacting with stored data;
- **Project management:** Fraunhofer Portugal Project Control is a web-based application that helps AICOS' collaborators in their daily management related activities, by providing a centralised tool to control project cost, time, quality and scope. The goal of Fraunhofer Portugal Project Control is to define a unified, systematic, and easy to use methodology for creating leads, compute

budgets, manage project execution, report, track expenses and payments, and compute AICOS' budget;

- **Publication management:** Fraunhofer Portugal CORTEX is a web-based application that offers a centralised tool to manage, store, search and access AICOS' scientific publications;
- **Software versioning, agile development, and documentation:** Fraunhofer Portugal support applications include a set of development tools that include a GIT-based revision control system, an issue tracking system, and a collaboration software to help AICOS' developers manage software versions, keep track of software issues and document their developments.

AICOS

Digital Fabrication Lab

This lab comprises an array of 3D printers and other technologies, tools and equipment for rapid creation of prototypes. Additionally, it provides access to powerful Computer-Aided Design (CAD) software, allowing the prototyping of intricate models with efficiency and precision. The following printing technologies and manufacturing techniques are made available to AICOS' scientists, clients, and partners:

- Fused Deposition Modelling (FDM)
- Stereolithography (SLA)
- Multijet (MJP)
- Vacuum forming
- Silicone moulding
- Milling machine
- Resin casting

Living Lab

For over 12 years, AICOS has grown and maintained a cohort of volunteer research participants, who enable the centre to conduct user research, co-design and technology assessment – this Living Lab is called COLABORAR³. Most volunteers are older adults, but the cohort also includes formal and informal caregivers. There are people who individually sign-up to be part of the cohort and others who participate through organisations (e.g., day-care centres, associations) which have established cooperation protocols with AICOS.

COLABORAR has supported 83 R&D projects with 3266 research sessions. The cohort counts on 62 active partner institutions and 1064 active participants.

Co-creation Space

³ <https://colaborar.fraunhofer.pt>

Realising that our offices' meeting rooms were not fully adequate to host co-design workshops, we have built a co-creation space designed to comfortably welcome our research participants, enabling sufficient space for approach and mobility, large collaboration spaces (on table surface and on wall), with close access to digital fabrication machines, with a location devoted to usability testing, and with enough storage for workshop materials.

The space has an adjoining room with sofas and sound-absorbing panels which, although easily adaptable to other situations, was designed to provide a comfortable and safe space for research participants who may need extra privacy, e.g., cancer survivors being interviewed about their unmet needs.

Motion Lab

To support the research activities related to human motion analysis, AICOS has established a Motion Lab. The Motion Lab features several Inertial Measurement Units (IMUs) and data loggers together with a *VICON* motion capture system, which is comprised of eight infrared cameras, calibration kits, body markers, and motion analysis software. The Motion Lab offers AICOS' scientists tools and resources to support the development and validation of algorithms for gait analysis, movement monitoring, and a range of motion estimation, based on inertial sensors' data, against to the gold standard defined by the motion capture system.

Open Lab

Following its internal research activities and market demand, AICOS has been constantly improving its embedded development, electronics' design and assembly capabilities. When first established in the new premises, AICOS equipped two different spaces: one for hardware related tasks and a second one for multipurpose software development. In order to bring together these close activities, AICOS merged these two labs into a new 85 square meter space called Open Lab.

This new space offers the necessary resources and tools to create state-of-the-art cyber-physical solutions, offering development, assembly, debug, and test equipment, specifically:

- Electronics assembly equipment;
- Electronics development tools;
- Radio Frequency test equipment;
- Testbeds.

AWAM

Water Lab

The Water Lab comprises laboratory equipment for the physicochemical and microbiological characterisation of water and wastewater streams, together with benchtop- and pilot-scale systems for advanced treatment and disinfection. The facility includes advanced oxidation process (AOP) systems and pressure-driven membrane units. The AOP infrastructure comprises UV-based systems (UV-A and UV-C) and ozonation, enabling studies on pathogen inactivation and micropollutant degradation. The pressure-driven membrane units include microfiltration (MF),

ultrafiltration (UF), and nanofiltration (NF) membranes, available in both polymeric and ceramic configurations, allowing the investigation of contaminant separation efficiency under controlled operating conditions.

Molecular Detection Lab

The Water Lab is supported by the Molecular Detection Lab. The combination of treatment technologies with online monitoring of pollutants enables process optimisation in terms of treatment effectiveness and energy consumption. It comprises a plasmonic device for the online detection and monitoring of trace substances in water. This technology, coupled with wastewater treatment technologies, can enable wastewater process control for efficient water treatment, reducing energy consumption and eliminating pollutants. Therefore, the molecular detection lab works synergistically with the Water lab for process optimisation.

Biogas Lab

The Biogas Lab is equipped with state-of-the-art infrastructure, including batch-scale anaerobic digesters and semi-pilot systems, enabling comprehensive evaluation of anaerobic digestion processes. This facility allows the determination of the biogas and biomethane potential of a wide range of substrates, as well as the assessment of co-digestion strategies to enhance process stability and energy recovery. Batch experiments are conducted under controlled conditions to support substrate characterization, kinetic evaluation, and optimization of operational parameters. The semi-pilot digester is a robust system used for process scale-up and optimization of digestion performance under conditions representative of industrial operation. This system enables the testing of innovative configurations, monitoring strategies, and pre-treatment approaches.

Furthermore, the biogas generated in this laboratory can be transferred to the Gas Processes Lab, where it undergoes upgrading through membrane separation or catalytic systems. This integrated approach allows the evaluation of complete biogas valorisation chains, from substrate conversion to the production of high-quality biomethane, supporting research and development activities focused on sustainable energy solutions.

Gas Processes Lab

The Gas Processes Lab comprises experimental setups for gas separation by membrane permeation and pervaporation at benchtop and lab scales, which can be used for membrane screening across different applications (e.g., biogas upgrading, ethanol removal, H₂ purification, CO₂ separation). The laboratory is also equipped with an in-house assembled, multi-purpose prototype unit that can be used for:

- i) catalyst testing
- ii) adsorbent testing
- iii) membrane testing
- iv) combinations thereof (e.g., adsorption-enhanced reactors, membrane reactors).

Consequently, this setup enables testing materials and advanced reactor concepts for the production of renewable, low-carbon fuels (e.g., within the scope of Power-to-X systems). The gas processes lab is further equipped with analytical instruments, namely a GC-MS, an online multigas analyser, a density meter, and a Fourier Transform Infrared (FTIR) spectrometer.

Chemistry Lab

The chemistry lab provides support for all involved laboratories and research activities. It is well equipped with systems for the characterization and analysis of liquids, solids, and gases. The available instrumentation includes an ionic chromatograph and HPLC for chemical analysis, a Kjeldahl unit for nitrogen determination, and a microwave digester for sample preparation. The laboratory also houses analytical and precision balances, along with standard equipment and materials, ensuring reliable and reproducible experimental work.

Optics Lab

This lab is equipped with an inverted microscope operating in brightfield, phase contrast, fluorescence, and reflected light, which primarily supports (bio)sensor development in the context of molecular detection but also supports the Water and Biogas labs.

Workshop

A small mechanical workshop allows scientists and lab engineers to manufacture equipment parts and to assemble setups up to lab-sized systems. Apart from hand tools, the following equipment is available:

- Mechanical lathe
- Milling machine
- Band saw
- Drill press
- Soldering station.

The infrastructure is complemented by an external area of 64m² used for installing large systems, such as containerized systems for pilot demonstrations at clients' facilities, and for meeting specific requirements not available in the laboratories, such as solar-based systems or high-pressure test beds. This external space can also be used for the safe storage of consumables, such as gas bottles, and large-volume samples, including agricultural residues and process wastewater.

Acronyms

ADM	Administrative
AHED	Advanced Health Education
AHK	Câmaras de Comércio Alemãs no Exterior
AI	Artificial Intelligence
AICOS	Fraunhofer Centre for Assistive Information and Communication Solutions
AlmaScience	Associação AlmaScience - Investigação e Desenvolvimento em Celulose para Aplicações Inteligentes e Sustentáveis
ALS	Amyotrophic Lateral Sclerosis
ANI	Agência Nacional de Inovação
APS	Administração dos Portos de Sines e do Algarve
AWAM	Fraunhofer Centre for Advanced Water, Energy and Resource Management
BMP	Biochemical Methane Potential
BoP	Beginning of the Period
CAPEX	Capital Expenditure
CCDR-N	Comissão de Coordenação e Desenvolvimento Regional do Norte
CCG	Associação CCG/ZGDV - Centro de Computação Gráfica
CCILA	German-Portuguese Chamber of Commerce and Industry
CeNTITVC	Centro de Nanotecnologia e Materiais Técnicos, Funcionais e Inteligentes
CHR	Clinical high risk
CISUC	Centre for Informatics and Systems of the University of Coimbra
CITEVE	Centro Tecnológico das Indústrias Têxteis e do Vestuário de Portugal
CMU	Carnegie Mellon University
CMVNG	Câmara Municipal de Vila Nova de Gaia
CoLAB	Collaborative Laboratoire
COTEC	Associação Empresarial para a Inovação
CT	Connected Things
CTCV	Centro Tecnológico da Cerâmica e do Vidro
CTM	Centre for Telecommunications and Multimedia of INESC TEC
DCF	Diclofenac
DFA	Design for Assembly
DFM	Design for Manufacturability
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
EBIT	Earnings Before Interest and Taxes
EBT	Earnings Before Taxes
ECG	Electrocardiogram
EoP	Ending of the Period
EU	European Union
FBAUP	Faculdade de Belas Artes da Universidade do Porto
FCT NOVA	Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa

FCT	Foundation for Science and Technology
FEP	Faculdade de Economia da Universidade do Porto
FEUP	Faculdade de Engenharia da Universidade do Porto
FhG	Fraunhofer-Gesellschaft
FhP	Fraunhofer Portugal
FhP-AICOS	Fraunhofer Portugal AICOS
FhP-AWAM	Fraunhofer Portugal AWAM
FLUP	Faculdade de Letras do Porto
FOKUS	Fraunhofer Institute For Open Communication Systems
FTE	Full Time Equivalent
GDP	Gross domestic Product
GDPR	General Data Protection Regulation
GFCF	Gross Fixed Capital Formation
GOV	Governance
HCD	Human-Centred Design
HCP	Health Cluster Portugal
HQ	Headquarter
HR	Human Resources
IADe	Instituto de Artes Visuais, Design e Marketing
IAPMEI	Agência para a Competitividade e Inovação, I.P.
ICET	Information, Communication and Electronics Technologies
ICS-UCP	Instituto de Ciências da Saúde - Universidade Católica Portuguesa
ICT	Information and Communication TechnologiesInstitute of Technology
INCM	Imprensa Nacional Casa da Moeda
INESC TEC	Instituto de Engenharia de Sistemas e Computadores, Tecnologia e Ciência
INVICTA	School of Vision, Computational intelligence, and patTern Analysis
IoT	Internet of Things
IPO	Instituto Português de Oncologia
IRC	Imposto sobre o Rendimento de Pessoas Coletivas
IRS	Imposto sobre o Rendimento de Pessoas Singulares
IS	Intelligent Systems
ISEP	Instituto Superior de Engenharia do Porto
IST	Instituto Superior Técnico
IT	Information Technology
IVA	Imposto sobre o Valor Acrescentado
KPI	Key Performance Indicator
LLM	Large Language Model
MBA	Master of Business Administration
Mkt&Com	Marketing and Communication
M.Sc.	Master of Science
MSK	musculoskeletal
ML	Machine Learning
NBD	New Business Development
NEEF	Engineering Physics Student group of the Aveiro University
NEE-MEC	Mechanical Engineering Student Group of the Aveiro University
NLP	Natural Language Processing

Acronyms

Acronyms	OCR	Optical Character Recognition
	OPEX	Operational Expenditure
	PCB	Printed Circuit Board
	PDM	Predictive Maintenance
	Ph.D.	Doctor of Philosophy
	PIEP	Pólo de Inovação em Engenharia de Polímeros
	P&L	Profit and Loss
	PoC	Proof-of-concept
	PRR	National Recovery and Resilience Plan
	PSD	Partido Social Democrata
	QREN	Quadro de Referência Estratégica Nacional
	R&D	Research and Development
	RM	Research Management
	RTO	Research & Technology Organization
	SNC-ESNL	Sistema de Normalização Contabilística
	SRA	Strategic Research Agenda
	SS	Shared Services
	TRL	Technology readiness level
	TS	Total Solids
	TWS	Thursdays with Science
	UA	Universidade de Aveiro
	UALG	Universidade do Algarve
	UE	Universidade de Évora
	UC	Universidade de Coimbra
	UHR	Ultra-High-Risk
	UI	User Interface
	UK	United Kingdom
	UNL	Universidade Nova de Lisboa
	UP	Universidade do Porto
	US	United States
	UTAD	Universidade de Trás-os-Montes e Alto Douro
	VAT	Value Added Tax~
	VCMI	Visual Computing and Machine Intelligence group of the Centre for Telecommunications and Multimedia of INESC TEC.
	VS	Volatile solids
	WFR	Water for Reuse
	WIP	Work in Progress
	XAI	Explainable Artificial Intelligence

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