



**OUR
ACTIVITY**



TEC4: VISION AND ADDED VALUE FOR INESC TEC MAIN MARKETS

TEC4
AGRO-FOOD



TEC4
ENERGY



TEC4
HEALTH



TEC4
INDUSTRY



TEC4
SEA



Co-shaping the digital evolution in agro-food and forestry.

The TEC4AGRO-FOOD aims at tackling productivity and sustainability societal challenges, towards an effective bioeconomy.

TEC4AGRO-FOOD acts through Research and Technological Development (RTD) in all phases of the Smart Precision Agriculture and Forestry, from Variability Measurement to Action with Variable Rate Technologies (VRT), encompassing Data Analysis and Decision and Prescription Map, as well as in what concerns Food Security and Bioeconomy.

In the scope of TEC4AGRO-FOOD, INESC TEC provides innovation services of Consultancy and Research and Technological Development, in the following application areas:

Smart Precision Agriculture and Forestry | This innovation service comprises all phases of the Smart (IoT, Big Data, Robotics and Artificial Intelligence) Precision (right time, right amount, right place) Agriculture and Forestry: Variability Measurement, Data Analysis and Decision, Prescription Map and Action with Variable Rate Technologies (VRT)

Food Security | This innovation service deals with Food Security issues along the Agriculture and Forestry supply chains

Bioeconomy | This innovation service deals with Bioeconomy issues along the Agriculture and Forestry supply chains

In 2019 TEC4AGRO-FOOD has continued its consolidation as the main RTD national partner in the scope of ICT&E and Robotics for Agro-Food and Forestry. At the same time, at an European level TEC4AGRO-FOOD is entering in a sustainable manner the "champions league" of H2020.



Decarbonization and digitalization of the energy sector.

TEC4ENERGY benefits from a strong recognized INESC TEC expertise in Power Systems, with more than 20 years transferring research results to manufacturers, software vendors, electric utilities and large energy users in Portugal, Europe and Brazil. This adds credibility to a broader effort, extended also to the fossil fuel sector, and encompassing from industry to transportation, buildings and energy efficiency.

TEC4ENERGY initiative responds to the Societal Challenges and Innovation Strategies for Smart Specialization defined by EU policies: the energy sector will be heavily digitalized, decentralized, under a user centric and market-based approach, involving a large-scale integration of renewable power sources, requiring the conceptualization and development of disruptive solutions.

TEC4ENERGY offers several innovation services to the energy ecosystem as:

DMS/EMS and network automation | Specification, development and integration of advanced computational tools for network management systems for all voltage levels (transmission, distribution and island systems) and of new solutions for network automation, protection and control of distribution networks.

System planning and reliability | Tools and models within this area aim at supporting not only the operational planning but also the expansion of power systems. Naturally, this activity appeals to advanced optimization techniques and new stochastic models for the representation of the overall system behaviour.

RES & DER integration | RES integration studies, identification of system support functions/ ancillary services from RES and the exploitation of new technologies for increasing the controllability and flexibility of transmission and distribution grids. Part of these activities are supported by the laboratorial infrastructure of CPES (SGEVL).

Asset Management and preventive maintenance | Implementation of a risk-based maintenance strategy software for the distribution grids by analysing failure modes, consequences and decision maker's risk attitudes; estimation of power transformers condition and remaining useful life (RUL) by combining expert knowledge, engineering models and data analytics; fibre optic sensors to measure vibration and magnetic field for HV lines, and corrosion monitoring in off shore wind parks; drone with rotary wings or monitor electrical assets, such as medium and high voltage support, substations and wind turbines.

In 2019 TEC4ENERGY aimed to identify new potential projects with the industry and the society, through a multidisciplinary scientific-based approach to overcome the limitations that stakeholders found in the existing market solutions.



User-centred ICTs to improve health care and personal wellbeing

The mission of TEC4HEALTH is to target healthcare and wellbeing challenges towards personalized medicine, healthier life styles and better systems management.

TEC4HEALTH is the INESC TEC initiative to generate a convergence of knowledge and competences into producing solutions for the Health Economy.

INESC TEC is already a relevant producer of research targeting the Health sector, leading to products, processes and services that can be transferred in 3 broad areas of application: **healthcare providers (primary, secondary and long-term care); patient monitoring (medical devices, e-health, m-health), and pharmaceutical industry.**

From a technology transfer perspective, health technologies have already been quite successful within INESC TEC (3 recent spin-offs, 50% of INESC TEC's patent portfolio). Mapping the past experience of INESC TEC with current worldwide health challenges led to the identification of three key TEC4HEALTH challenges to address in the next 5 years: cancer, neurological diseases and disease screening.

Innovation services provided by INESC TEC in the scope of TEC4HEALTH:

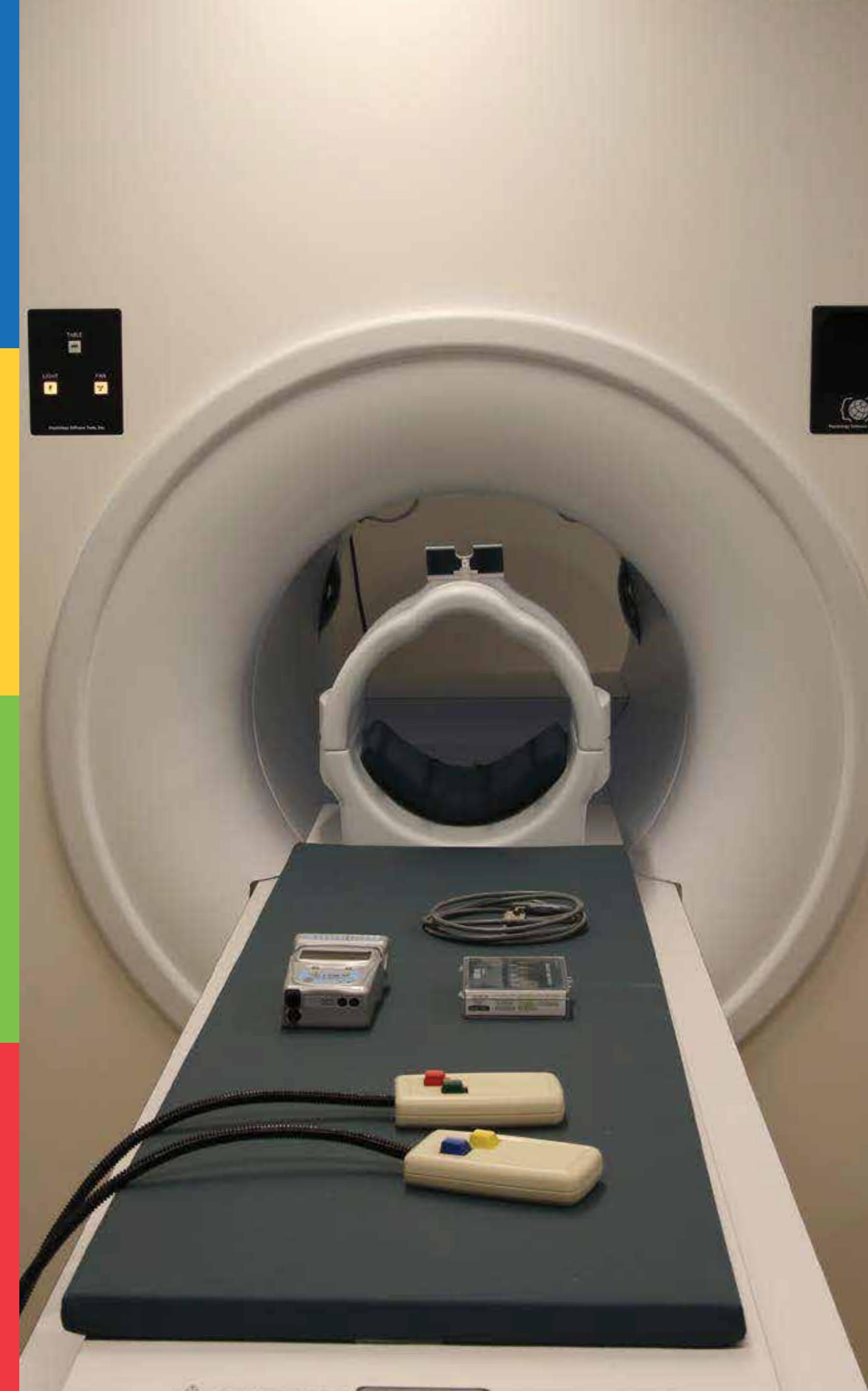
Artificial Intelligence Enhanced Healthcare

Predictive Analytics

TeleHealth and Information Systems

Healthcare Sensing and Monitoring

In 2019 TEC4HEALTH consolidated its presence in thematic international and national networks.



TEC4 INDUSTRY

Foster transformation for an innovative, collaborative, human-centred and sustainable industry.

TEC4INDUSTRY is the INESC TEC initiative to drive into R&D and generate a convergence of knowledge and competences into producing solutions for the Retail and Manufacturing Industry, covering end-to-end supply chain actors anchored in a history of successes and impact in technology transfer to companies.

TEC4INDUSTRY is committed to bringing unique knowledge and solutions to logistics, manufacturing industry, distribution, and retail.

Innovation services provided by INESC TEC in the scope of TEC4INDUSTRY:

Factory Design and Operational Planning | The work addresses simulation and optimization of the production lines through mathematical and simulation models to design facilities and to plan and operate operations.

Future Industrial Robotics and Collaborative Robotics | Future industrial robotics will move from a robot centred perspective of a robotics work cell, to an integrated approach that involves perception, multiple sources of information, close collaboration with humans and continuous process learning.

Logistics and Retail | Development of intra and inter-organisational logistics systems. Services to enable companies to integrate IoT components and orchestrate manufacturing modules, such as planning and scheduling. New models and algorithms for optimising the delivery of products purchased by online customers.

Predictive Maintenance and Consumer Forecasting | Prediction of anomalous events and machine learning techniques to increase maintenance optimization and consumer forecast.

In 2019 TEC4INDUSTRY continued participating in national and international projects addressing solutions covering all value chain areas of TEC4INDUSTRY. Most of the new projects addressed the challenges related with digitalization activity of the enterprises in the context of INDUSTRY 4.0 framework.





Bringing the digital world to a sustainable sea economy.

The mission of TEC4SEA is to articulate INESC TEC activity to the sea and deep-sea domains towards a sustainable Sea Economy.

TEC4SEA is able to offer value-added innovation services related with 3D mapping and data fusion in unstructured environments, optical and bio-sensors, broadband communications solutions for marine environments, software solutions for data collection, processing and management, among others.

The multidisciplinary competencies within the TEC4SEA facilitate the development of solutions for a wide range of industries, such as: aquaculture, marine and seabed mining, management of marine protected areas, deep-sea observation, ocean renewable energy (including offshore wind energy), maritime safety and surveillance.

In the scope of TEC4SEA, INESC TEC provides innovation services in the following areas:

High-tech marine products and services

Marine business services

Marine manufacturing and construction

Marine R&D and education

Maritime and coastal tourism

Maritime safety and surveillance

Ports

Shipbuilding and repair

Shipping

In 2019 the main focus was the infrastructure and to make INESC TEC competencies in the Sea domain known in international forums.

