

from knowledge production to science-based innovation





INSTITUTE FOR SYSTEMS AND COMPUTER ENGINEERING, TECHNOLOGY AND SCIENCE

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ManuFUTURE 2030 STRATEGY

Leadership in resilient &

adaptive manufacturing

2040



Digitalization: an endless world of connected objects



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Road map to the digital transformation?

- toolbox approach?
- key technologies?
- know where we are?
- which dimensions?







Key Technologies



- digital producers
- digital consumers
- digitally transformed

Promises 4.0



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still 10 to 15 years before maturity is attained



From industry 3.0 to industry 4.0



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Maturity Assessment [Org XYZ] - multi-dimensional analysis



- Professional M.SC. in digital transformation?
- Toolkit/BoK for SMEs?



Digital Masters

 do not be enslaved to large technology vendors and brandings

Lessons (already) learned

- much more than BoD level ppts (by the big 4)
- process- (not resource) based organisation innovation
- lean/kaizen lessons on failure or stagnation

Source: Leading Digital - Turning Technology into Business Transformation George Westerman, Didier Bonnet & Andrew McAfee

Fashionists

INESC TEC managed-science model

- putting pervasive intelligence to work

Research

Clusters - Science push



TEC4 - Market pull

Clusters of **13 Research Centres** build a **multidisciplinary environment** to optimize resources and maximise synergies







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COMPUTER

SCIENCE

Strategy driven platforms addressing and impacting great societal challenges and market needs



End-to-end Knowledge Value Chain

377 projects build an integrated two-way pipeline

Technology Readiness Levels



- National competitive funding: 70 projects
- EU competitive funding: 78 projects
- National competitive funding in consortia: 25 projects
- R&D consulting services: 204 projects

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Being international



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Critical mass and talent in research and tech-transfer

659 Research	 163 Academic s 91 Employees 64 Postdoctora 341 Graduate g 	staff (50% FTE) (46 PhDs) al grant holders rant holders (146 PhD students)	
 92 Support Services 407 Other Collaborators 269 External researchers 138 Research trainees 			Image: November 2018
30+ nationalities	2 IEEE Fellows 13 IEEE Senior Members 1 ACM Senior Member	Research Coordinator 2% Junior Researcher 55%	c Employment Senior Researcher 4% Assistant Researcher 39%

From the physics lab to international markets

Photonics research started - 1985



First fiber Bragg grating fabricated in Portugal - 1994

DATE 04. 15.94 GRATING-1 MEASOO 120 40 40 40 40 522.5 1522.5 1522.5 1522.5 1522.5 1527.5 1527.5 1527.5 1527.5 1527.5 1527.5 1527.5 1527.5 1527.5 INESC TEC spin-off in fiber optic sensing - 2004



ITER reactor

Acquisition by Multinational **HBM** - 2014

FIDErSensing bringing light to measurement Siemens Airbus Thales Porsche



Hundreds of FBG sensors to operate at cryogenic temperatures (down to 10 K)





A leading country in renewable integration – smart grids



Pilot for a Smart City: Évora – 33,000 consumers using Smart Grid technology



Portuguese Technology on advanced EMS/DMS tools (EFACEC), Smart Metering and Smart Grids solutions



Managing the Power System with large scale integration RES: Forecasting, reserve management, stability studies

> Prevind Wind power forecasting services

Provides short-term forecasts up to 72 hours ahead, 4 times per day 75% of the wind power forecasts in Portugal



> 5100 MW
instaled capacity
in Portugal
(7th in Europe)

World record: over 4 days with 100% renewable electricity hydro, wind, solar, biomass



2016 Feb - renewables enough to feed all the country load and export during 106 h



INESCTEC

20+ years partnering with technology vendors and *lead users* in the shoe sector



- 75 + million pairs

30 success stories of INESC TEC research

30 short (10 minutes long) documentaries for television, have been broadcasted by the public TV channel RTP3.

The goal has been to use research undertaken at INESC TEC to show the social relevance and economic impact of science and technology.

Please access the link below and watch the videos numbered 31-61 which have English under titles.

https://goo.gl/2xAYts





TEC4 – Addressing societal challenges and market needs

TEC4ENERGY

Decarbonization and digitalization of the energy sector



TEC4AGRO-FOOD

Co-shaping the digital (r)evolution in Agro-Food and Forestry



TEC4SEA

Bringing the digital world to a sustainable sea economy



TEC4HEALTH

User-centred ICTs to improve health care and personal wellbeing



TEC4INDUSTRY

Collaborative value chains for an innovative, human-centred and sustainable industry



TEC4MEDIA

Digital Media technologies to improve the content value chain and user experience





Successful Demonstration of ?VAMOS! Underwater Mining Technology in UK







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- Underwater mining technology
- Supporting Portuguese Navy
- Locating two submerged vehicles in a flooded marble quarry pit – south Portugal

November 26, 2018







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CoLAB Vines&Wines



Spatial Data Infrastructure for Douro Demarcated Region **Smart Precision Viticulture**







Detection of Fertility Levels



Monitoring Pests and Diseases



Control of Degree of Ripeness Evolution



Soil Occupation/Sistematisation Monitoring Plant Maps; Zoning



Physiological Data



Slope Maps



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CoLAB ForestWISE

Calibration of indices of fire danger with satellite measurements of energy released by wildfires



Fire prevention and fighting require well calibrated indices of fire danger

Energy released by wildfires is measurable from space, is a good indicator of fire activity and is especially appropriate to calibrate indices of fire danger







Satellite radar remote sensing of vegetation biomass for fuel hazard assessment

Map vegetation height and biomass in forests and shrublands, as part of national-level fire danger mapping

Include annual updating of vegetation height and biomass to account for changes due to fires, forest harvesting, and shrubland/pasture grazing







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