INESC TEC

40

'25 ANNUAL REPORT

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40 YEARS

LUÍS SECA, MARIA DA GRAÇA BARBOSA, JOÃO CLARO, CLARA GOUVEIA, GABRIEL DAVID, LIA PATRÍCIO, ANÍBAL MATOS.

Celebrating 40 Years

Recognised for Excellence

Committed to the Future

As we present this Annual Report, we do so for a year of particular meaning for INESC TEC. In 2025, we marked 40 years of activity: four decades of research, innovation, partnership, and public purpose. That milestone gave the year a special intensity. It invited reflection, but it also sharpened our sense of responsibility.
The context was demanding: geopolitical instability persisted, technological change accelerated, and environmental and societal pressures continued to grow. In such a landscape, anniversaries matter less as commemorations than as tests of substance. What this report shows is how INESC TEC responded to that test: with stronger performance, deeper institutional maturity, and a renewed commitment to the future.

Academic Excellence and Innovation

In 2025, we reinforced our academic mission with results that were both demanding and consequential. INESC TEC was awarded the highest classification of Excellent in the national FCT R&D Units Evaluation, confirming the quality, maturity, and impact of its scientific activity. We maintained a high level of scientific output, with 932 indexed journal and conference publications, while consolidating our presence in top-tier venues. We also strengthened the conditions for talent development and long-term scientific capacity, through the expansion of doctoral education, the creation of the Research Student Office, and targeted recruitment in key scientific areas, supported in part by the FCT-Tenure Programme. Our role in Open Science and research data management also became more visible, including through our contribution as one of the ten national centres for Research Data Management.

Tackling the Toughest Challenges

Our work in 2025 remained closely tied to the challenges that matter most to science, technology, and society. Through a comprehensive portfolio of projects and initiatives, we contributed to areas such as sustainability, digital transformation, health, energy, and the blue economy. The Institute continued to play a major role in large-scale initiatives under the PRR, which deepened collaboration with industry and public stakeholders and expanded our capacity to operate in real-world settings. The launch of TEC4COMMUNICATIONS gave clearer structure to our work in advanced communications, linking research capabilities with industrial demand and emerging technological priorities. We also strengthened our role in public debate and policymaking, notably through the restructuring of the Foresight and Public Policy Office and through the 10th Autumn Forum, which brought together more than 500 participants to discuss how artificial intelligence intersects with ethics, identity, and society.

Integrating Across Disciplines and Ecosystems

The year confirmed something that has long been central to INESC TEC's way of working: important advances rarely come from isolated effort. They emerge when disciplines, institutions, and sectors connect with purpose. In 2025, this was evident in the launch of INESCTEC.OCEAN, which created a new multidisciplinary platform in ocean research and engineering, and in the launch of POEMS, the Portuguese Competence Centre in Semiconductors. We also took a significant step in strengthening the link between research and entrepreneurial translation through the creation of the Entrepreneurship and Spin-offs Office. The launch of KEPsoft, together with INESC TEC's third consecutive podium position at the EARTO Innovation Awards, showed that our ability to connect science, innovation, and societal relevance is becoming more consistent and more visible at European level.

Fostering a Talented Community

Our community remains the basis of everything we do. In 2025, we continued to invest in people across different stages of their path at INESC TEC. Core Human Resources reached 1,199 person-year, a 10% increase over 2024, with growth accompanied by a stronger presence of highly qualified personnel and a gradual increase in more stable positions. We broadened mobility opportunities, reinforced the International Visiting Researcher Programme, and continued to attract growing interest from researchers abroad. We also reached a record 121 summer internships, with around one third of participants continuing research collaborations, and the 2025 Call for PhD Studentships resulted in the approval of 51 fellowships, a 45% increase, representing around €1 million in annual funding. Alongside this, we continued to improve the working environment through investments in infrastructure, digital tools, diversity and inclusion initiatives, and internal engagement actions, many of which gained special resonance in the year of our 40th anniversary.

Pursuing Operational Excellence

Operational strength is what allows scientific ambition to become sustained institutional capacity. In 2025, INESC TEC reached €39.7M in total activity, an 18% increase over 2024, supported by a diversified funding base combining European programmes, national instruments, and direct collaboration with companies and public organisations. We maintained strong participation in competitive funding, continued the execution of 29 PRR projects, and delivered 134 research services contracts directly to companies, generating €3.9M in revenue. We also strengthened internal systems and management capacity through the completion of a new ERP system, the consolidation of the Project Office and centralised PMO, and continued progress in digital transformation. Infrastructure remained a strategic priority, with the start of construction of the Leixões Blue Hub, the continued development of SUSTEMARE, the increased use of the Mar Profundo vessel, and further reinforcement of research capacity through EQUIPAR+2 and other investments.

Looking ahead, we do so with confidence, but also with perspective. The achievements of 2025 matter in themselves. They also show that INESC TEC is entering its next phase with stronger foundations, broader reach, and clearer strategic direction. We extend our sincere thanks to all who contribute to this mission – researchers, staff, students, alumni, partners, and supporters. Your dedication, intelligence, and trust are what sustain this institution and what will continue to move it forward.

The Board of Directors

Creating a Fulfilling and Sustainable Future

As the largest Research and Technology Organisation (RTO) in Portugal, we work to inspire and empower people, organisations, and ecosystems.

We mobilise science and technology to address society's most pressing challenges, with impact, scale, and responsibility.

RESEARCH.

Artificial Intelligence

Bioengineering

Communications

Computer Science & Engineering

Photonics

Power & Energy Systems

Robotics

Systems Engineering & Management

INNOVATION.

TEC4 agro-food

TEC4 communications

TEC4 energy

TEC4 health

TEC4 industry

TEC4 sea

TEC partnerships

close to **600** Researchers

400+ PhD holders

close to **400** PhD Students

40+ Nationalities

APPROXIMATELY **€40M** ACTIVITY

350+ ONGOING PROJECTS

6 PORTFOLIO SPIN-OFFS

50+ PATENT FAMILIES

Our international exposure is strong and deliberate. With a permanent representation in Brussels, deep engagement in transatlantic partnerships, and significant participation in European programmes, representing close to 30% of our revenues, we operate within a global innovation ecosystem. At the same time, national collaboration programmes with industry accounts for over 45% of our activity, reflecting our close engagement with nearly 130 companies.

As an Associate Laboratory, a Technology and Innovation Centre, and a public-interest institution, we act at the interface between academia, the private sector, the public sector, and society. This institutional model allows us to mobilise scientific knowledge to strengthen competitiveness, resilience, sustainability, and societal impact.

VALUES

Values are not slogans.

They are the standards we refuse to compromise.

Rigour and excellence define the quality of our science.
Integrity, transparency, and ethics safeguard the trust placed in us.
Freedom to create and think protects intellectual independence.
Creativity, boldness, curiosity, and innovation drive discovery and transformation.
Collaboration multiplies impact across disciplines and sectors.
People-centredness and inclusion ensure that progress strengthens communities and empowers individuals.

These values do not only sit alongside our mission and vision. **They make them possible.**

MISSION

As a **free-thinking and diverse community, we take on bold scientific and technological challenges** because knowledge must serve a greater purpose. We **empower talent** because people are the true drivers of transformation. We **nurture collaborative ecosystems** because meaningful change happens collectively. And we **contribute to public policy** because science must help shape the future, not merely observe it.

VISION

Our vision is to be an inspiring and empowering force, driving the science and technology of digitally enabled systems into overcoming society's challenges.

In a world defined by acceleration and uncertainty, our values, mission and vision remain our compass.
They help ensure that impact is not only innovative, but responsible.

Not only ambitious, but inclusive.
Not only transformative, but trusted.
Because what we build matters.
And how we build it matters even more.

Institutional Path

“Behind every step, every outcome, every boundary pushed, we were – and we are – people together at work: thinking, creating, questioning, building.”

João Claro
INESC TEC Chairman

Forty years ago, a bold idea took root in Porto. In 1985, INESC arrived in the city with the mission of improving laboratory conditions, securing appropriate funding, promoting the transfer of knowledge from academia to society, and contributing to the country’s development.

Over the decades, that founding vision evolved into a distinctive institutional model, one that bridges science, technology and society, and connects fundamental research, innovation, and public-interest engagement.

Built through people, partnerships and shared ambition, this model has enabled INESC TEC to respond to complex societal and industrial challenges with scientific depth, technological capacity and institutional responsibility.

The year 2025 marked an important milestone as we celebrated 40 years of activity and honoured our path. It was also a moment to recognise those who have left a lasting mark on that trajectory, with Pedro Guedes de Oliveira and José Manuel Mendonça, former Chairmen of the Board of Directors, being distinguished as *Chairmen Emeriti* of INESC TEC. In that spirit, we also reaffirmed the commitments that will shape the future of the institution.

This is our collective ambition:

Innovate for excellence

Scientific excellence remains the cornerstone of INESC TEC’s mission, driving the development of advanced technologies with global relevance.

Make an impact through the toughest challenges

Addressing complex societal and technological challenges is a defining feature of INESC TEC’s research agenda.

Create relevance through integration

INESC TEC’s institutional model is built on the integration of disciplines, actors and missions, connecting research, industry and public policy so that scientific knowledge translates into tangible societal and economic value.

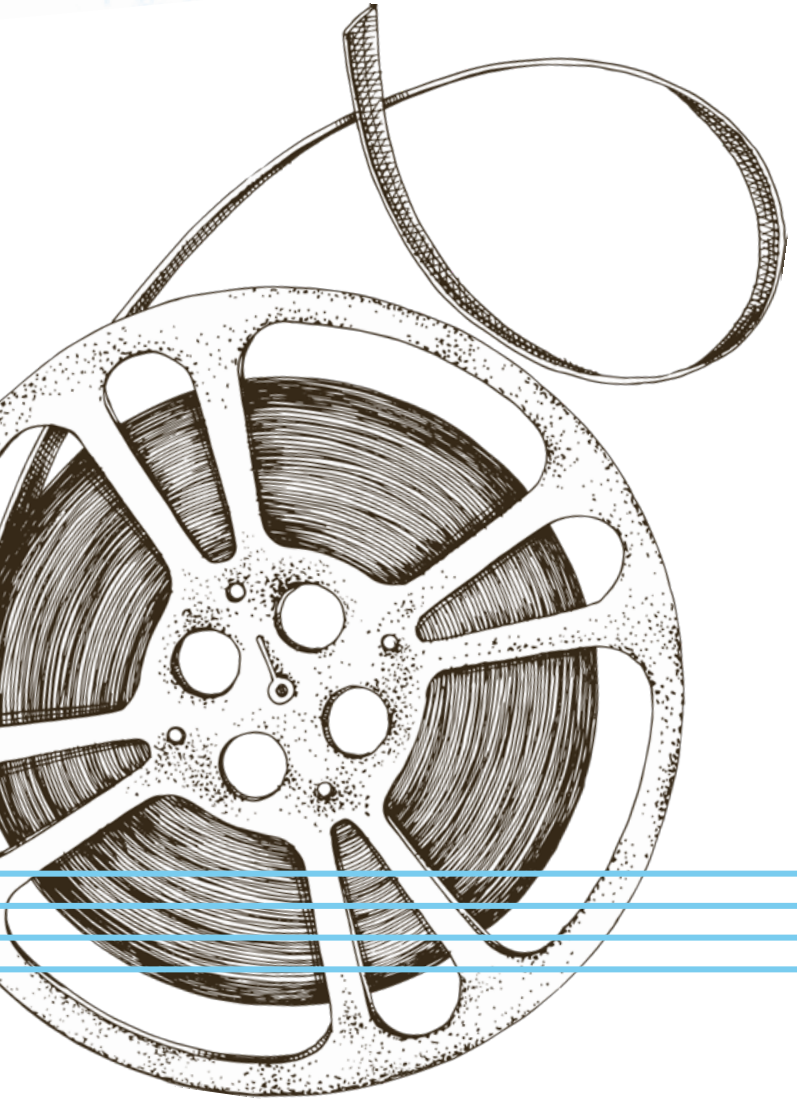
Cultivate our community

A strong and diverse community of researchers, students and partners remains fundamental to INESC TEC’s long-term success.

Sustain a sound operational model

Over four decades, INESC TEC has developed a robust operational model that combines scientific ambition with institutional sustainability and international engagement.

Timeline



JANUARY

INESCTEC.OCEAN officially launched. We kicked off our 40th anniversary year with the launch of **Portugal's first Centre of Excellence in Ocean Engineering and Research** and the signing of an MoU with SINTEF Ocean, reinforcing collaboration in this strategic domain.

We were recognised as a National Data Management Centre. Through the FAIRWay project, we were designated as one of ten National Research Data Management Centres recognised by FCT, reinforcing our role in data governance and Open Science.

FEBRUARY

Modular-E reinforces international leadership in agricultural robotics.
For the second consecutive year, our Modular-E robot ranked second in the "Participants' Choice" category at the World FIRA Forum, with over 500 votes.

MARCH

Shaping Europe's research future. We joined the European Parliament Task Force on the future of Widening countries within the EU Framework Programme.

APRIL

Recognised as Excellent. We received the highest classification, "Excellent", in the 2023/2024 national R&D Units Evaluation conducted by FCT.

International scientific collaboration expanded to Taiwan. We launched our first joint exploratory research projects with NIAR (Taiwan), strengthening transnational cooperation.

MAY

40 years of impact.
We marked our 40th anniversary with an internal celebration that brought together different generations of our community. Through shared memories and testimonies, the event honoured four decades of science, innovation and collective growth.

Portuguese science at the heart of European energy policy. We trained experts from the European Commission's Joint Research Centre (JRC) in semantic interoperability, strengthening the digitalisation of the EU energy sector.

Recognition from the business ecosystem.
INESC TEC was awarded the title of Honorary Member by the Portuguese Business Association (AEP), recognising its contribution to the national business ecosystem and to Portugal's economic and social development.

JUNE

A strategic position on European data sovereignty. We released the Dataspaces Manifesto, a position paper on the Future of Dataspaces, reinforcing principles of sovereignty, security and interoperability within the European Digital Single Market.

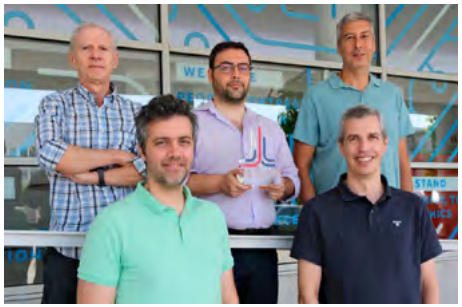
European debate on strategic autonomy and dual-use technologies. We co-organised a high-level event in Brussels with representatives from DG DEFIS, DG RTD and the Cabinet of the European Commissioner for Startups, Research and Innovation.

Robotics, AI and IoT advancing viticulture. In collaboration with UTAD, ADVID and Sogrape, we organised a cross-institutional event to showcase R&D results in precision viticulture.

Hosting the SLICES Summer School on 6G. For the first time in Portugal, we welcomed 50 international participants for the SLICES Summer School, organised under the CONVERGE project.

JULY

Innovation in logistics recognised nationally. The TacitRouting project, combining data science and optimisation for last-mile route planning, received the PEL Academia 2025 Award from the Portuguese Logistics Association (APLOG).



Advancing digital ocean research. We contributed to the ILIAD project, which delivered a federated and distributed digital twin architecture enabling cooperation between local twins through sovereign data sharing and interoperable models and applications.

AUGUST

Commitment to open-source energy innovation. INESC TEC joined Linux Foundation Energy, reinforcing its contribution to open-source solutions that accelerate the energy transition and strengthen European technological sovereignty.

LF ENERGY

SEPTEMBER

Advancing responsible AI and regulation. We contributed to European AI policy processes, including consultations on generative AI transparency and participation in standardisation efforts supporting the AI Act.

Record participation in the Summer Internship Programme. We offered a total of 121 internships, with around one third of participants continuing research collaborations, reinforcing talent attraction and retention.

INESC TEC at the world's largest maritime robotics exercise. Our teams took part in REPMUS 2025, operating autonomous systems in critical underwater infrastructure and submarine escape and rescue scenarios, and showcasing INESC TEC and INESCTEC.OCEAN assets in a unique real-world experimentation environment.

Human–AI collaborative networks in focus. We brought the international PRO-VE community to Porto to discuss the collaborative integration of humans and artificial intelligence in organisational and technological networks.

OCTOBER

European innovation recognition for spin-off impact. Our spin-off KEPSoft secured a podium position at the EARTO Innovation Awards, marking the third consecutive year in which INESC TEC was recognised in this European forum.

International acknowledgement for early-career excellence. Our researcher Miriam Seoane Santos received the ERCIM Cor Baayen Award, becoming the first Portuguese researcher to receive this distinction.

NOVEMBER

Autumn Forum at Casa da Música. We closed our 40th anniversary celebrations with the tenth edition of our Autumn Forum, gathering more than 500 participants to discuss how AI intersects with society, ethics and human values, and why inclusion, diversity and responsibility must remain central to technological futures.

Strong results in the 2025 PhD Studentships Call. A total of 51 fellowships were approved, a 45% increase representing approximately €1 million in annual funding, with strong industry collaboration.

Ocean governance at the United Nations. Our researcher Eduardo Silva participated in a UNDOALOS panel on marine technology transfer and capacity development within the UN Consultative Process on Oceans and the Law of the Sea.

DECEMBER

Ricardo Bessa elevated to IEEE Fellow. Ricardo Bessa, Coordinator of our Centre for Power and Energy Systems, joined the ranks of IEEE Fellows, in recognition of an international career of distinction in energy systems and artificial intelligence.

Helping shape the first steps towards Europe's foundation AI model for energy. In 2025, we contributed to early work on advanced AI solutions for the energy sector, supporting the development of a European foundation AI model for power grids and engaging with the GenerativeAI4EU initiative.

Numbers

OUR PEOPLE

At INESC TEC, our impact starts with our people. We rely on a multidisciplinary and highly skilled team that brings together expertise across different scientific domains and innovation areas. This diversity fosters collaboration, creativity and innovation, enabling us to tackle complex challenges and generate meaningful impact.

Total Core HR

1199

Faculty
272

R&D Employees with PhD
125

R&D Employees
166

Postdoctoral Fellows
13

Researchers with PhD
401

PhD Students
392

MSc & BSc Students
421

Mgmt, Admin & Technical
135

OUR FUNDING

In 2025, INESC TEC recorded a significant increase in activity, reaching nearly €40 million in total funding, representing an 18% growth compared to the previous year. This evolution highlights the increasing relevance of our work across research, innovation and collaboration with external stakeholders. Notably, national cooperation programmes with industry grew by 37%, reinforcing our strong connection to the business sector and our ability to translate knowledge into value for companies and the economy.

Total Activity

39.7M€ (+18%)

Project Funding Highlights

National Funding

R&D Programmes – FCT
1.6M€ (+17%)

Cooperation Programmes with Industry
15.5M€ (+37%)

R&D Services and Consulting
National and International
3.9M€ (+34%)

EU Funding
11.6M€ (+16%)

OUR NUMBERS

OUR TECHNOLOGY

Our technology transfer activity reflects a strong commitment to transforming knowledge into impact, with continued progress in first priority patent applications, patent internationalisation, commercial contracts and the consolidation of patent families, alongside the creation of new spin-offs that bring INESC TEC technologies closer to the market.

First Priority Patent Applications
19

First Patents Internationalisation
7

Commercial Contracts
1

Spin-offs
1 Established
8 In development

Active Patent Families
56

OUR SCIENCE

Our scientific output reflects the strength and breadth of our research activity, encompassing journal and conference articles, books and PhD theses concluded at or supervised by INESC TEC, contributing to the advancement of knowledge across multiple domains.

Indexed Articles in Journals
468

Indexed Articles in Conferences
464

Books (author)
7

Book Chapters
42

Concluded PhD theses by INESC TEC members
43

Concluded PhD theses supervised by INESC TEC members
64

OUR DISSEMINATION

INESC TEC actively promotes the dissemination of knowledge through a wide range of activities, including editorial roles in scientific journals, participation in programme and organising committees, and the organisation of conferences, workshops and scientific sessions, as well as engagement in international events, fairs and exhibitions, and the delivery of advanced training courses, fostering dialogue between science, industry and society.

Participation as principal editor, editor or associated editor in journals
103

Conferences organised by INESC TEC members
(in the organising committee or chairing technical committees)
62

International events in which INESC TEC members participate in the program committees
235

Participation in events such as fairs or exhibitions
123

Conferences, workshops and scientific sessions organised by the R&D Centres
88

Participants in the conferences, workshops and scientific sessions organised by the R&D Centres
8532

Advanced training courses organised by R&D Centres
22

OUR VOICE IN 2025
— COMMUNICATING SCIENCE WITH STRATEGY

In 2025, communication was a strategic instrument for positioning INESC TEC as a leading voice in science, technology and public debate. As we celebrated our 40th anniversary, we strengthened our external visibility while consolidating our role as a trusted knowledge partner in key societal discussions.

From Visibility to Strategic Intelligence

We reinforced our external positioning through a more structured and data-informed approach, enabling clearer insight into how INESC TEC is perceived nationally and internationally. This allowed us to move beyond exposure and focus on influence, strengthening our presence in policy-relevant and technology-driven debates.

Science in the Public Arena

In 2025, we positioned researchers not only as authors of scientific publications, but as interpreters of complex societal challenges.

Through the **Science & Society** magazine, podcasts, videocasts and expert commentary formats such as **INESC TECWatch**, we contributed to public debate on artificial intelligence, communications, digital infrastructure and energy resilience.

A defining moment occurred during the Iberian power outage. Through two special editions of **INESC TECWatch**, our experts provided timely, evidence-based analysis - first in power and energy systems, then in telecommunications. The energy-focused edition became the most viewed to date, reinforcing our credibility at a moment of national relevance.

This visibility extended to international media, with our researcher João Abel Peças Lopes featured in the **Financial Times**, providing expert insight on energy markets and cross-border electricity dynamics, reinforcing INESC TEC's presence in global media and positioning our expertise within international policy and economic debates.

Our research also reached other international mainstream audiences. INESC TEC was featured in **Euronews**' "Food Detectives", highlighting work developed under the WATSON project and strengthening our visibility in tackling food fraud through advanced technology.

Integrated campaigns and Public Engagement

Throughout the year, integrated communication campaigns combined editorial content, video, digital outreach and media relations, reinforcing institutional values while ensuring coherent storytelling across platforms.

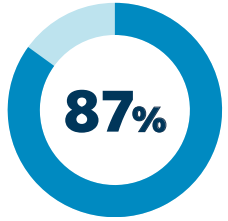
Initiatives such as the **International Day of Women and Girls in Science, National Scientific Culture Day, the Autumn Forum, INESC TEC Open Week**, and **Café de Ciência** were designed as purposeful moments of engagement, aligning our scientific work with broader societal conversations and expanding our digital reach.

The **Autumn Forum**, held at Casa da Música and attended by more than 500 participants, became the public highlight of our anniversary year, positioning INESC TEC at the centre of reflection on what it means to be human in the age of Artificial Intelligence.

Public events were platforms of influence, connecting researchers, policymakers, industry and society.

6508

MEDIA MENTIONS



INTERNATIONAL MENTIONS

11.8

M€

ADVERTISING VALUE EQUIVALENT

2.06

BILLION MEDIA TOTAL REACH

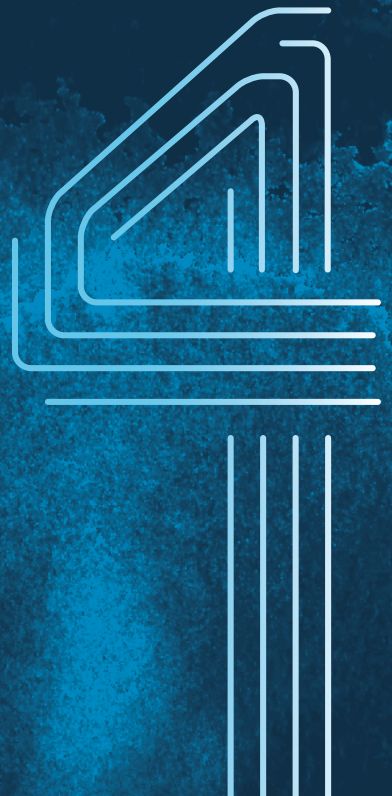
104

EXTERNAL EVENTS SUPPORTED

162

VIDEO PRODUCTIONS

2025: Excellence that Shapes the Future



Throughout this report, we show the scale, breadth and diversity of our activity. Here, we bring into focus some moments that defined INESC TEC in 2025, from institutional recognition and scientific leadership to frontier research, innovation with European impact, and science shaping public agendas and societal resilience.

Recognised as **Excellent** – a national achievement during a milestone year

In 2025, in the very year we celebrated our 40th anniversary, we were recognised at the highest national level. We received the classification of **Excellent** in the **national Evaluation of R&D Units conducted by the Portuguese Foundation for Science and Technology (FCT)**, confirming the consistency, maturity and international competitiveness of our scientific activity.

Four decades after our foundation, this distinction was a validation of a trajectory built on rigour, collaboration and long-term vision.

We celebrated 40 years as a community, honouring the people, ideas and partnerships that shaped our path, while reaffirming our commitment to creating a fulfilling and sustainable future through impactful science, technology and innovation.

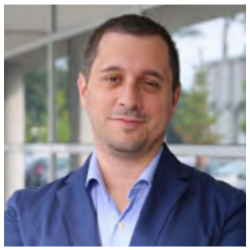
Excellence, built over 40 years, continues to define who we are.

Scientific Leadership Distinguished

In 2025, our scientific excellence was recognised across multiple international stages, from artificial intelligence and computer science to energy systems, robotics and digital technologies. These distinctions reflect not just individual achievement, but also a sustained culture of scientific rigour, global relevance and impact.

Our researcher **Alexandra Mendes** received the **Amazon Research Award**, a prestigious distinction that reinforces the international visibility and relevance of our work in artificial intelligence and advanced digital technologies.

Our researcher **Miriam Seoane Santos** became the first Portuguese scientist to receive the **ERCIM Cor Baayen Award**, a prestigious international prize for early-career excellence in informatics and mathematics, recognising her leadership in responsible AI research.



Ricardo Bessa was elevated to **IEEE Fellow**, one of the highest honours in the engineering profession worldwide, acknowledging his impactful contributions to energy systems and artificial intelligence.

At a national level, **Rúben Almeida**, **Sérgio Nunes** and **Ricardo Campos** won **first prize at the Arquivo.pt Award** for the platform *"A minha região – o teu portal autárquico"*, strengthening democratic access to public data.

Rui Martins received an **Honourable Mention in the context of the Jorge de Mello grants for Industry and Innovation, delivered by the President of the Portuguese Republic**, in recognition of the societal relevance and innovation potential of his work in spectral point-of-care technologies.

Together, these distinctions confirm what has long defined us: we pursue excellence not as an exception, but as a standard.

Research at the Global Frontier

In 2025, our research achieved the highest levels of international scientific visibility.

Across our scientific domains, we published in some of the world's most selective venues in Artificial Intelligence and Computer Science, including **AAAI, ACL, EMNLP and ICDM, as well as SIGMOD and VLDB**, two of the most competitive conferences globally in data management.

Our work also appeared in leading journals such as **IEEE Transactions, Applied Energy, Nature Scientific Data and Quantum Science and Technology**.

In bioengineering, our paper *"Exploring image and skeleton-based action recognition approaches for clinical in-bed classification of simulated epileptic seizure movement"* was published in **Expert Systems with Applications (Elsevier)**, ranked as the **number one Artificial Intelligence journal according to Google Scholar metrics**. This positioned our work at the forefront of AI-driven clinical innovation.

In neuroimaging, our research was featured on the **cover of *Neuroscience***, the official journal of the International Brain Research Organization (IBRO), signalling international recognition in brain research.

In robotics, a paper was presented at **IROS 2025**, one of the flagship conferences on intelligent robots and systems.

These achievements reflect both productivity and strategic positioning: our research contributes directly to shaping global scientific agendas.

Innovation with European Impact – Technology that Generates Value

In 2025 our scientific excellence translated into economic value and European recognition.

Our spin-off **KEPSoft** secured a podium position for INESC TEC at the **EARTO Innovation Awards** for the third consecutive year, reinforcing the strength of our knowledge valorisation model.

INESC TEC remained among the top **10 Portuguese institutions for patent applications**, maintaining a position it has held since 2017.

Through dozens of projects under the **Recovery and Resilience Plan (PRR)**, we supported structural transformation across industry, energy, health, telecommunications, forestry and agriculture.

Our spin-off ecosystem continued to grow: **SeedSight** secured €1.78 million in investment and was recognised as one of Europe's most promising start-ups, while **LTP Labs** marked ten years of activity.

Within the European Chips for Europe framework, we helped establish **Portugal's first Competence Centre in Semiconductors**, strengthening the country's contribution to Europe's technological autonomy and industrial resilience.

For us, excellence generates value: measurable, scalable and transformative.

Science Shaping Policy and Society

In 2025, excellence was inseparable from responsibility. Beyond scientific output and technological innovation, we reinforced our role as a trusted partner in strategic public debates at European and international levels.

We contributed to **high-level discussions** on artificial intelligence governance, digital sovereignty and strategic technologies, strengthening our presence in **European policy** arenas at a time of accelerated regulatory and geopolitical change.

Our expertise informed ongoing European processes related to **AI governance and critical infrastructure resilience**, positioning INESC TEC as a reference institution at the intersection of science, regulation and technological autonomy.

At global level, our participation in the **United Nations Consultative Process on Oceans and the Law of the Sea** reinforced our contribution to international dialogue on marine technology transfer and sustainable ocean governance.

We also strengthened long-term strategic partnerships, including leadership within the **UT Austin Portugal Program**, consolidating Portugal's integration into global research networks.

Structural investments such as **INESCTEC.OCEAN** and the **Blue Hub of Leixões** further positioned Portugal at the forefront of sustainable ocean engineering and digitally enabled maritime innovation.

For us, excellence means more than recognition. It means shaping agendas, informing decisions and contributing to societal resilience.

Our Contributions

TO SCIENCE

Science is where new knowledge begins to take shape. At INESC TEC, we develop research that advances the frontiers of science and engineering, addressing complex challenges through rigorous, multidisciplinary approaches.

Across eight scientific domains - artificial intelligence, bioengineering, communications, computer science and engineering, power and energy systems, photonics, robotics and systems engineering and management -, we generate knowledge that contributes to international scientific progress while laying the foundations for future technological innovation. Our work combines theoretical advances, experimental validation and real-world relevance, ensuring that scientific excellence translates into meaningful impact.

Through this approach, science is not only a source of discovery, but also a driver of transformation, enabling new ways of understanding, designing and improving the systems that shape our society.

Artificial Intelligence

We develop advanced artificial intelligence systems by combining data-driven and model-based approaches to address complex real-world challenges.

Our research spans areas such as machine learning, multimodal perception, natural language processing and human-centred AI, focusing on the development of systems that are efficient, trustworthy and aligned with human needs. This includes advancing explainability, robustness and ethical-by-design principles, ensuring that AI technologies contribute responsibly to society.

In 2025, our key scientific contributions were related to:

Advancing multimodal and perception-driven AI

by developing large-scale datasets, including a dialogue-attended audiovisual dataset with 280,000 video clips, and new methods for video understanding, music generation and 3D scene representation.

Developing AI solutions for healthcare

through lung nodule segmentation and characterisation, as well as explainable AI approaches that enable more transparent and reliable clinical decision-making.

Strengthening natural language processing and data-centric AI

by creating new datasets and models for European Portuguese, and developing systems such as MedLink and Physio for clinical decision support and healthcare assistance.

Improving real-time and adaptive AI systems

by developing methods for concept drift detection, online learning and data stream processing, enabling AI models to operate effectively in dynamic environments.

Advancing responsible and trustworthy AI

by developing AI auditing frameworks and contributing to research in data quality and ethics, recognised through distinctions such as the Cor Baayen Award.

Promoting human-centred AI and education

by developing LLM-based tutoring systems, AI-mediated learning approaches and initiatives to promote AI literacy and capacity building.

Enhancing AI systems and infrastructure

by contributing to hardware–software co-design, interoperability through ONNX, and integration with AI-oriented architectures such as RISC-V.

Advancing domain adaptation and knowledge extraction

by developing pipelines for corpus construction, lexical drift detection and the adaptation of AI models to specialised domains.

Bioengineering

We develop advanced bioengineering solutions at the intersection of engineering, life sciences and digital health, addressing complex challenges in healthcare, biomedical research and environmental monitoring.

Our research combines computational models, sensing technologies, and biomedical systems to support disease prevention, early diagnosis, personalised healthcare, and human-machine interaction, thereby improving health outcomes and quality of life. This work is developed in close collaboration with clinical partners, industry and international research networks, ensuring strong translational impact.

In 2025, our key scientific contributions were related to:

Macro-to-nano scale biosensing

by developing advanced biosensors and bioactuators, including wearable and implantable sensing platforms, and enabling applications in neuromodulation, chronic disease management and environmental monitoring.

Novel technologies for personalised health and wellness

by integrating multimodal health data, including genomics, clinical records and wearable sensing, and developing AI-driven models to support personalised diagnosis and treatment.

New challenges in medical signal and image analysis

by developing advanced methodologies for biomedical data processing, including brain, cardiac and gastrointestinal imaging, and enabling more accurate diagnostics and clinical decision support.

Biorobotics and human-machine symbiosis

by developing robotic systems, brain-computer interfaces and AI-driven interaction models, and enabling new approaches to rehabilitation and assistive technologies.

8.1.3

Communications

We develop advanced wireless communication systems that support the evolution of digital infrastructures and enable new forms of interaction between people, devices and environments. Our work addresses key sectors such as industry, energy, mobility, health, smart cities, agriculture and the maritime domain, contributing to more efficient, adaptive and sustainable communication networks.

Our research focuses on the development of perceptive and self-adaptive communication systems, capable of sensing and responding to their environment, and on reconfigurable and sustainable antenna technologies, which transform how wireless systems are designed and operated. Together, these approaches support the transition towards intelligent, resilient and energy-aware communication infrastructures.

In 2025, our key scientific contributions were related to:

Secure and resilient underwater communications

through blockchain- and semantic-enabled communication methods for underwater networks that improve security and reliability in challenging maritime environments.

(OCEANS 2025)

Context-aware optimisation for flying networks

with adaptive rate control mechanisms based on real-time link conditions, enhancing performance and predictability in UAV-based communication systems.

(IEEE Networking Letters)

Energy-efficient UAV network deployment

using optimisation models for multi-UAV positioning considering energy consumption that ensure continuous coverage while reducing operational costs.

(Wireless Days, IEEE WONS 2025)

AI-driven UAV swarms for disaster response

through edge-enabled strategies for UAV coordination in search and rescue scenarios that improve communication and sensing capabilities in critical situations.

(IEEE VCC 2025)

Reconfigurable intelligent surface (RIS) demonstration

with a prototype enabling dynamic beam steering based on real-time localisation, advancing adaptive and programmable wireless environments.

(IEEE EuCAP 2025)

8.1.4

Computer Science & Engineering

We develop advanced computational systems and software engineering approaches to address the growing complexity, scalability and trustworthiness of digital infrastructures.

Our research focuses on the design, verification and optimisation of software and computing systems, ensuring performance, security, interoperability and sustainability. This work supports key areas such as artificial intelligence, data infrastructures, distributed systems and human-centred computing, enabling reliable and efficient digital transformation across sectors.

In 2025, our key scientific contributions were related to:

Advancing the software development ecosystem

by developing methods and tools for AI-enabled, distributed and privacy-preserving systems, including federated repositories and mechanisms supporting distributed machine learning, as well as human oversight in data standardisation processes, through projects such as Inno4Vac and NOUS.

Ensuring software correctness

by advancing formal methods and verification techniques for distributed and emerging computing environments, including the CRDV model for conflict-free replicated data views and contributions such as secure genomic computation tools like Gyosa, improving reliability and trust in complex systems.

Managing the increasing complexity of critical information systems

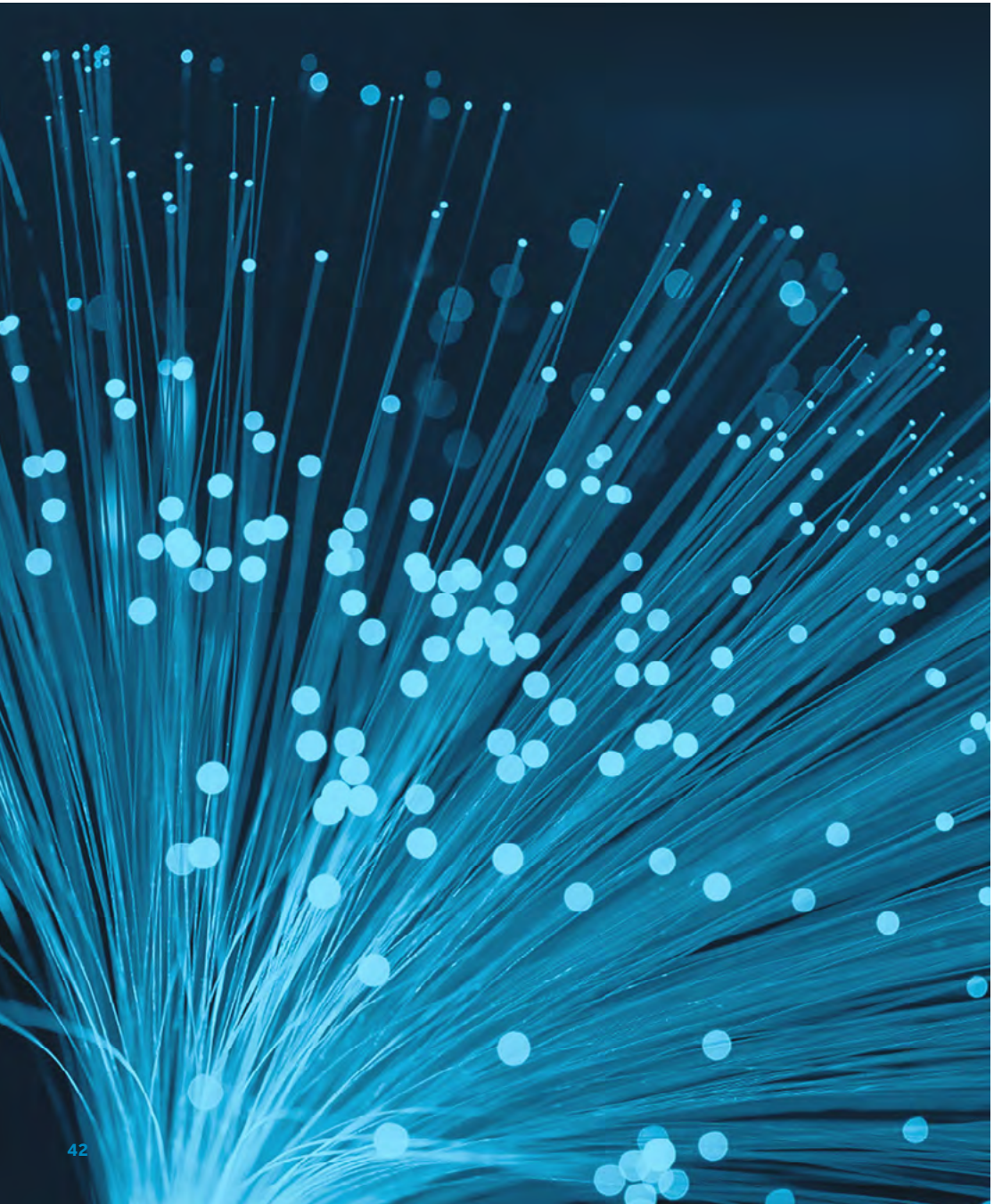
by developing scalable, distributed and privacy-preserving data infrastructures, including contributions to the PRIVATEER project and the development of FAIR-compliant systems supporting large-scale health initiatives such as IMPROVE PRETERM and the Health Cluster Portugal, while improving information quality and access through AI-driven methods.

Designing and deploying heterogeneous computing architectures

by advancing high-performance computing across the hardware–software continuum, including RISC-V-based platforms, co-simulation frameworks and novel compilation techniques, improving performance, energy efficiency and programmability in next-generation systems.

Improving computational systems for human-technology symbiosis

by advancing human-centred computing through AI, immersive technologies and interactive systems, including extended reality and digital twin platforms in projects such as BLUE-X and Battleverse, as well as human-in-the-loop AI, education initiatives and personalised dashboards for decision support.



8.1.5

Photonics

We explore optical phenomena as a foundation for developing advanced photonic technologies, combining fundamental research with real-world applications.

Our work spans the development of sensing systems for industrial and chemical applications, photonic solutions for extreme environments, and optical systems for ultra-fast processing and emerging quantum technologies. Through this approach, we materialise the impact of science while contributing to the development of a new generation of highly specialised researchers, strengthening the growing photonics ecosystem at both national and international levels.

In 2025, our key scientific contributions were related to:

Enabling resilient and reliable photonics--based solutions for biological and chemical sensing

by advancing nanotechnology and integrated photonics, from simulation tools to high-quality structure fabrication, and by developing optical sensing systems and microfabrication techniques for biological, chemical, environmental and industrial applications, supported by multiple patent applications and collaborations with industry partners such as iLoF.

Monitoring extreme environments with remote and distributed optical sensing

by advancing fibre-based sensing technologies, including Distributed Acoustic Sensing (DAS) and applications on submarine and OPGW cables, enabling reliable monitoring of ocean environments and critical infrastructures through projects such as Submerse.

Harnessing optical devices and quantum technologies for sensing, imaging and computing

by advancing ultra-fast optical computing and quantum sensing, including the development of a Hong-Ou-Mandel microscopy setup using non-classical states of light for polarisation imaging, and a Fisher-information-enhanced sensing and speckle-based multipoint acoustic sensing approaches, opening new paths towards all-optical platforms for edge computing and ultra-fast sensor interrogation.

Enhancing decision tools through multimodal spectroscopy instrumentation

by developing an industry-grade LIBS prototype for contaminant identification in recycled wood under the PRR TRANSFORM, new algorithms for user-centric analysis of multimodal spectral data and the recognition of ProSpec, a spin-off in development, reinforcing the transfer of photonics research into industrial innovation.

Power & Energy Systems

We develop advanced solutions to support the transition towards decarbonised, digitalised and resilient energy systems, addressing the full energy value chain – from generation and markets to system operation and end-users.

Our research combines model-based and data-driven approaches to optimise and control integrated energy systems, supporting new market designs, improving system resilience and enabling the large-scale integration of renewable energy sources. This work contributes to key sectors such as energy, mobility, industry and infrastructure, supporting the transition to more sustainable and flexible energy systems.

In 2025, our key scientific contributions were related to:

Cost-effective decarbonisation and digitalisation of energy systems

by advancing the integration of low-carbon technologies through power electronics, optimisation and data-driven energy management, including solutions for hydrogen production, hybrid energy systems and electrification of mobility, and supporting applications such as smart EV charging, battery optimisation and the decarbonisation of maritime ports through modelling, simulation and policy-relevant studies.

(Applied Energy; Int. J. Hydrog. Energy; IEEE Access; Transport Policy)

Evolving and decentralised energy-driven business models and markets

by developing grid-aware frameworks for local flexibility markets and energy communities, enabling decentralised energy trading, improved resource aggregation and new market designs integrating electricity and hydrogen systems.

(Utilities Policy; Renewable & Sustainable Energy Reviews; Heliyon)

Resilience and reliability of energy systems

by proposing models and optimisation methods for planning and operating converter-dominated systems, including grid-forming technologies, reliability assessment and cyber-resilience strategies, enhancing the stability and robustness of future energy infrastructures.

(IET; Int. J. Electrical Power & Energy Systems; IEEE Trans. Ind. Appl.)

Smart control architectures and centres of the future

by integrating artificial intelligence into system operation, including decision support, control design and human-machine interaction, and improving observability, automation and resilience in next-generation power system control architectures.

(IEEE; iScience; ISGT-Europe 2025)

8.1.7

Robotics

We develop advanced robotic systems capable of operating across multiple domains - land, air, water and underwater - combining intelligence, autonomy and adaptability in complex and dynamic environments.

Our research focuses on advancing robotic autonomy, enhancing physical interaction capabilities, improving human-robot collaboration and designing more sustainable robotic systems. These approaches enable robots to operate in real-world conditions, supporting applications in areas such as industry, agriculture, forestry and extreme environments.

In 2025, our key scientific contributions were related to:

Increasing the autonomy of robotic systems

by developing advanced algorithms for fleet coordination, localisation and navigation in GNSS-denied environments, and applying artificial intelligence techniques to improve task allocation, decision-making and autonomous navigation in complex and dynamic scenarios.

Improving manipulation and other physical interaction capabilities

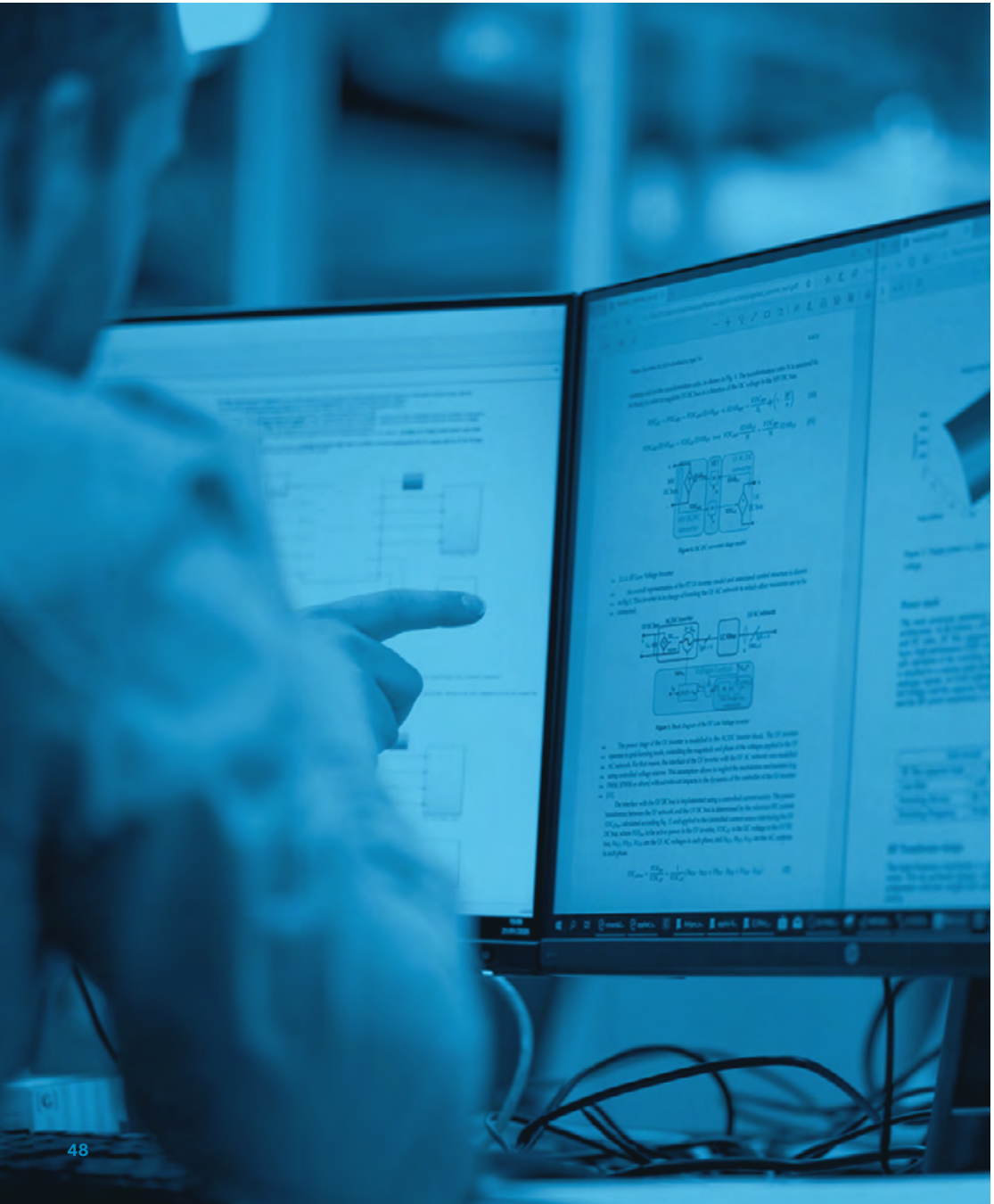
by developing novel perception and manipulation methods for complex and unstructured environments, including automated disassembly and recycling scenarios, and enabling robots to detect, classify and manipulate heterogeneous objects with high accuracy and reduced human intervention.

Enhancing human-robot collaboration

by developing 5G-enabled teleoperation systems and XR-based teaching frameworks, allowing operators to remotely control and train robotic systems and improving interaction, adaptability and efficiency in industrial environments.

Designing sustainable robotic systems

by advancing modular robotic platforms and integrating artificial intelligence, including generative AI, LLMs and digital twin technologies, enabling scalable, adaptive and data-driven robotic solutions for applications such as precision agriculture and forestry.



Systems Engineering & Management

We develop approaches to design, manage and optimise complex socio-technical systems, supporting decision-making, human-centred operations and technology-driven innovation.

Our research addresses challenges related to complex organisations, value chains and digital transformation, combining optimisation, data-driven methods and system thinking to improve performance, resilience and sustainability across sectors such as industry, energy, mobility and public policy.

In 2025, our key scientific contributions were related to:

Transitioning socio-technical systems towards sustainability

by developing data-driven models and decision-support frameworks addressing energy systems, waste management, food systems and energy poverty, and advancing trustworthy AI through the INESC TEC-led Trust-AI project, successfully concluded in 2025, while contributing to governance innovation through the DECODIT project by promoting Living Lab approaches for real-world experimentation, stakeholder engagement and citizen-centric solutions.

Developing responsive and resilient end-to-end value chains

by addressing complexity and uncertainty in supply chains through the development of innovative models and strategies, including circular approaches and remanufacturing processes, applying frameworks such as the Supply Chain Resilience Fit Model in industrial ecosystems, and participating in European projects such as RISE-SME and ReSChape. Also, by organising the EurOMA Sustainable Operations and Supply Chains Forum to foster knowledge exchange between academia and industry.

Managing systems under uncertain, complex and dynamic environments

by developing optimisation, simulation and AI-based methods, including reinforcement learning and digital twins, and advancing solutions through projects such as PEER, enabling more efficient decision-making in logistics and retail operations, while supporting applications in adaptive manufacturing, demand-responsive transport, last-mile logistics and urban mobility systems.

Engineering human-centred systems for sustainability and resilience

by developing socio-technical architectures and digital platforms to manage digital twin systems, and advancing AI-based solutions for industrial applications, including multi-agent systems and more efficient MLOps approaches, while promoting knowledge exchange through the organisation of the IFIP/SOCOLNET Working Conference on Virtual Enterprises.

Our Contributions

TO INNOVATION

Our contributions
TO INNOVATION

Innovation takes shape when science meets real-world challenges. At INESC TEC, we work side by side with companies, public institutions and sector stakeholders to transform technological needs into solutions that generate economic and societal value. Across different strategic innovation areas — **agro-food, communications, energy, health, industry and the sea** —, we mobilise advanced knowledge, experimentation infrastructures and multidisciplinary teams to accelerate digital transformation, strengthen competitiveness and support more sustainable and resilient economic sectors. Through this collaborative approach, innovation becomes a catalyst for progress in business and society.

8.2.1.

Agro-food

Digital technologies are increasingly transforming agriculture and food systems, enabling more efficient, sustainable and resilient production. At INESC TEC, we work closely with companies, producers and public stakeholders to translate technological challenges into research, development and innovation activities that support the digital transformation of the agro-food sector.

TEC4AGRO-FOOD promotes collaboration between research teams, industry and stakeholders from the agriculture and forestry sectors, enabling the adoption of technologies such as artificial intelligence, data analytics, sensing systems and digital platforms for agriculture and food production. Through this initiative, we support companies in improving productivity, traceability and sustainability across the agro-food value chain.

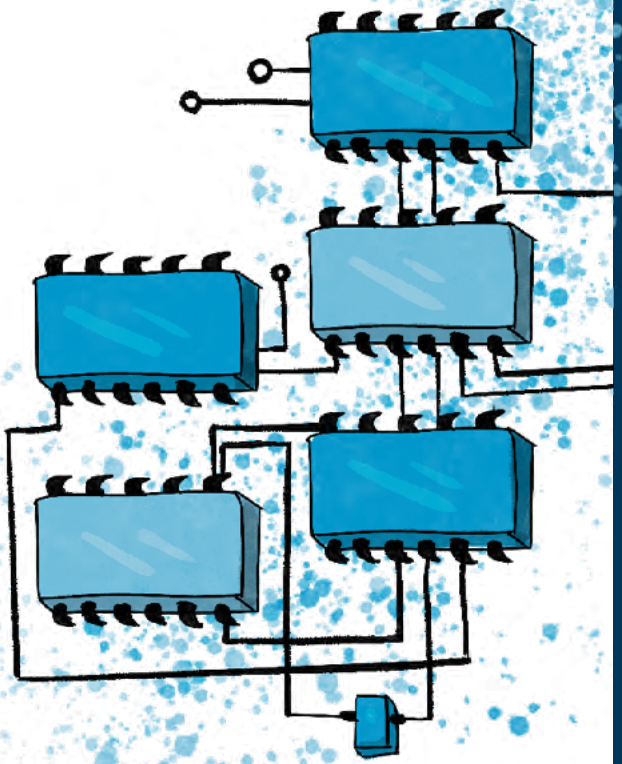
In 2025, we:

- Strengthened collaboration with several companies, such as **Sogrape**, **Sonae MC**, **Sumol+Compal** and **Vitacress**, supporting innovation in areas such as food traceability, supply chain optimisation and digital agriculture.
- Advanced collaborative R&D initiatives with industry and European partners through projects such as **WATSON**, addressing food fraud detection and transparency in agro-food supply chains, and **Wine4Cast**, which applies data analytics and predictive modelling to support decision-making in viticulture.
- Promoted networking and knowledge exchange with companies through thematic events, workshops and demonstration sessions.

Some of the events we attended, both nationally and internationally, include **World FIRA 2025**, **Dare2Change Conference**, **AgroIn 2025**, **AGROGLOBAL 2025**, **ARTEX 25** or the **INIAV Conference**. Also, we organised demonstration and networking initiatives like the **Open Day of our TRIBE Lab** – our research infrastructure that supports our work in the agro-food area -, creating opportunities for dialogue between researchers, producers and industry stakeholders around digital technologies for agriculture and food systems.

- Reinforced our innovation pipeline, through **European projects**, **national funding programmes** and **technology services**, strengthening collaboration with companies and other stakeholders to develop solutions that improve productivity, sustainability and resilience in the agro-food sector.

8.2.2.



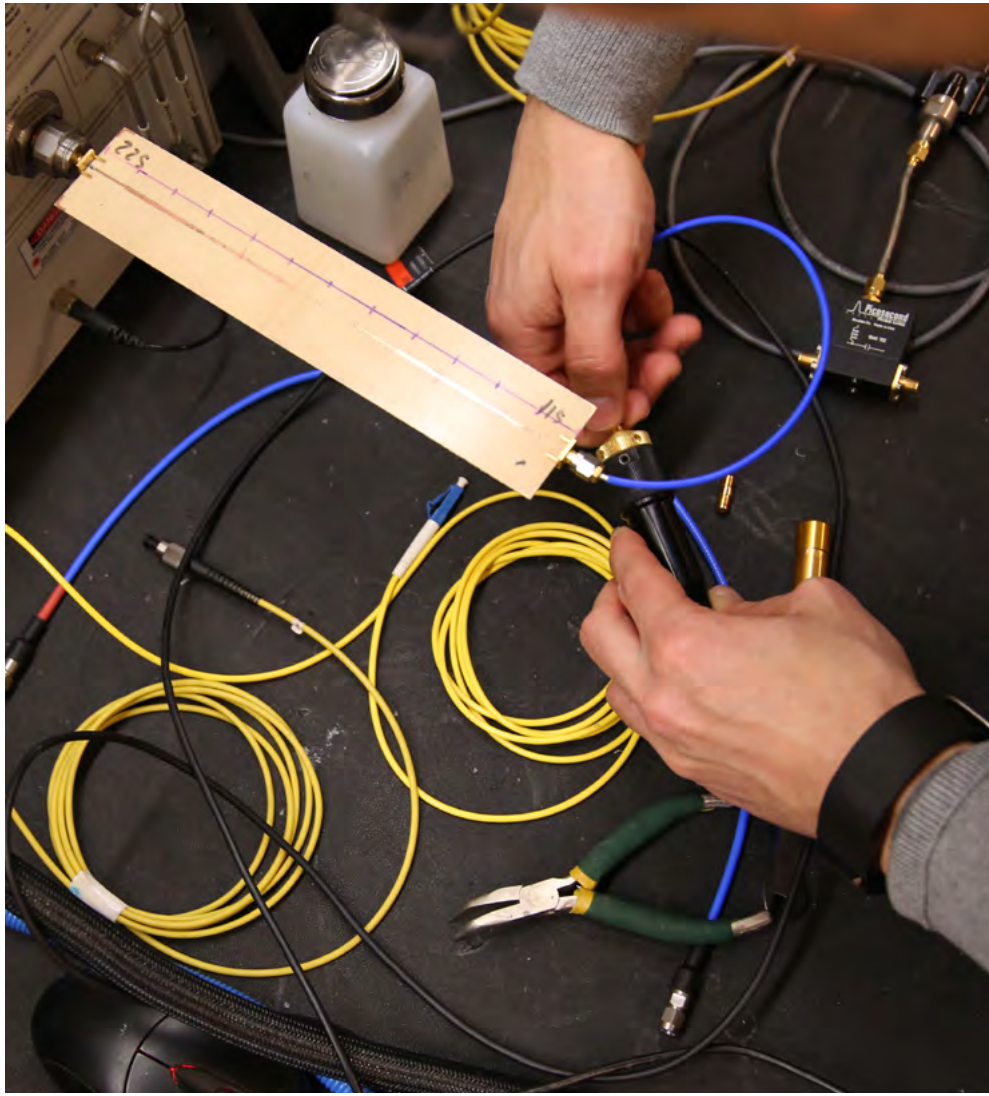
Communications

Advanced connectivity and sensing technologies are key enablers of digital transformation across multiple sectors. At INESC TEC, we work with companies, technology providers and public stakeholders to translate emerging communications technologies into innovative activities that support new services, infrastructures and industrial applications.

TEC4COMMUNICATIONS promotes collaboration to accelerate experimentation and the transfer of advanced connectivity and sensing technologies into real-world applications.

In 2025, we:

- **Strengthened engagement with key national stakeholders**, including major telecommunications operators, sectoral associations, the national telecommunications regulator and industrial companies interested in private communications infrastructures.
- **Expanded international collaboration** with organisations operating large-scale telecommunications research infrastructures, supporting knowledge exchange and alignment with emerging global initiatives.
- Secured funding for the construction of the **Communications and Machine Perception Laboratory**, a new facility, located at Leça da Palmeira, Matosinhos, that will include experimental infrastructures such as a reconfigurable anechoic chamber, sensing laboratory, autonomous systems arena, electronics laboratory and high-performance computing cluster for large-scale AI and data processing.



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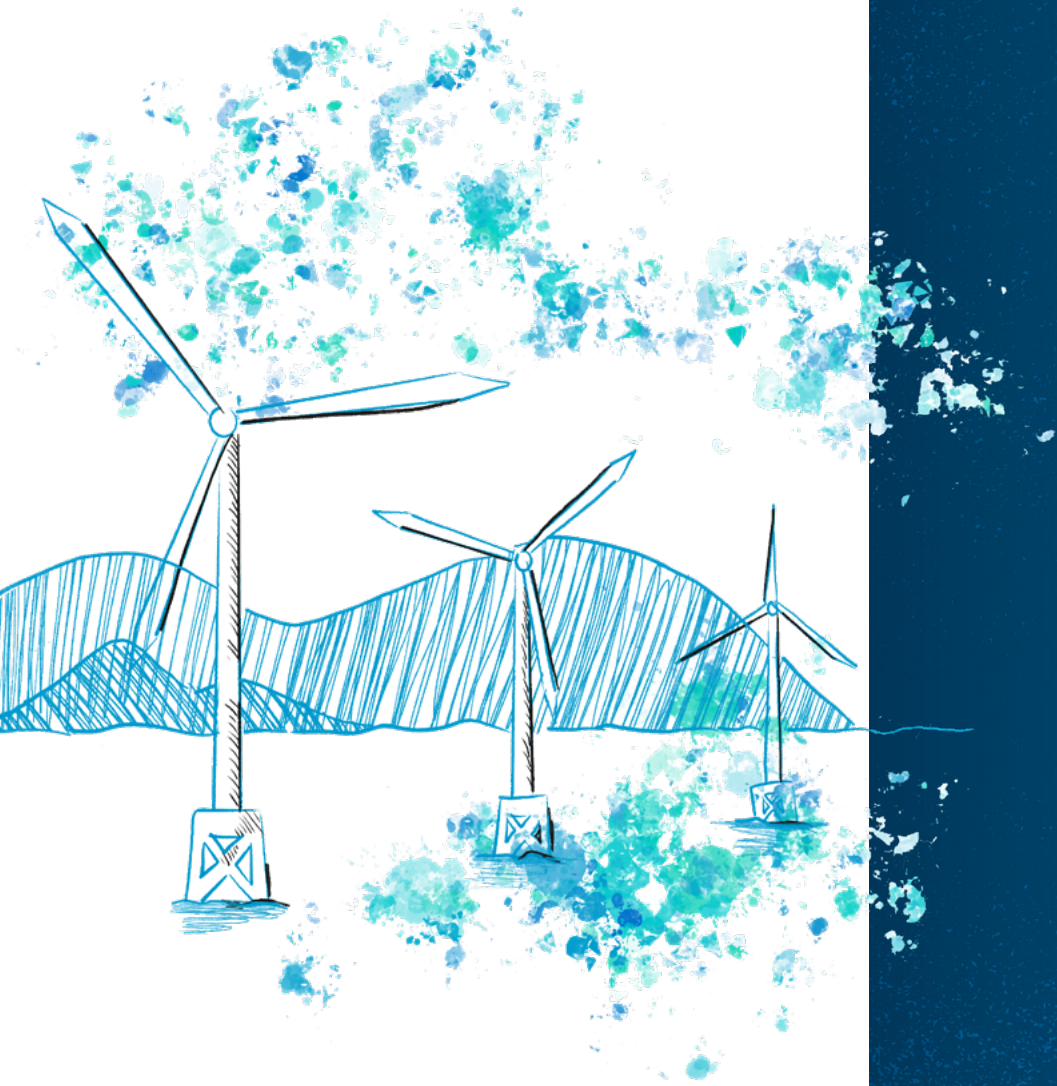


Energy

The energy transition and the decarbonisation of the economy create new technological challenges for power and energy systems. At INESC TEC, we work with industry and public stakeholders to translate these needs into research, development and innovation activities that support a more digital and low-carbon energy system.

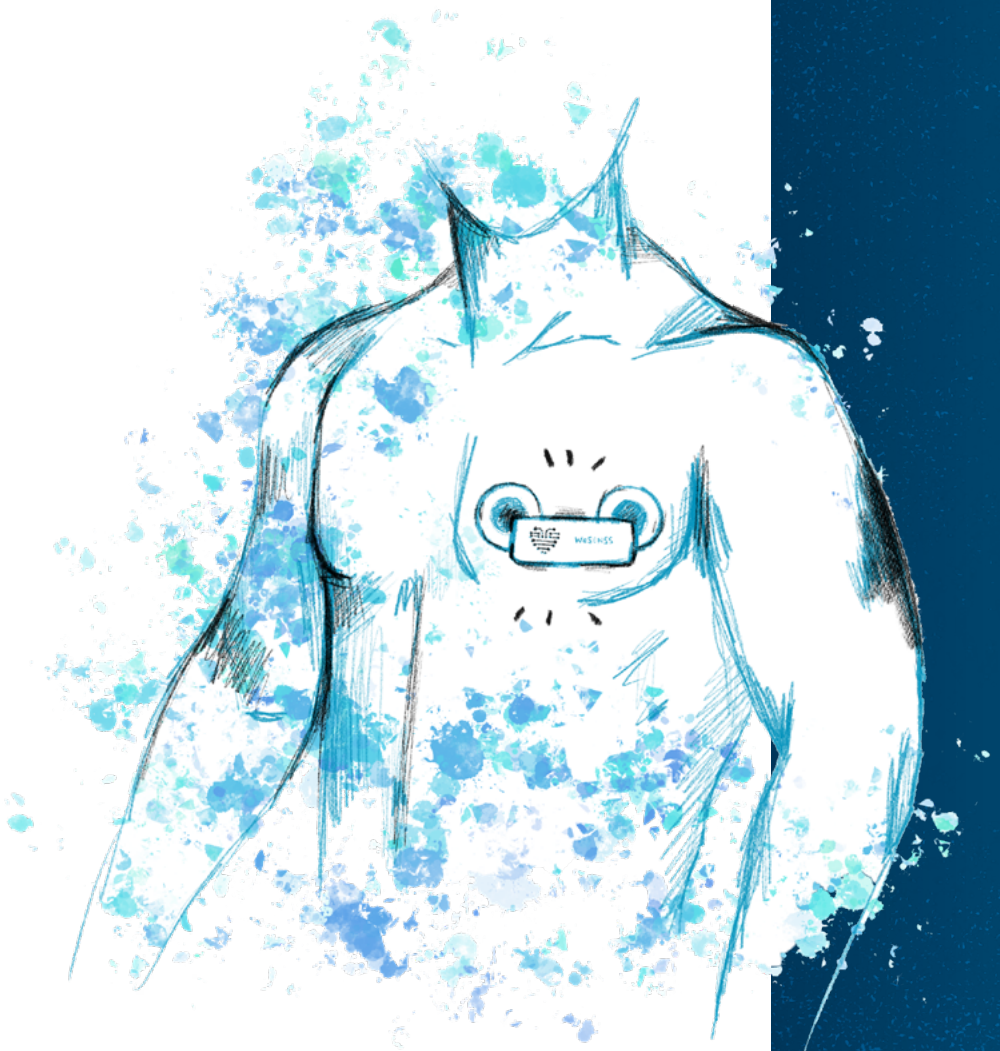
TEC4ENERGY catalyses strategic collaboration with national and international stakeholders across key energy domains including hydro power and renewable generation technologies, energy storage systems, power markets and tariffs, planning and operation of electric grids, security of supply, hydrogen for sector coupling, control of electrolysers, electric mobility and industrial energy systems, directly advancing the digital and decarbonised transition in alignment with European Commission priorities.

In 2025, we:

- Participated in **ENLIT**, Europe's largest energy event, gathering stakeholders across generation, renewables, electric grids, and green hydrogen. A demonstrator integrating **PlugTecAC (AC EV wall box)**, **DERway (DER Gateway)**, and **FlexiHome (Residential Energy Management System)** was presented.
- Organised the **second edition of Energy Technology Open Day**, welcoming around 200 participants from industry, network operators, academia and INESC TEC.
- Secured **over €2 million in advanced consulting services and R&D project funding**, through collaborations with companies such as **REN**, **EDP**, **Infraestruturas de Portugal**, and **BONDALTI**, as well as entities, including ***Direção Geral de Energia e Geologia*** **(DGEG)**, ***Associação de Produtores Independentes de Energias Renováveis da Madeira*** **(APIERAM)**, and ***Associação Portuguesa das Empresas do Sector Eléctrico*** **(ELECPOR)**.

8.2.4.

Health



We cover areas such as artificial intelligence, data analytics, medical imaging, software and information systems, sensors and micro-technologies, supporting the development of technologies from early research stages to validation in real healthcare contexts, in close collaboration with hospitals, healthcare providers, companies and public entities.

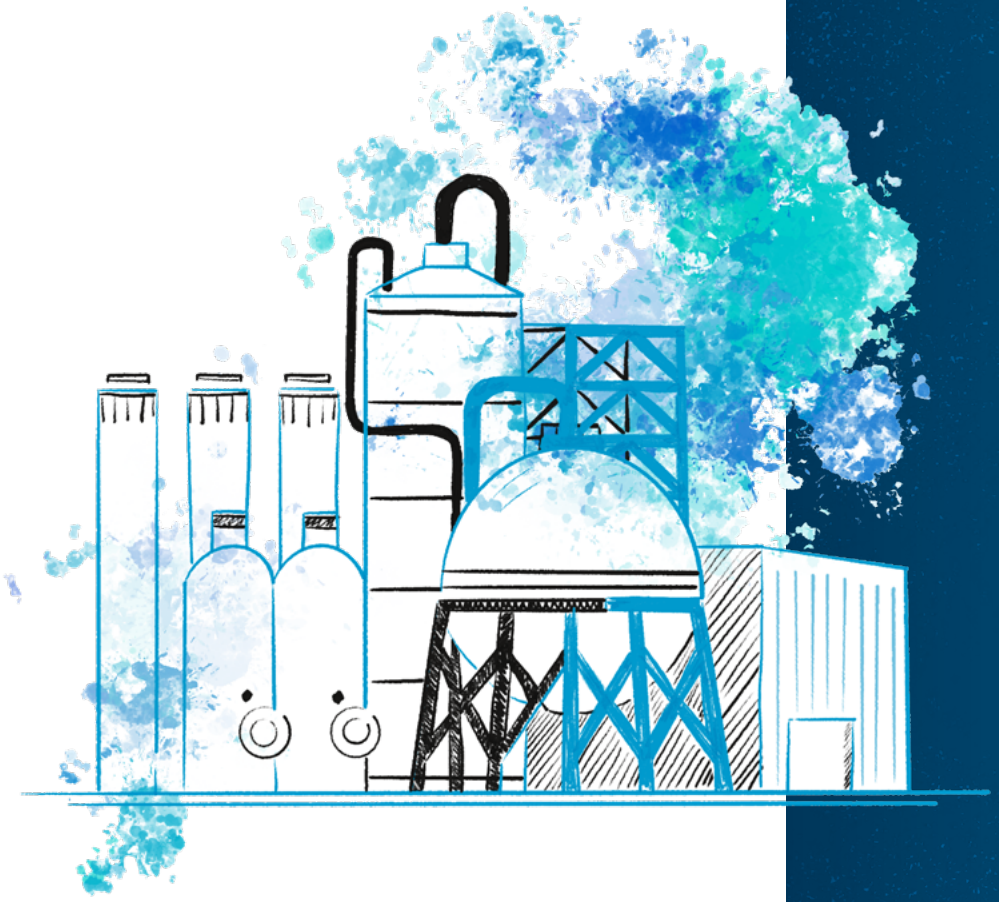
TEC4HEALTH acts as a platform focused on research, innovation and technology transfer in the health domain, serving as a bridge between scientific and technological capabilities, healthcare institutions, industry and public stakeholders. Through this initiative, INESC TEC addresses challenges across prevention, diagnosis, treatment, monitoring and health system organisation, with a strong emphasis on digital technologies, data-driven approaches and advanced sensing solutions.

In 2025, we:

- Contributed to to the national PRR mobilising agenda, **Health from Portugal (HfPT)**, through the development of **several technological results** across different contexts of the health system, including: digital and non-invasive intraoperative localisation and planning systems for **breast cancer surgery** using **augmented reality** and **artificial intelligence**; computer-assisted detection solutions for **computed tomography angiography** examinations, integrated into the Champalimaud Foundation's PACS system; continuous learning methods for segmenting, detecting and classifying **lung cancer**; software for **analysing data** collected by wearable sensors; platforms supporting the management and sharing of **medical data** between heterogeneous systems; an innovative ofluidic method for embedding optical fibres in microfluidic devices, resulting in a patented technological solution.
- Developed AI-based personalised care solutions for **respiratory diseases** under the **AI4LUNGS project**.
- Contributed to **privacy-compliant health data services** for artificial intelligence development, addressing data protection, governance and secure reuse of clinical data under the **PHASE IV AI project**.
- Developed artificial intelligence solutions for **medical imaging and clinical decision support**, including computer-assisted endoscopy, radiomics approaches and automatic cardiovascular reporting in projects like **GATE, EndoRadiomics and CardioComplete**.
- Developed, in projects such as **PULSE** and **WeFetal**, **wearable and sensing-based technologies** for physiological signal acquisition and analysis, supporting monitoring and data-driven decision-making in healthcare contexts.

8.2.5.

Industry



Digitalisation, automation and advanced manufacturing technologies are reshaping industrial production. At INESC TEC, we work closely with companies to identify technological challenges and translate them into research, development and innovation activities that improve industrial efficiency, resilience and sustainability.

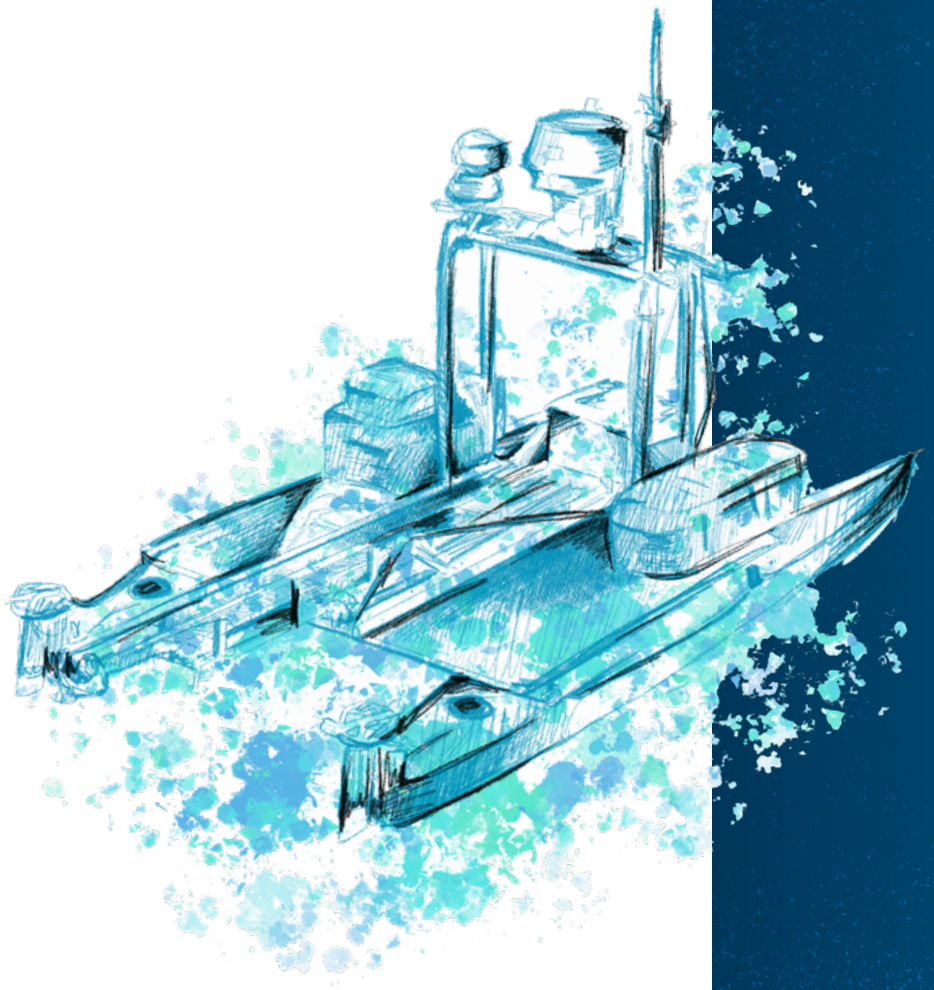
TEC4INDUSTRY acts as a platform connecting research teams, companies and industrial ecosystems. Through this initiative, INESC TEC supports the adoption of advanced digital technologies, including artificial intelligence, robotics, optimisation and data-driven decision-making, enabling companies to accelerate their digital transformation and develop new industrial capabilities.

In 2025, we:

- Strengthened collaboration with industry through the **Industry Club** initiative, promoted by INESC TEC, NOS, COTEC, Kaizen Institute, and Porto Business School. This initiative grew to nearly **500 members** and hosted activities such as Masterclasses, Speed Summits and Open Days. The year culminated in the **"Voices of Industry" Conference**, bringing together industrial leaders to discuss the digital transformation of manufacturing.
- Expanded experimentation and demonstrator activities at our **Industry and Innovation Lab (iiLab)** – INESC TEC's research infrastructure that supports the developments we carry out in this industrial domain -, including the deployment of **six additional industrial pilots under the TestBed 5G NOS programme**, supporting technology validation from TRL 4 to TRL 6 and reinforcing collaboration with companies such as **NOS Telecommunications**, **AZITEK**, **Azevedos**, **Flowbotic**, **JPM** and **Infinite Foundry**.
- Advanced the implementation of **PRR initiatives**, particularly **PRODUTECH R3**, supporting the development and demonstration of technologies such as robotic teleoperation, digital twins, industrial simulation and optimisation tools for manufacturing environments.
- Reinforced collaboration with companies through a growing portfolio of **industrial services, technology transfer and collaborative R&D projects**, supporting organisations such as **NOS**, **Corticeira Amorim**, **Petrotec**, **Covipor** and **W2V** in areas including process optimisation, simulation, digital twins, traceability systems, logistics and AI-based decision support. In parallel, we also supported national innovation programmes, including PRR agendas such as PRODUTECH R3 and CLEVER, as well as Portugal 2030 initiatives like STEP2DIGITAL, Retail AI for Scalability and Excellence and decarb4SMEs, reinforcing collaboration between research teams, industrial partners and technology demonstrators.

8.2.6.

Sea



Ocean technologies are becoming increasingly important for addressing challenges related to climate change, sustainable resource management and maritime operations. At INESC TEC, we work with companies, port authorities and public stakeholders to translate these challenges into research, development and innovation activities that support the digital and sustainable transformation of the blue economy.

TEC4SEA connects research teams, maritime industries and public authorities promoting the development and adoption of technologies such as marine robotics, ocean monitoring systems, digital platforms and advanced data analytics.

In 2025, we:

- Strengthened collaboration with national and international partners across the maritime sector, including organisations such as **SINTEF Ocean**, **EMSA (European Maritime Safety Agency)** and the **International Seabed Authority (ISA)**, while also contributing to the **Northern Portugal blue economy ecosystem** through initiatives such as **SUSTEMARE**, **where we serve on the board**, **and through collaboration with the Norte Portugal Regional Coordination and Development Commission (CCDR-N) in the development of the Regional Smart Specialisation Platform (PREI)**. Advanced research and innovation activities in **marine robotics**, **ocean monitoring and autonomous maritime systems**, contributing to projects and initiatives supporting maritime operations, environmental monitoring and ocean data management.
- Reinforced experimentation and validation activities linked to offshore infrastructures, including initiatives connected to the Aguçadoura offshore test platform for marine technologies and structures, located off the coast of Póvoa de Varzim, **and other ocean testing environments**, supporting the development and demonstration of new marine technologies.
- Promoted **networking and knowledge exchange with companies and other stakeholders through international conferences, workshops and demonstration initiatives**, strengthening collaboration between research teams, maritime industries and public organisations working on the sustainable development of the blue economy.

Our Contributions TO TALENT

DEVELOPING THE NEXT GENERATION OF SCIENCE AND INNOVATION LEADERS

In 2025, we continued to support talent development across multiple stages of the scientific path, from early exposure to research to advanced doctoral training. The year brought strong results in internship participation and doctoral fellowships, alongside external distinctions received by members of our community at earlier stages of their scientific and innovation journey.

DOCTORAL EXCELLENCE AND GROWTH

The 2025 Call for PhD Studentships resulted in 51 fellowships approved, a 45% increase representing approximately €1 million in annual funding. Collaborative doctoral projects developed with companies and non-academic partners played a decisive role in this performance, reinforcing the connection between advanced research, innovation and real-world impact.

8.3

EARLY ENGAGEMENT AND ATTRACTION

The INESC TEC Summer Internship Programme reached a record milestone, offering 121 internships. Around one third of participants continued research collaboration with INESC TEC, confirming the programme's relevance as an entry point into scientific activity and as a mechanism for attracting and retaining talent.

EMPOWERING RESEARCHERS

In 2025, INESC TEC joined the European network YEAR – Young European Associated Researchers, which brings together Research and Technology Organisations (RTOs) across Europe to support young researchers. Building on this, it launched an internal initiative, the BEAR – Boosting Early-stage Researchers – network, to foster participation in European networks, promote transversal skills, encourage the exchange of experiences and good practices, and reinforce institutional representation in relevant initiatives.

EMERGING TALENT DISTINGUISHED

In 2025, several members of our community at earlier stages of their scientific and innovation journey were distinguished through national and international awards and recognition initiatives, reflecting the quality of the environment in which they develop their work and the strength of the broader research and innovation ecosystem in which they are embedded.

Among them:

- **Ana Catarina Gomes**, who received the IEEE Portugal Outstanding Master Thesis Award for her work on security vulnerabilities in distributed machine learning systems;

- **Luís Rodrigues**, who received the Vestas Award for Best Master's Thesis for his work on monetisation strategies for collaborative forecasting using blockchain;

- The Quantum SHEmulation team, composed of **Alexandra Ramôa**, **Ana Neri** and **Bruna Salgado**, INESC TEC researchers, and **Sara Franco**, INL researcher, which secured second place at PQHack 2025;

- **Ricardo Ferreira**, who received the Best Student Paper Award at the 25th International Conference on BioInformatics and BioEngineering (BIBE 2025) for his work on algorithmic support to surgical planning;

- **Pedro Afonso Dias**, who received the Best Master's Thesis Award, during the 25th edition of the IEEE International Conference on Autonomous Robot Systems and Competitions (ICARSC2025), for his work on path planning for a robotic manipulator in constrained workspaces;

- The ProSpec team, composed of **Tomás Lopes**, **Joana Teixeira**, **Rafael Cavaco** and **Diana Capela**, which received the EIT Innovation Award in Raw Materials category.

Our Contributions

TO PUBLIC POLICY

STRUCTURED POLICY INFLUENCE

In 2025, our contribution to public policy was deliberate, sustained and evidence-based. We engaged directly in European and national policy processes through position papers, technical consultations, expert workshops, strategic dialogue and institutional collaboration. Our role was grounded in the capacity to bring scientific and technological expertise to contexts marked by regulatory change, geopolitical pressure and the need for long-term policy vision.

POSITION PAPERS AND STRATEGIC CONTRIBUTIONS

We released the Dataspaces Manifesto, outlining principles for sovereignty, interoperability and security within the European Digital Single Market and reinforcing INESC TEC's role in the debate on sustainable and responsible data ecosystems.

We also contributed to the European discussion on research and technology infrastructures through a position paper advocating a more integrated strategy for governance, long-term funding, interoperability, access and strategic autonomy across Member States.

Following the Iberian power outage, we published a technical position paper on energy system resilience and infrastructure robustness, contributing evidence-based recommendations to inform public debate and policy reflection at a moment of heightened societal attention.

ARTIFICIAL INTELLIGENCE AND DIGITAL GOVERNANCE

We actively contributed to European processes related to artificial intelligence, participating in consultations and standardisation efforts connected to the implementation of the AI Act, including discussions on transparency and governance of generative AI systems.

Moreover, we contributed to the development of advanced AI solutions for the energy sector, supporting Europe's foundation AI model for power grids and engaging with the GenerativeAI4EU initiative. We also took part in a high-level European Commission discussion on Artificial Intelligence and Energy, reinforcing the connections between AI innovation, digital infrastructure and energy system resilience.

EUROPEAN STRATEGIC DIALOGUE AND AUTONOMY

We reinforced our presence in European strategic dialogue on competitiveness, widening, dual-use technologies and research and innovation priorities. This included participation in the European Parliament Task Force on the future of Widening countries within the EU Framework Programme and the co-organisation, in Brussels, of a high-level policy event with representatives from DG DEFIS, DG RTD and the Cabinet of the European Commissioner for Startups, Research and Innovation, focused on strategic autonomy, dual-use technologies and Europe's competitiveness in critical domains.

We also provided specialised expertise to European institutions, including training activities for the European Commission's Joint Research Centre (JRC) in areas related to semantic interoperability and the digitalisation of the energy sector, contributing technical capacity to European digital infrastructure development.

NATIONAL INSTITUTIONAL COOPERATION

At national level, we strengthened institutional dialogue and cooperation in areas of public relevance, including public health research through the renewal and expansion of our cooperation protocol with ISPUP. More broadly, our policy engagement in 2025 contributed to reinforcing INESC TEC's role as a trusted interlocutor at the interface between science, technology and public policy.

Special Projects

INESCTEC.OCEAN

Portugal's Centre of Excellence in Ocean Research and Engineering.

In 2025, INESC TEC launched INESCTEC.OCEAN, Portugal's Centre of Excellence in Ocean Research and Engineering.

This initiative reflects a long-term institutional commitment: to position Portugal at the forefront of sustainable ocean science and engineering, contributing to climate resilience, technological innovation and responsible marine governance, in alignment with INESC TEC's institutional strategy, the European Green Deal and the European Ocean Pact.

Structured around four core domains – Marine Robotics, Ocean Energy, Ocean Data and Marine Structures – INESCTEC.OCEAN develops advanced R&D solutions that respond to major scientific, industrial and policy challenges, from the deep sea to earth and space. Its activity is aligned with strategic frameworks such as the EU Mission "Restore Our Ocean and Waters", the Digital Ocean Twin initiative, and the United Nations Decade of Ocean Science for Sustainable Development.

By connecting science, technology, and policy, the Centre creates conditions for stronger collaborations between academia, industry, and public authorities, helping advance sustainable ocean engineering, marine innovation and responsible ocean governance.

In 2025 we:

- strengthened strategic collaboration with Higher Education Institutions, including FEUP and ISEP, reinforcing academic integration and talent development;
- established international partnerships, including a memorandum of understanding with SINTEF OCEAN and collaboration with other European Centres of Excellence in marine research such as MARBLE in Croatia and CMMI in Cyprus;
- structured four core scientific domains, aligning research capacity with industrial and societal needs;
- created an international Stakeholder Forum, bringing together more than 30 committed entities to reinforce alignment between research, industry and public policy;
- advanced the coordination and optimisation of ocean-related infrastructures, strengthening long-term capacity and operational readiness.

More than a research initiative, INESCTEC.OCEAN is a way of organising long-term capacity – scientific, technological and institutional – around the ocean challenges that matter most to Portugal and Europe.

UT AUSTIN PORTUGAL

Photo: © UT Austin

A science and technology partnership between Portugal and the University of Texas at Austin

In 2025, the UT Austin Portugal Program entered a new phase. Following the renewal of Portugal's partnerships with U.S. universities for 2025–2030, after a positive independent evaluation commissioned by FCT, the Program reaffirmed its long-term impact on Portugal's scientific and technological ecosystem.

Phase 4 aligns with emerging strategic priorities, focusing on clean energy systems, advanced computing and artificial intelligence, critical materials, and Space–Earth technologies – areas where Portugal demonstrates emerging or consolidated strengths and where structured collaboration with UT can generate high-impact outcomes.

As host institution in Portugal, INESC TEC continued to provide strategic, negotiation and operational leadership to the partnership between FCT and the University of Texas at Austin. FCT and the Ministry of Education, Science, and Innovation announced the appointment of José Manuel Mendonça, Chairman Emeritus of INESC TEC, to chair the new governance structure mandated to oversee the Programs with CMU, MIT, and UT Austin. Rui Oliveira (INESC TEC and University of Minho) was reconducted as Director of the UT Austin Portugal Program, and Rute André (CICECO and University of Aveiro) was appointed to serve alongside him at the Program Board.

In 2025 we:

- launched the UT Austin Portugal Training Academy, delivering advanced skills development and executive education in collaboration with leading UT units, including immersive and interdisciplinary programmes;
- reinforced the research pipeline through the 2025 Exploratory Research Projects call;
- put forward to FCT a proposal to launch a 12-month mobility scheme at UT, exclusively targeting doctoral candidates from Portuguese universities;
- launched TechLaunch, inspired by the U.S. National Science Foundation's I-Corps model, supporting Portuguese research teams in structured customer discovery and market validation;
- expanded entrepreneurial capacity through the first edition of the Entrepreneurial Foundations course;
- convened a transatlantic colloquium on electrical grid resilience and energy transition, strengthening dialogue between research, policy and industry.

UT Austin Portugal creates a structured basis for long-term collaboration, linking frontier research, doctoral and advanced training, and initiatives aimed at innovation and market translation.

Our Research Infrastructures

FROM EXPERIMENTATION TO IMPACT: WHERE SCIENCE BECOMES TECHNOLOGY

At INESC TEC, research infrastructures are essential platforms where scientific knowledge is transformed into technological solutions with real-world impact. These environments provide conditions for **experimentation, prototyping and validation**, enabling researchers and industry partners to test new technologies, advance solutions across higher Technology Readiness Levels (TRLs) and accelerate their transfer to the market.

They are also **spaces for talent development and attraction**, where students and early-career researchers can develop their work in advanced experimental environments, while remaining open to the **national and international scientific community**. At the same time, they play a key role in terms of **collaboration with industry**, supporting the testing and validation of solutions in conditions that closely replicate real-world environments.

Aligned with INESC TEC's **scientific domains**, these infrastructures respond to our research needs while simultaneously supporting our **innovation activities**, reflecting the strategic sectors in which we operate, including industry, energy, health, communications, agro-food and the sea. This dual alignment ensures a strong connection between knowledge generation and its application in economic and societal contexts.

Distributed across multiple locations in Portugal, our infrastructures form a **multisite national ecosystem of experimentation and technological validation**, combining specialised facilities, advanced equipment and multidisciplinary expertise.

Some of our infrastructures are integrated into the **Portuguese Roadmap of Research Infrastructures**, implemented by the Portuguese Foundation for Science and Technology, recognising their strategic relevance for the national research and innovation ecosystem. By enabling large-scale experimentation and close collaboration with industry, INESC TEC infrastructures bridge the gap between **scientific discovery, technological development and societal impact**.

A NATIONAL INFRASTRUCTURE FOR SCIENCE, EXPERIMENTATION AND INNOVATION

Computer Graphics and Virtual Reality	UTAD	VILA REAL
Research Computing & Data Infrastructure	U Minho	BRAGA
Tec4Sea Infrastructure	Leixões	MATOSINHOS
Bioengeneering Communications Energy Systems Research Computing & Data Infrastructure	Headquarters	PORTO
Robotics and Autonomous Systems Robotics for Agriculture Computer Graphics and Virtual Reality	FEUP	
Robotics and Autonomous Systems	ISEP	
Photonics	FCUP	
Industrial Robotics	PORTIC	
Tec4Sea Infrastructure	CINTAL	ALGARVE

THE RELATIONSHIP WITH THE PORTUGUESE ROADMAP OF RESEARCH INFRASTRUCTURES

Two of our research infrastructures – x-energy lab (Energy Systems, headquarters) and Tec4Sea Infrastructure (Leixões and Algarve) – are integrated into the **Portuguese Roadmap of Research Infrastructures**, recognising their strategic relevance for the national research and innovation ecosystem.

Our **x-energy lab** supports experimentation and validation of advanced energy systems, including smart grids, e-mobility and distributed energy resources. The infrastructure enables the testing of new solutions for grid operation, flexibility services and energy transition technologies, bridging scientific research with real-world applications in the energy sector.

Our **Tec4Sea Infrastructure** focuses on technologies for the blue economy, supporting research and innovation in marine robotics, ocean monitoring systems and maritime technologies. Through experimentation environments and offshore testing capabilities, this infrastructure contributes to advancing ocean technologies and strengthening Portugal's scientific capacity in the maritime domain. This infrastructure was established in collaboration with the Algarve Centre of Technology Research (CINTAL).

EMSO-PT: A NATIONAL OCEAN OBSERVATION INFRASTRUCTURE

Also in the marine domain, we participate in the **EMSO-PT (European Multidisciplinary Seafloor Observatory – Portugal)**, that also belongs to the **Portuguese Roadmap of Research Infrastructures** and that is integrated into the European EMSO network.

EMSO-PT aims to establish a network of multidisciplinary underwater observatories along the Atlantic coast, supported by laboratories and data processing infrastructures. These observatories generate continuous scientific data on marine environmental processes, enabling the monitoring of interactions between the geosphere, biosphere and hydrosphere while supporting the development of new ocean sensing technologies.

Through our participation in EMSO-PT, we contribute to strengthening Portugal's capabilities in **ocean observation, marine technologies and environmental monitoring**, reinforcing our role in international scientific infrastructures dedicated to the study of the oceans.

OTHER ASSOCIATED RESEARCH INFRASTRUCTURES

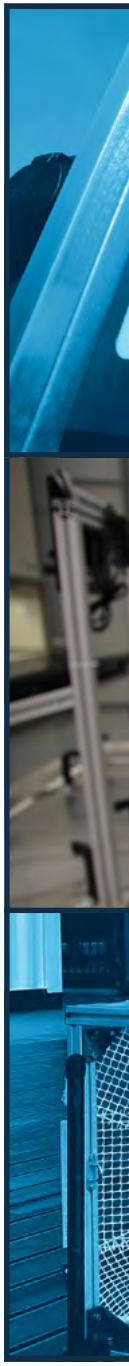
Beyond our own infrastructures, we also contribute to a number of **associated research and experimentation infrastructures**, aligned with European innovation and digital policy initiatives. **These platforms enable large-scale testing environments where emerging technologies can be validated in real operational contexts**.

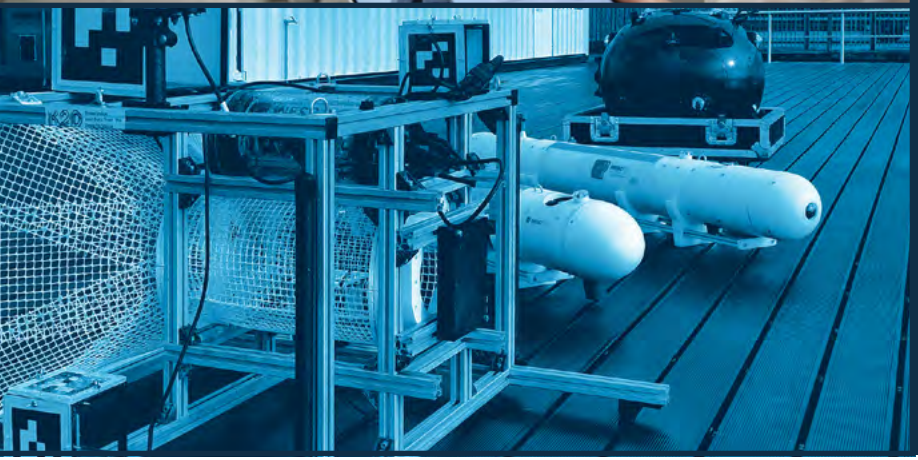
AI Testing and Experimentation Facility – IN-DATA is a node of the European AI-EFFECT initiative, providing testing and experimentation environments **for AI-based systems in the energy sector**. The infrastructure enables access to energy data spaces and supports the development and validation of solutions for microgrid management, distributed energy resources and new energy business models aligned with net-zero goals.

OASIS – Offshore Renewable Energy AI Testing Infrastructure, part of the EnerTEF initiative, provides a testing environment **for artificial intelligence services applied to offshore renewable energy systems**. Using shared computing resources and connected data platforms, the infrastructure supports the development and validation of trustworthy AI solutions for offshore energy applications.

5G Testbed for Digital Transformation, integrated into the national network of Test Beds and led by NOS, provides **experimentation environments for SMEs and startups to develop and test new digital services using advanced connectivity technologies**. Located at our research infrastructure iiLab (Industrial Robotics, PORTIC) this testbed supports the development of innovative products and services in both physical and simulated environments.

Through participation in these associated infrastructures, we reinforce our role in European technology experimentation ecosystems, enabling the testing and validation of advanced digital technologies while strengthening connections between research, industry and public policy.





WHY OUR RESEARCH INFRASTRUCTURES MATTER

TALENT DEVELOPMENT AND ATTRACTION

- Advanced environments where students and researchers develop skills and grow scientific careers

OPEN TO THE SCIENTIFIC COMMUNITY

- Accessible platforms supporting national and international research collaboration

INDUSTRY COLLABORATION AND VALIDATION

- Spaces to co-develop, test and validate technologies with companies

REAL-WORLD EXPERIMENTATION

- Conditions that closely replicate real operational environments

BRIDGING RESEARCH AND INNOVATION

- Aligned with our scientific domains and market-oriented innovation areas

MULTISITE NATIONAL ECOSYSTEM

- Distributed infrastructures across Portugal, combining complementary capabilities

STATE-OF-THE-ART EQUIPMENT AND TECHNOLOGY PROTOTYPING

- Enabling the development and testing of advanced solutions


INESC

Our people define who we are.

Our actions reflect the values we stand for: people-centredness, inclusion, integrity, transparency and ethics.

DIVERSITY & INCLUSION

Promoting gender equality, interculturality and accessibility

At INESC TEC, diversity and inclusion are essential to building a respectful, collaborative and healthy research environment.

In 2025, the Diversity and Inclusion Commission promoted several initiatives aimed at raising awareness, strengthening competencies and fostering dialogue within our community.

2025 highlights

Training sessions and other major events organised:

- "GIA Checklist – How to Incorporate Gender Issues into Research Projects", a working session led by Marisa Matias, researcher and professor at the Faculty of Psychology and Educational Sciences, University of Porto.
- "Promoting Healthy Work Environments - INESC TEC Barometer", a session promoted by Tânia Gaspar, coordinator of the Portuguese Laboratory for Healthy Work Environments, presenting the "Ecosystems of Healthy Working Environments" (EATS) initiative and launching the INESC TEC Barometer survey to assess professionals' health conditions, lifestyles, and organisational factors influencing well-being and psychosocial risk.

Community and Cultural Initiatives:

- Eid al-Fitr + Nowruz celebration, organised in collaboration with the Iranian/Persian community, fostering intercultural understanding and cultural exchange within INESC TEC.

SOCIAL RESPONSIBILITY

Supporting our people and our community

Through environmental actions, volunteering initiatives and community engagement, we aim to contribute positively both within our organisation and to society in general. In 2025, several initiatives reflected this commitment.

2025 highlights

External initiatives:

- "June, Children's Month" Solidarity Campaign, supporting the Children's Support Association Ajudaris through donations. Additional campaigns enable the donation of end-of-life equipment from INESC TEC - including small household appliances, computers and monitors - to solidarity associations that support economically disadvantaged students and researchers.
- "Levar a Ciência ao IPO do Porto", an outreach initiative focused on robotics and spatial exploration, engaged young patients in STEM topics and shared research developed at INESC TEC.
- International Volunteer Day, mobilising of 50 INESC TEC volunteers, who participated in solidarity activities across 6 institutions: Hospital de S. João, Bebés de S. João, Ajudaris, Animais de Rua, Canil do ICBAS (Porto), Refood (Braga).
- Participation in the national-wide initiative, with 440 entities involved, for 2025 Christmas Season campaign "O melhor presente é estar presente" for road safety and accident prevention.
- Continued participation as an official nominator of the Earthshot Prize, endorsing one solution under the "fix our climate" Earthshot category.
- Continued collaboration with "Escolhas com Futuro" collaborative project, supporting students' community initiatives.

Internal initiatives:

- "40 Years, 40 Trees", organised in partnership with Porto Municipality and Porto Ambiente, brought together more than 40 INESC TEC's volunteers to plant 40 trees in Asprela Park, marking our 40th anniversary with an internal contribution to Porto's sustainability.
- World Mental Health Day, marked through four thematic webinars with invited experts, engaging more than 100 collaborators, to promote awareness and good practices related to mental health and well-being in the workplace.

ETHICS COMMITTEE

Promoting standards of integrity, honesty and responsibility

In 2025, the Ethics Committee continued to support researchers in assessing projects to ensure compliance with ethical requirements, while introducing improvements to the process through updates to support tools and the project submission platform, providing a clearer and more user-friendly interface. Moreover, it promoted the INESC TEC Open Talks on Ethics in Research and Defence, with three sessions reinforcing reflection and dialogue on ethical challenges:

- On 25 February, Álvaro Vasconcelos, founder of the Demos Forum and holder of the José Bonifácio Chair at the University of São Paulo in 2023 and 2024, delivered a talk entitled "Humanism without Borders".
- On 8 May, Afonso Seixas-Nunes, priest and Assistant Professor of Law at Saint Louis University, USA, delivered a talk entitled "Proportionality in War: Room for AI Systems or Imminent Disaster?".
- On 23 September, Michael Teutsch, AI Strategist and Lead at HENSOLDT, delivered a talk entitled "Ethics in Action: Challenges and Responsibilities of Military AI in Surveillance and Reconnaissance".

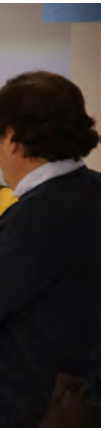
11.2

At INESC TEC, our people are our greatest strength. Throughout 2025, we created moments to bring our community together, celebrating achievements, strengthening connections and recognising the individuals behind our collective success.

Our scientific breakthroughs are the result of collaboration, dedication and shared purpose. Behind every discovery, every innovation and every impact we generate, there is a community that makes it possible.

Thank you to everyone who contributes to this journey.

OUR COMMUNITY



WE ARE SCIENCE.
WE ARE TECHNOLOGY.
WE ARE INNOVATION.
WE ARE INESC TEC.

INESC TEC

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