

COORDINATED B INESCPORTO PORTUGAL

FROM KNOWLEDGE GENERATION TO: SCIENCE-BASED INNOVATION

Research and Technological Development

Technology Transfer and Valorisation

Advanced Training

Consulting

Pre-incubation of Technology-based Companies

Our Mission



RESULTS:

Better science in Portugal

&

A more competitive business fabric





Institutional





ASSOCIATE UNIT

CISTER Real-Time and Embedded Computing Systems

The Scientific Advisory Board of INESC TEC



PRESIDENT

José Carlos Príncipe University of Florida USA



Volker Stich Aachen University of Technology Germany



CSIG, HASLAB, CRACS José Luíz Fiadeiro University of Leicester UK



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SSOCIATE LABORATORY

CTM

John O'Reilly Cranfield University UK





Leonardo Chiariglione CEDEO Italy



CPES

Tomaz Goméz Universidad Pontificia Comillas Spain





Faramarz Farahi University of North Carolina at Charlotte USA



Peter Corke University of Melbourne Australia



CROB

Steven P. Nichols University of Texas at Austin USA

CSIG, HASLAB E CRACS

José A. B. Fortes University of Florida USA



LIAAD

Maarten van Someren Universiteit van Amsterdam The Netherlands

CEGI



James C. Spohrer **IBM University Programs** World-Wide (IBM UP)



Max Viergever University Medical Center Utrecht The Netherlands

ASSOCIATE UNIT INESC TEC



Daniel Mossé University of Pittsburg USA

Institutional

MAIN FIGURES

INESC TEC Coordinated by INESC Porto

- Private non-profit association
- Public Interest Institution since
 2001
 - Associate Laboratory statute awarded in 2002 by the Portuguese Ministry of Science
- Awarded the level of Excellent by an international evaluation board of the Ministry of Science

Partnership-based resources = 1.515 M€

Turnover = 11.8 M€

R&D Centres = 12 + 1

- **Collaborators** = 800 • *R&D* = 600
 - PhD = 300
 - Integrated PhDs = 250
- Support Services = 57

10,89%

33,33%

55,78% U.Porto Foundation

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Institutional

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SSOCIATE LABORATORY

INESC TEC (INESC TECHNOLOGY & SCIENCE) - coordinated by INESC Porto



CPES – Centre for Power and Energy Systems

CITE – Centre for Innovation, Technology and Entrepreneurship

CESE – Centre for Enterprise Systems Engineering

CEGI – Centre for Industrial Engineering and Management

CAP – Centre for Applied Photonics

CTM – Centre for Telecommunications and Multimedia

C-BER – Centre for Biomedical Engineering Research

CROB – Centre for Robotics and Intelligent Systems

CSIG – Centre for Information Systems and Computer Graphics

LIAAD – Laboratory of Artificial Intelligence and Decision Support

CRACS – Centre for Research in Advanced Computing

Systems

HASLab – High-Assurance Software Laboratory

ASSOCIATE UNIT

CISTER - Research Centre in Real-Time and Embedded **Computing Systems**

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Our Associates: our Strength











FEUP FACULDADE DE ENGENHARIA UNIVERSIDADE DO PORTO



FEP FACULDADE DE ECONOMIA UNIVERSIDADE DO PORTO









Universidade do Minho



Timeline

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> ECHNOLOGY & SCIENCE ASSOCIATE LABORATORY

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Timeline



Profile of activities in the value chain

The metaphor of the production chain of knowledge-value: **we make it a reality**









Sources of funding (Number of Projects)

Courses of Funding	Year							
Sources of Funding	2008	2009	2010	2011	2012	2013		
National Programmes	49	44	83	106	95	102		
European Union Programmes	20	19	20	28	30	39		
R&D Services and Consulting	70	78	90	102	109	108		
Other Sources of Funding			10	7	10	6		
Other External Sources	6	9	3	4	7	8		
Internal		1	3	8	8	6		
Total	145	151	209	255	259	269		





Competitive Research funded by the Portuguese Foundation for Science and Technology

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
No. of Proj.	8	12	21	27	22	27	26	30	50	60	61	65	409

Research funded by the Ministry of Science is fundamental not only to provide advanced training to human resources, but also to create knowledge.

There are other national sources of funding (QREN/NSRF) which support the development of projects and INESC TEC is also an active agent in these programmes.

Papers published in international journals



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TECHNOLOGY & SCIENCE ASSOCIATE LABORATORY

Sources of Funding



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PROJECTS

FECHNOLOGY & SCIENCE ASSOCIATE LABORATORY Ľ



Sources of Funding: diversity is key

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R&D Services and Consulting secure 36% of funding

International activities represent 26% of funding

Sources of Funding: diversity is key

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National Programmes
 European Union Programmes
 R&D and Consulting Services

Other Sources of R&D Funding

Other External Sources

Data from 2013

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The research units and the production chain of knowledge



High-level R&D contracts



Socially relevant Research : 2 Examples

1ST EXAMPLE: smart grids

ACTION

- 4 European projects, 3 FCT projects
- Various national development and consulting contracts with significant financial support from industry
- An important project for industry (INOVGRID)

RESULT

A consortium led by the largest energy operator in Portugal (EDP) along with 4 partners from industry and INESC TEC as the only R&D institution involved in defining the technical specifications

A solution and nationally competitive technologies that can be exported

A pilot project for a Smart City: Évora – 33,000 consumers using Smart Grid technology





Socially relevant Research : 2 Examples

2ND EXAMPLE: the footwear industry

ACTION

- 5 European projects, 14 national projects with significant financial support from industry
- Demonstration and training programmes

Guaranteeing competitiveness in the Portuguese footwear industry

Many companies can benefit from INESC TEC's technology

RESULT

Transforming the Equipment Manufacturing Industry: exporting to Italy, USA, China and Brazil





Infrastructure

Ĩ	INESC TEC	O CPES	O CITE	O CESE	O CEGI	O CROB
	12 R&D Centres + 1 Associate Unit 6 poles Porto, Braga and Vila Real	O CAP	O CTM	O C-BER	O CSIG	O LIAAD
		O CRACS	O HASLASB	O CISTER		







INESC TEC:

In four university *campi*:

University of Porto

FEUP (Engineering) FCUP (Science) FEP (Economics)

Polytechnic Institute of Porto ISEP (Engineering)

University of Trás-os-Montes and Alto Douro Engineering

University of Minho Engineering

INESC TEC: A compact puzzle

600 Researchers

- 300 PhD holders
 - 250 Integrated PhD

A compact and coherent continuum





Geographic Location

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Scientific capacity

HUMAN RESOURCES





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Human Resources: Type of Link



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Human Resources: nationalities of foreign researchers







Foreign researchers at INESC TEC







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International Doctoral Programmes

AVANCED TRAINING PhD TRAINING

International Partnerships 40% of foreign students

MIT Portugal Massachusetts Institute of Technology

ENGINEERING DESIGN AND ADVANCED MANUFACTURING SUSTAINABLE ENERGY SYSTEMS TRANSPORTATION SYSTEMS

UTAustin Portugal

DIGITAL MEDIA UNIVERSITY TECHNOLOGY ENTERPRISE NETWORK

Carnegie Mellon Portugal Information and Communication Technologies Institute

MAP-i COMPUTER SCIENCE MAP tele TELECOMMUNICATIONS

UNIVERSITY OF AVEIRO UNIVERSITY OF MINHO UNIVERSITY OF PORTO

FEUP Faculty of Engineering of the University of Porto

PD EEC ELECTRICAL AND COMPUTER ENGINEERING

PD EIG INDUSTRIAL ENGINEERING AND MANAGEMENT

MIETE MASTER'S IN INNOVATION AND TECHNOLOGICAL ENTREPRENEURSHIP (FEUP/FEP FACULTY OF ECONOMICS OF THE UNIVERSITY OF PORTO)



ASSOCIATE LABORATORY



MISSION

Promote the scientific and technological development of Brazil as well as international cooperation in areas such as information technology, energy, communications and related sciences. This will be achieved by implementing multidisciplinary and consortium projects similar to projects conducted within the European Union's Framework Programmes.

Nongovernmental Science and Technology Institution, which aims at coordinating a network of cooperation in research, development and technology transfer in Brazil, together with public Brazilian universities and INESC TEC.



Passion for **Knowledge**

Respect for the identities

Knowledge \rightarrow Social well-being



Responsible Science

Solidarity among partners



PAST ACTIVITY

R&D CONTRACTS CELPA, FLAGSHIP

ADVANCED CONSULTING ONS, PROMON FOR ANEEL

PH.D. HOLDERS, GRANT HOLDERS AND POST-DOCS AT INESC TEC

EUROPEAN PROJECTS WITH A BRAZILIAN PARTNER

SPIN-OFF PARTNERSHIPS: FIBERSENSING WITH GÁVEA SENSORS

ONGOING ACTIVITIES AND NEGOTIATIONS

R&D CONTRACTS

POWER

ROBOTICS

OPTICAL SENSORS

INSTRUMENTATION

ASSET MANAGEMENT

TELECOMMUNICATIONS

INESC BRAZIL NETWORK

PROJECT PRESENTED TO CNPq

INESC PORTO

UFC FEDERAL UNIVERSITY OF CEARÁ

UFPA FEDERAL UNIVERSITY OF PARÁ

UFPE FEDERAL UNIVERSITY OF PERNAMBUCO

UFRJ/COPPE FEDERAL UNIVERSITY OF RIO DE JANEIRO

UFRN FEDERAL UNIVERSITY OF RIO GRANDE DO NORTE

UFSC FEDERAL UNIVERSITY OF SANTA CATARINA

UNICAMP STATE UNIVERSITY OF CAMPINAS

UNIFEI FEDERAL UNIVERSITY OF ITAJUBÁ

USP/SÃO CARLOS UNIVERSITY OF SÃO PAULO/SÃO CARLOS CAMPUS

THE NETWORK IS MANAGED BY INESC P&D BRASIL, SÃO PAULO



MISSION: Contribute to the **scientific and technological development of Brazil** and promote international cooperation in engineering, information technology, communications and related sciences.

& SCIENCE NUT





INESC TEC: R&D Centres and Laboratories

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CPES – Centre for Power and Energy Systems

POWER AND ENERGY CLUSTER

Areas of Activity

- Power Systems planning and operation, Load modelling, Reliability
- Dynamic security analysis, Integration of embedded generation
- Isolated systems
- Control of wind generators and wind power forecasting
- Smart Grids, Micro-generation and Micro-grids
- Active distribution networks
- Regulation and Electricity market
- Multi-criteria Decision Aid, Fuzzy Sets and Computational Intelligence applied to power systems







CITE – Centre for Innovation, Technology and Entrepreneurship

INDUSTRY AND INNOVATION CLUSTER

Areas of Activity

- Innovation Management
- Entrepreneurship, Business
 - Development, Incubation
- R&D in Innovation Management and Technology-Based

Entrepreneurship

• Launching of spin-off companies





CESE – Centre for Enterprise Systems Engineering

INDUSTRY AND INNOVATION CLUSTER







CEGI- Centre for Industrial Engineering and Management

INDUSTRY AND INNOVATION CLUSTER

Areas of Activity

Engineering, Management and Social Sciences

Identification of processes, techniques and indicators of efficient institutions.

The strategy for this Unit focuses on problem-driven research, which requires developing appropriate solutions for each company/institution.







DE ENGENHARIA

E GESTÃO INDUSTRIAL

LABORATÓRIO ASSOCIADO
CROB – Centre for Robotics and Intelligent Systems

NETWORKED INTELLIGENT SYSTEMS

- Advanced solutions based on mobile and autonomous robotics
- Integration of advanced sensing technologies
- Intelligent control
- Underwater exploration ROVs and AUVs
- Aerial and surface exploration
- •Defence, security
- Industrial solutions





CAP – Centre for Applied Photonics

NETWORKED INTELLIGENT SYSTEMS

- Optoelectronics Devices and Instrumentation
- Microfabrication, Integrated Optics and Thin Films
- Interferometric Optical Imaging
- Structural Health Monitoring Systems
- Environmental Monitoring Systems





CTM – Centre for Telecommunications and Multimedia

NETWORKED INTELLIGENT SYSTEMS

- Multimedia Technologies and Systems
 - Media Processing
 - Multimedia Services
- Wireless and mobile networks
- Internet Architectures and Networking
- Optical and electronics technologies
 - Microwave and optical communications
 - Microelectronics





C-BER – Centre for Biomedical Engineering Research

NETWORKED INTELLIGENT SYSTEMS







CSIG – Centre for Information Systems and Computer Graphics

COMPUTER SCIENCE CLUSTER

- Computer Graphics and Virtual Environments
 - Image Synthesis and Visual Perception
 - Geospatial Systems, Virtual Environments and Serious Games
- Software Engineering
 - Software architectures for complex systems
 - Agile process engineering
 - Knowledge management in software projects
 - Software quality, testing, verification and certification
- Information Management and Systems
 - Information Systems
 - Information Retrieval
 - Digital Repositories and Preservation

LIAAD - Laboratory of Artificial Intelligence and Decision Support

COMPUTER SCIENCE CLUSTER

Areas of Activity

Machine learning

Decision support systems:

- Data mining
- Forecasting
- Adaptive modelling and optimisation

Applications:

- Marketing
- Financial services
- Process scheduling
- Health
- Text information retrieval

LIAAD

LABORATÓRIO ASSOCIADO





CRACS - Centre for Research in Advanced Computing Systems

COMPUTER SCIENCE CLUSTER

- High Level Programming Languages
- Parallel and Distributed Computing
- Mobile Computing and Sensor Networks
- Information mining and Applications
- Pattern Recognition in Genomics and Proteomics
 - Analysis of Gene Expression Data
 - Understanding Cellular Pathways
 - Clinical Analysis
 - Intrusion detection systems
 - SPAM classification
- Web-based systems
 - Semantic Digital Libraries
 - E-learning Environments and Tools

HASLAB - High-Assurance Software Laboratory

COMPUTER SCIENCE CLUSTER

- High-assurance software
- Formal verification of real-time and user-computer interaction systems
- Safety-critical embedded systems
- Secure cryptographic schemes and protocols
- Tools for the mechanical verification of cryptographic implementations and security proofs
- Dependable distributed systems
- Large-scale dependable data management
- Elastic high-performance transactional systems







CISTER - Research Centre in Real-Time and Embedded Computing Systems

ASSOCIATE UNIT

- Wireless Sensor Networks
 - WSN Communication infrastructures
 - Real-time and reliability in COTS Technology
 - Application areas in environmental monitoring, process control
- Cyber-Physical Systems
 - Holistic view of computation and networking
 - Ubiquity and high resolution of physical perception
- Real-Time Software
 - Reliable embedded software infrastructures (OS, languages)
 - Distributed QoS-aware embedded middleware
- Multicore Systems
 - High-performance but predictable platforms
- Adaptive Real-Time Systems
 - Computation depending on energy constraints
 - Temporal Isolation and Adaption

INESC TEC supports public policies and other public interest issues

INESC TEC

- Advising the NSRF and the FCT on Programme regulations, eligible expenses, etc.
- Supporting the FCT in the creation of Fraunhofer Portugal
- Consulting for the Regional Coordination and Development Commissions: CCDR-N (Northern Portugal) and CCDR-LVT (Lisbon and Tejo Valley)
- Consulting for the MEI (Ministry of Economy and Innovation) in public tenders (e.g.: on Wind Energy Concessions in Portugal)
- Technical support for the creation of legislation in Madeira/Azores
- Contributing to the development of new organisational models for the University of Porto
- Participating in the Areas of Competitiveness and Technology (Health, ICT, Sea, Forest, Energy, Sustainable Manufacturing, Fashion Industries, Creative Industries)









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Corporate TV and Digital Signage Networks

2007 **CTM/CSIG**

In-Store Virtual Shop Assistant





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Audio Hi-Fi Systems

2007-2011 (sold to company developers) CTM







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Energy Solutions

2008-2011 (sold to company developers with 400% value increase)

CPES



- Energy Efficiency
- Carbon Management and

Sustainability

- Strategic Consultancy in Energy
- Energy Certification





IESCTEC HNOLOGY & SCIENCE SOCIATE LABORATORY











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Based on a forecasting system: EPREV
Provides short-term forecasts up to 72 hours ahead, 4 times per day, with a mean absolute error of up to 20%









Network of former INESC TEC employees

- Professional tracking
- Two-way communication
- **Professional synergies**



Around 200 former employees in 23 countries

In **2013** INESC TEC sent around **150** highly qualified individuals (**20 PhD**) into the market, to companies/institutions such as:



Launching pad for young talent

National Companies

Former Researchers in important Portuguese companies **PORTO AND NORTH**

ACCENTURE AVELEDA BLIP EDP EFACEC FIBERSENSING LIPOR IT MOG TECHNOLOGIES NOVABASE PORTO EDITORA SONAE VORTAL WE DO TECHNOLOGIES COOLLINK FRAUNHOFER

CENTRE PT INOVAÇÃO BOSCH SECURITY SYSTEMS

LISBON EDP DISTIBUIÇÃO GENERIS FARMACÊUTICA SONAECOM ALTRAN REN CORIANT GMBH & CO. KG

CORIANT GMBH & CO. KG INSTITUTO GULBENKIAN DE CIÊNCIA

Launching pad for young talent

Global network of competence

Former Researchers in important organisations around the world

