

**FACULTY OF ENGINEERING, UNIVERSITY OF PORTO  
EDUCATION, RESEARCH, THIRD MISSION**

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**FEUP Mobility Network**

**21 November 2011**

**FEUP, Porto, Portugal**

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**TO SAY WHAT I AM GOING TO SAY...**

- ① **Some historical and institutional notes**
  - ① **Portugal, Porto, The University of Porto, The Faculty of Engineering**
- ② **The Faculty of Engineering**
  - ② **The Mission: Education; R&D; The third mission within the mission – Facts&Figures and some real applications**
- ③ **Concluding Notes – Expectations for the future**

## LOCATION

## ACT LOCAL, THINK GLOBAL



## PORTUGAL: EURO-ATLANTIC HUB



Cantino Planisphere (1502): The oldest known map from the days of the Portuguese discoveries

## THE MOST WESTERN COUNTRY OF THE EUROPEAN CONTINENT, THE OLDEST STABLE BOUNDARIES

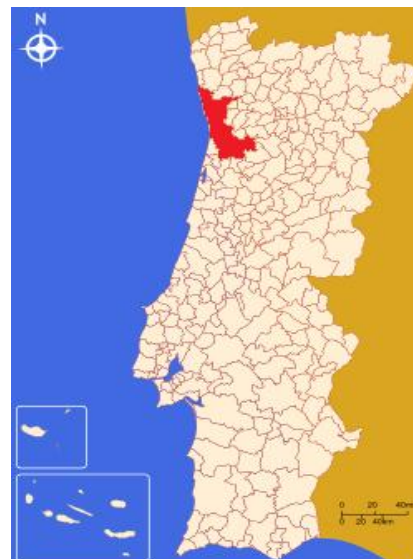


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## PORTO METROPOLITAN AREA

- **Figures and Facts**
  - 16 Municipalities
  - ~1.700.000 inhabitants
  - Porto, capital of the north region
- **Porto brands – assets and attractions**
  - Port Wine
  - The University of Porto
  - F.C. Porto
  - Culture, architecture, the bridges of Porto, World Heritage Site
- **2 Pritzker award winners**
  - 1992 – Álvaro Siza Vieira
  - 2011 – Eduardo Souto de Moura



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## PORTO AND GAIA –FROM THE DAYS OF THE ROMANS...



## RIBEIRA AND PONTE DA ARRÁBIDA – ARRÁBIDA BRIDGE



WORLD HERITAGE SITE - UNESCO 1996

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**VINHO DO PORTO – PORT WINE – THE REFERENCE...**



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**RABELOS BOATS AND BRIDGE LUIS I, TEÓFILO SEYRIG, 1886-1887**



**WORLD HERITAGE SITE - UNESCO 1996**

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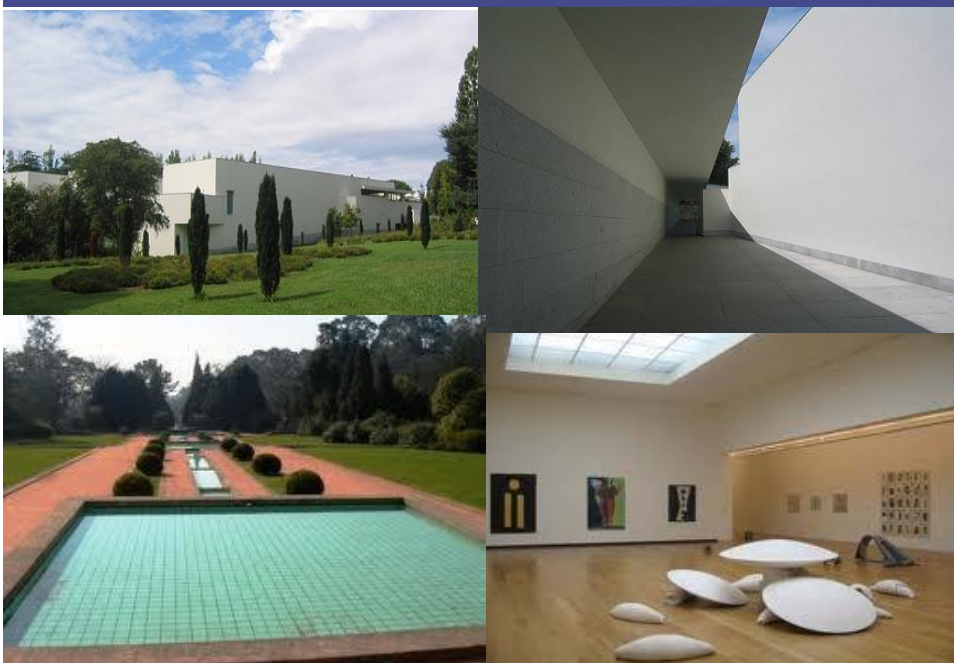
**A BOAT RACE IN DOURO RIVER  
PORT WINE AND THE UNIVERSITY OF PORTO... TOGETHER**



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**PORTO, CITY OF ARCHITECTURE: SERRALVES MUSEUM, ARQ. ÁLVARO SIZA, 2005**



**PORTO, CITY OF CULTURE: CASA DA MÚSICA – CONCERT HALL**



**Arq. Rem Koolhaas, Pritzker Winner, RIBA European Award 2007**

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**PORTO, CITY OF TRADE, WITH EXCELLENT EASY ACCESSES**



**2<sup>nd</sup> Best European Airport (ACI award 2011)**

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**F.C. PORTO – THE BEST SOCCER IN THE WORLD...**  
**EUROPE LEAGUE CUP 2011**



**PORTO, CITY OF SCIENCE: THE UNIVERSITY OF PORTO**



1837-1911 Polytechnic Academy, the Rectorate of U.Porto since 1911

The teaching of engineering in Portugal started in this building, in 1837

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## UNIVERSITY OF PORTO A COMPREHENSIVE RESEARCH UNIVERSITY

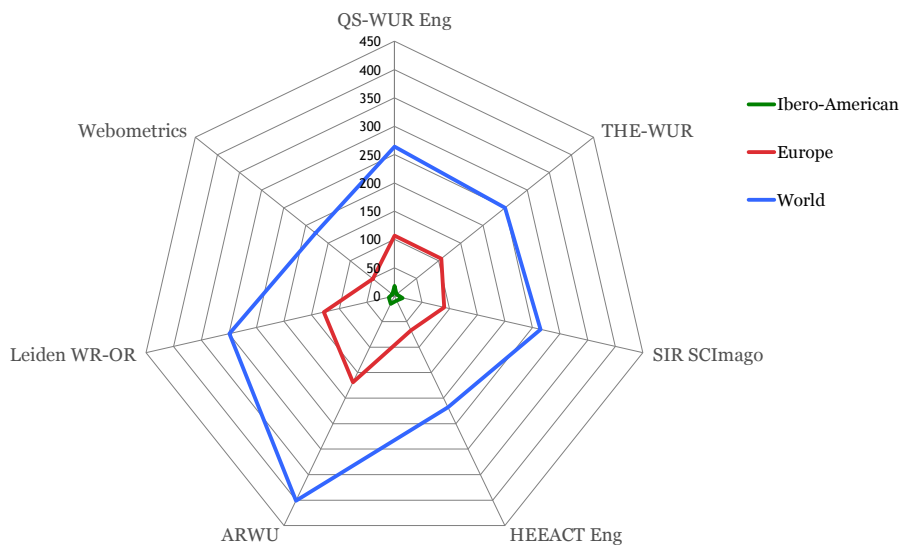
- ☞ **The University of Porto is the largest comprehensive University in Portugal**
  - **Organised in 3 main campuses in the city**
  - **more than 30.000 students (10% plus foreign students)**
  - **14 Faculties and a Business School.**
- ☞ **A leading research University in the country**
  - **60 R&D units**
  - **responsible for ~22% of the published scientific papers in Portugal**

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### UNIVERSITY OF PORTO

### *International Rankings U.Porto 2010*



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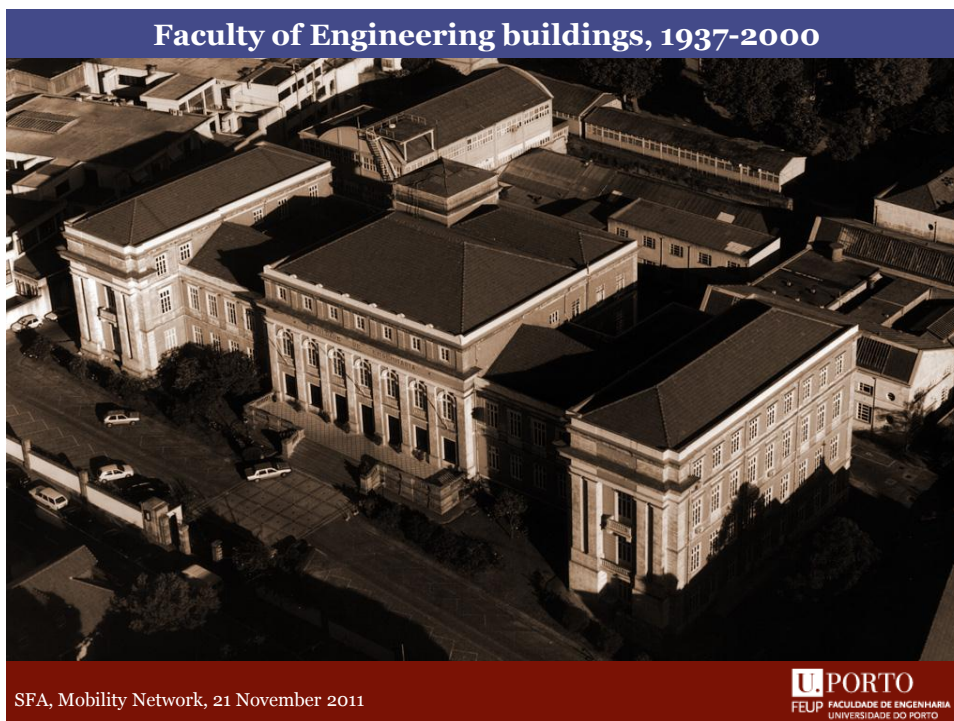
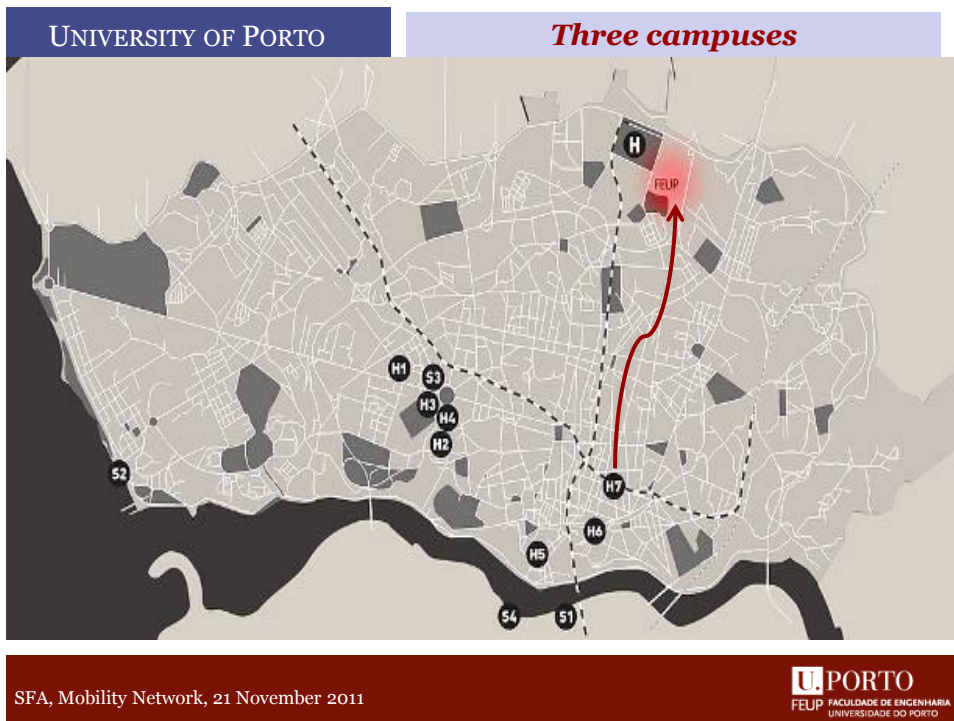


**Performance Ranking of Scientific Papers  
for World Universities (Taiwan)**

	2007	2008	2009	2010	2011
Top 500 Universities (World rankings)	459	375	332	328	320
European Ranking	195	161	140	141	141
Ibero-American Ranking		10	11	9	8
National Rankings	1	1	1	1	1

**TO SAY WHAT I AM GOING TO SAY...**① **Some historical and institutional notes**① **Portugal, Porto, The University of Porto, The Faculty of Engineering**② **The Faculty of Engineering**② **The Mission: Education; R&D; The third mission within the mission – Facts&Figures and some real applications**③ **Concluding Notes – Expectations for the future**





## Faculty of Engineering buildings in Asprela, 2000 -

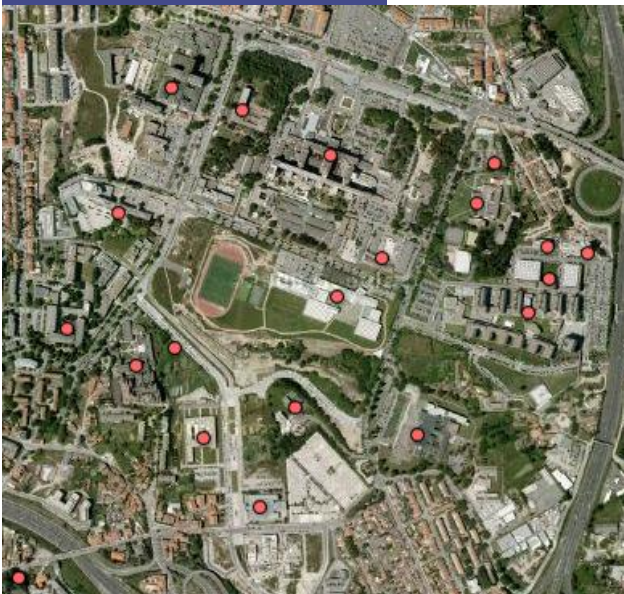


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UNIVERSITY OF PORTO

## *Asprela: the Technology Campus*



**More than 17.000  
people work in science  
and technology, within  
U.Porto, at Asprela**

- **7 Faculties**
- **6 main R&D Interface Institutes,**
- **2 Hospitals**
- **The Science and Technology Park, supporting today 58 innovative companies**

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☞ **Core activity**

- ✓ **Education – all cycles of the European Qualifications Framework adopted within the Bologna Process agreements**
- ✓ **Research & Development**
- ✓ **Activities of the Third Mission**

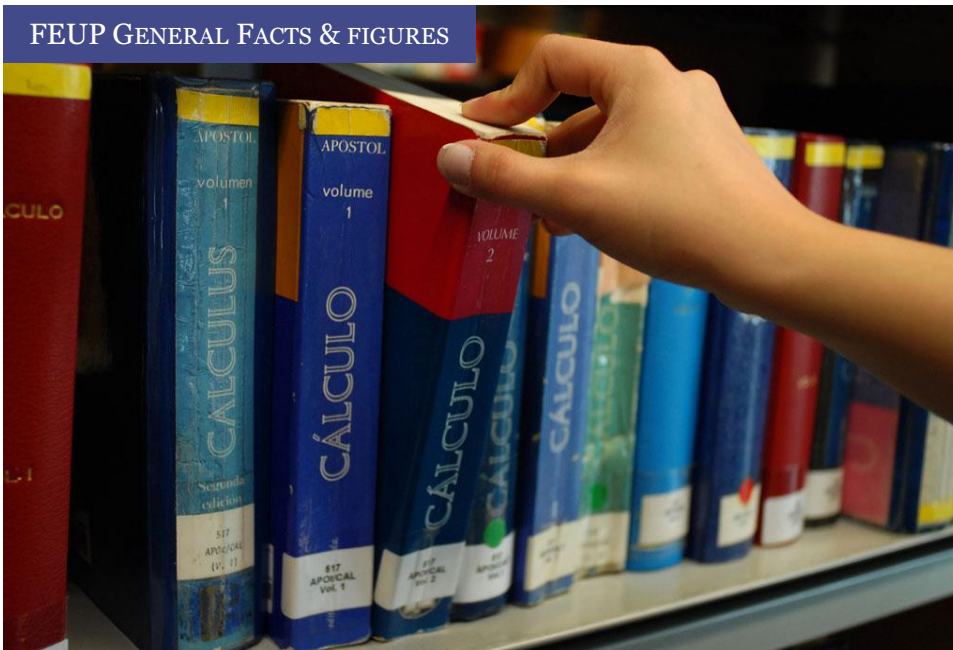
☞ **Education, including cultural, ethical and civic education**☞ **Underlying principles – keywords are**

- ✓ **Quality, Internationalisation, Cooperation**
- ✓ **Building trust through reputation**

☞ **Lifelong learning education**☞ **Human resources – transfer to industry and public services other than academic institutions**☞ **Intellectual property**☞ **Spin offs**☞ **Contracts with industry**☞ **Contracts with Public Bodies**☞ **Participation in policy making**☞ **Involvement in social and cultural life**☞ **Public understanding of science**

\* After Philippe Laredo, *Toward a third mission for Universities*, UNESCO research seminar for the Regional Scientific Committee for Europe and North America, Paris 5-6 March 2007.

## FEUP GENERAL FACTS & FIGURES



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## FEUP GENERAL

## *Campus Infrastructures*

Total campus constructed area	~84 000 m <sup>2</sup>
Green area	23 000 m <sup>2</sup> (30% of total)
Library area/seats	5 694 m <sup>2</sup> (500 seats)
Computers for teaching	1350
Computer labs	30 (open 365d/24h)
Teaching labs	63
Multimedia equipped classrooms	43
Investment in Lab equipment	1,81 M€ (2010)
<b>Services:</b> bookstore, printing, merchandising, snack-bars, restaurant, canteen	

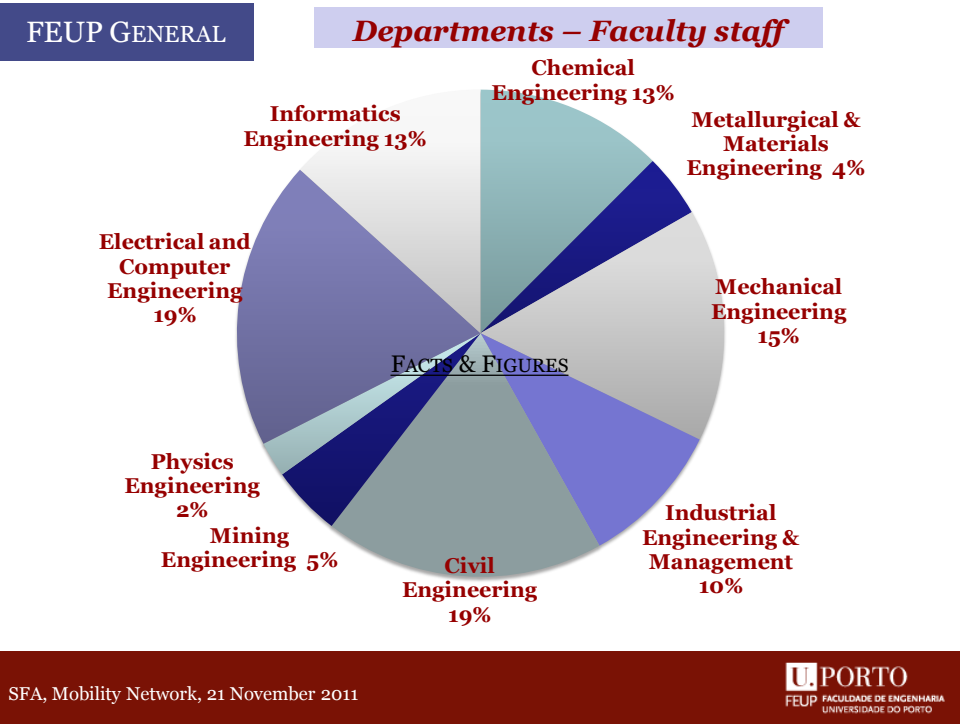
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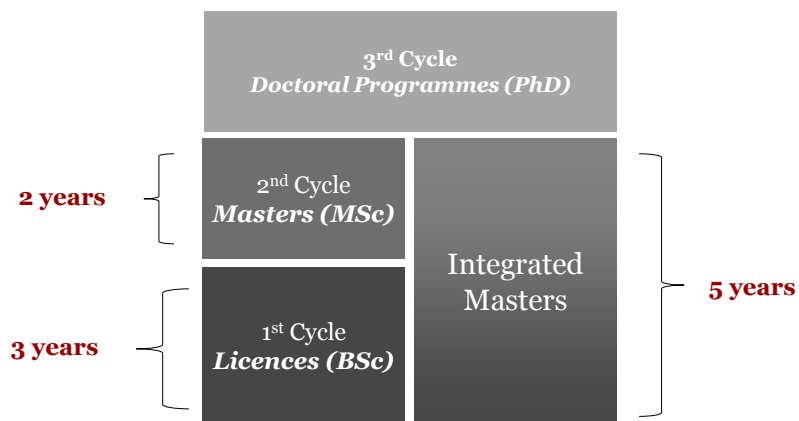
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Faculty - Permanent	360
Faculty - Invited	244
Faculty - Total FTE	460,4 (78,6% Ph.D.)
Research staff (5 year contracts)	34
Technical staff	338,5
Students	7145
Ratio Technical /Faculty (FTE)	0,74
Ratio Students / Faculty (FTE)	14,6

<i>Degree programmes - 7112</i>		
Undergraduate	202	
Integrated Masters	5739	(23,4% female)
Independent Masters	417	(50,2% female)
Doctoral Programmes	754	(34,9% female)
<i>Non-degree programmes - 33</i>		
Specializations	24	
Advanced Studies	9	
<b>Total students - degree and non-degree programmes - 7145</b>		
<i>Lifelong Learning - 1159</i>		
Refresher courses	789	
Course individual units	370	





<i>Degree programmes</i>	
Undergraduate programmes	3
<b>Integrated Masters</b>	<b>9</b>
Independent Masters	13
Doctoral Programmes	22
<i>Non-degree programmes</i>	
Specializations / 2nd cycle level	7
Advanced Studies / 3rd cycle level	4
<i>Lifelong Learning -</i>	
Refresher courses	14
Course units	119
Summer courses	4



***Undergraduate Programmes – 1st cycle***

**Information Science**  
**Communication Sciences: Journalism, Public Relations, Multimedia**  
**Mining and Geo-Environmental Engineering**

***Integrated Masters – 1st + 2nd cycle***

**Bioengineering**  
**Chemical Engineering**  
**Civil Engineering**  
**Electrical and Computers Engineering**  
**Environmental Engineering**  
**Industrial Engineering and Management**  
**Informatics and Computing Engineering**  
**Mechanical Engineering**  
**Metallurgical and Materials Engineering**

**Biomedical Engineering**  
**Information Engineering \***  
**Mining and Geo-Environmental Engineering**  
**Occupational Safety and Hygiene Engineering**  
**Production Engineering \***  
**Services Engineering and Management**  
**Communication and Sports**  
**Computational Mechanics \***  
**Industrial Design and Development \***  
**Information Science**  
**Innovation and Technological Entrepreneurship**  
**Multimedia**  
**Spatial Planning and Urban Project \***

\* program awaits A3ES accreditation

**Biomedical Engineering**  
**Chemical and Biological Engineering**  
**Civil Engineering**  
**Electrical and Computer Engineering**  
**Engineering and Public Policy \***  
**Engineering of Refining, Petrochemistry and Chemistry**  
**Environmental Engineering**  
**Industrial Engineering and Management**  
**Informatics Engineering**  
**Mechanical Engineering**

\* program awaits A3ES accreditation

**Metallurgical and Materials Engineering**  
**Mining and Geo-Resources Engineering**  
**Physics Engineering**

**Applied Mathematics**  
**Computer Science**  
**Digital Media**  
**Industrial Design and Development \***  
**Leaders for Technical Industries**  
**Occupational Safety and Health**  
**Sustainable Energy Systems**  
**Telecommunications**  
**Transport Systems**

## EDUCATION

### *Dual Degree Agreements*

***Integrated Masters – 1st + 2nd cycle***  
**Civil Engineering (ENPC ParisTech)**

***Doctoral Programmes– 3rd cycle***  
**Computer Science (CMU)**  
**Digital Media (UTAustin)**  
**Electrical and Computer Engineering (CMU)**  
**Telecommunications (CMU)**

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## EDUCATION

### *Non-degree Programmes*

***Specializations (2nd cycle)***  
**European Executive Master in Innovative Service Systems**  
**Operations Management**  
**Product Design and Development**  
**Services Engineering and Management**  
**Technological Entrepreneurship and Sustainability**  
**Technological Entrepreneurship in Occupational Safety**  
**Thermal Engineering**

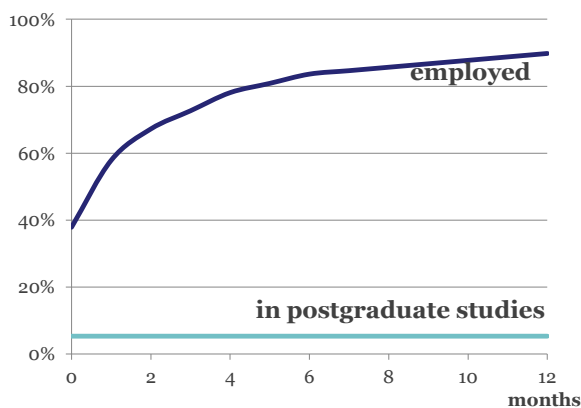
***Advanced Studies (3rd cycle)***  
**Product Design and Development**  
**Refining, Petrochemical and Chemical Engineering**  
**Sustainable Energy Systems**  
**Technology Management Enterprise**

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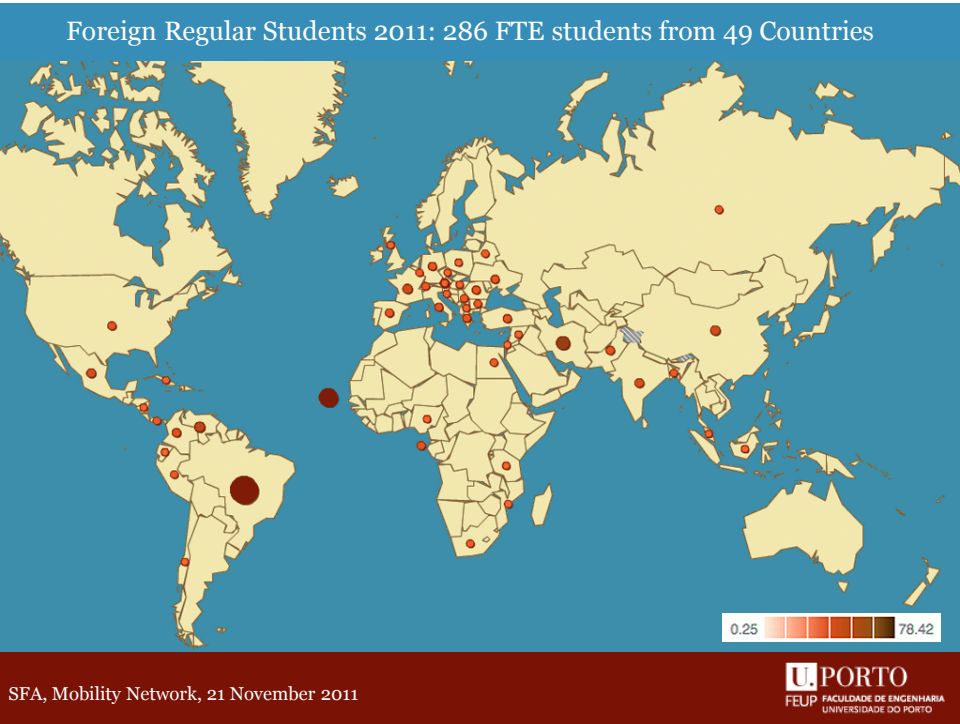
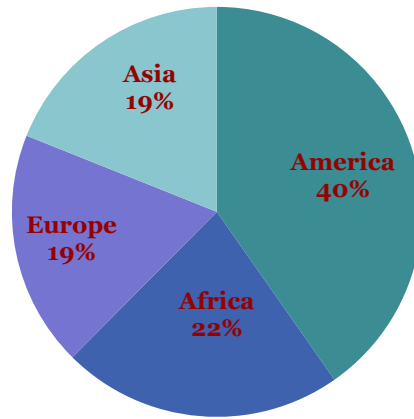
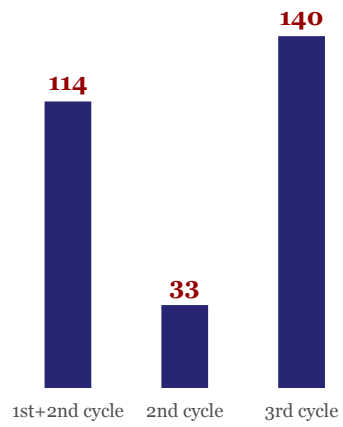
Cooperation agreements with companies (active)	93
Master dissertations undertaken in companies (2009/2010)	235 (24,0 %)
Cooperation agreements with international universities	526
Master dissertations undertaken within mobility programmes	40 (4,1 %)

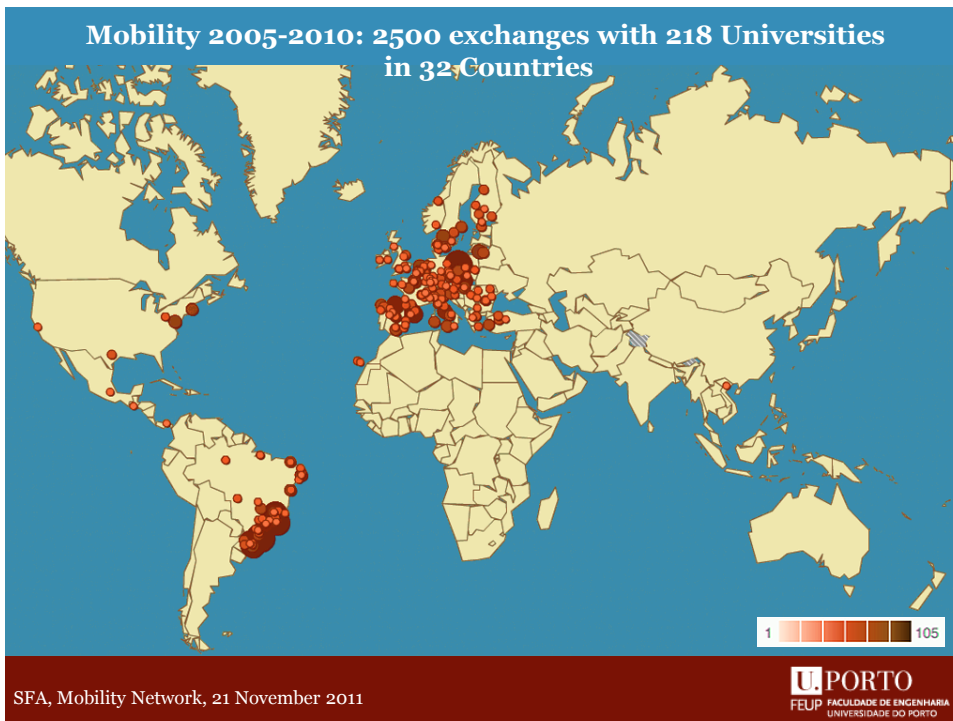
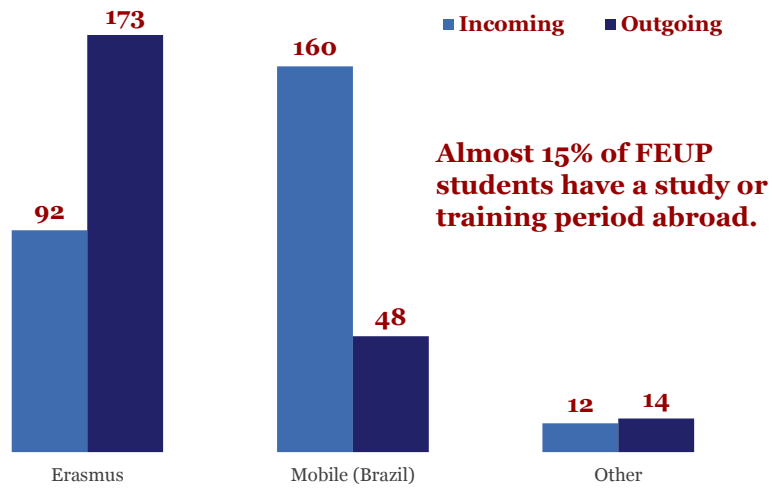


Employment survey results 2010  
(graduate students in 2008/2009)

**FEUP FirstJob fair brings each year to the campus more than 50 companies for job hunting, business presentations and chat rooms.**

**FEUP also organizes career workshops, recruitment simulations and supports entrepreneurship.**









- ☞ **Research, Development and Extension work of Faculty Staff is carried out in**
  - **9 R&D Units recognized and financed by the National Foundation for Science and Technology based in FEUP**
  - **22 other Units based in institutions other than FEUP (within U.Porto's other Faculties, within Interface Institutes or within other Universities)**
- ☞ **Interface Institutes – non-profit organizations of which U.Porto or U.Porto-FEUP are shareholders**
  - **More flexible organizations for cooperation with stakeholders in general**
  - **They also house R&D Units of the National Foundation**

***Associated Laboratory***

**Separation and Reaction Engineering / Catalysis and Materials**

***R&D units evaluated with 'Excellent'***

**Laboratory for Process, Environment and Energy Engineering  
Transport Phenomena Research Center**

***R&D units evaluated with 'Very good'***

**Centre for Wind Energy and Atmospheric Flows  
Laboratory for the Concrete Technology and Structural  
Behaviour**

***Other R&D units evaluated with 'Good'***

**Construction Studies Centre  
Geo-Environmental and Resources Research Center  
Institute for Systems and Robotics of Porto  
Research Centre for Territory, Transports and Environment**

☞ *Interface Institutes*

**Institute for Systems and Computer Engineering of Porto**  
**Mechanical Engineering and Industrial Management**  
**Institute**

**Mechanical Engineering Institute**

**Biomedical Engineering Institute**

**Construction Institute**

**Institute for Technological Research and Development**

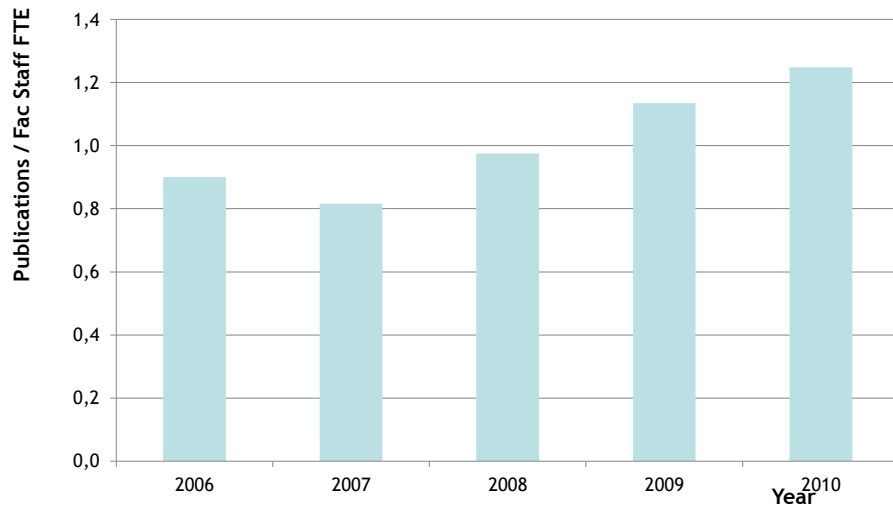
**Hydraulics and Water Resources Institute**

**Building Materials Testing Laboratory**

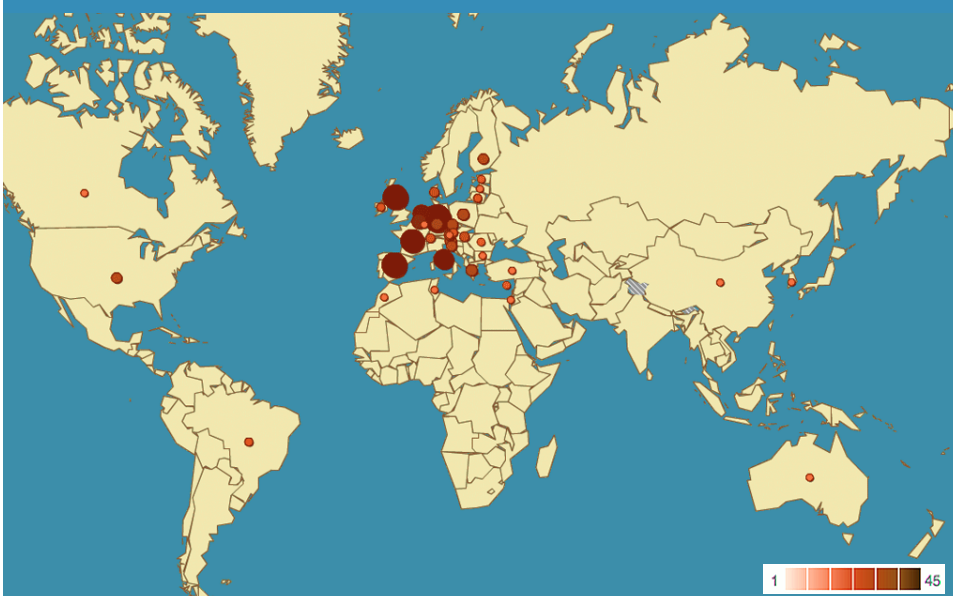
☞ **The University or the Faculty are shareholders of these institutes**

*Some indicators*  
*Publications, Contracts,*  
*patents, spin-offs, 2010*

☞ <b>Publications ISI WoS</b>	<b>489</b>
➤ <b>Publications / PhD (FTE) - 1,25</b>	
☞ <b>Contract work (active)</b>	<b>30</b>
☞ <b>Patent applications filed in 2011/Cumulative total</b>	<b>2/46</b>
☞ <b>Spin-off companies set up in 2011/Cumulative total</b>	<b>3/20</b>
☞ <b>11-13 % of the budget comes from provision of service to the economic activities</b>	



Research 2005-2010: 67 projects involving 410 Institutions in 38 Countries





☞ ***Carnegie Mellon | Portugal***

***Information and Communication Technologies Institute***

- **Security and Critical Infrastructure Protection**
- **Future Internet Services and Technologies**
- **Services and Technologies for Interactive Media**
- **Software Engineering**

☞ ***MIT | Portugal***

- **Stem Cell Engineering for Regenerative Medicine**
- **Sustainable Energy and Transportation Systems**
- **Materials and Design-Inspired Products**
- **Fundamentals of Engineering Systems**

☞ ***UT Austin | Portugal***

- ***CoLab - International Collaboratory for Emerging Technologies***
  - **PhD programme in Digital Media**
- ***UTEN-University Technology Enterprise Network - Professionalizing and Advancing S&T Commercialization in Portugal***

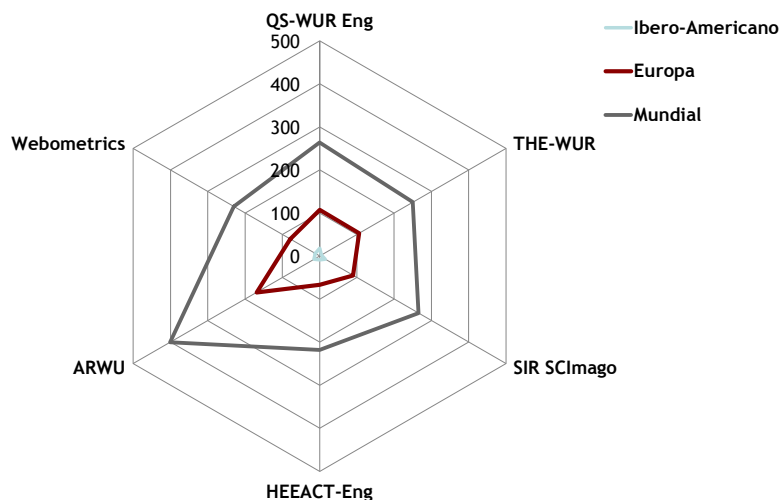
☞ ***Fraunhofer Portugal Research Center***

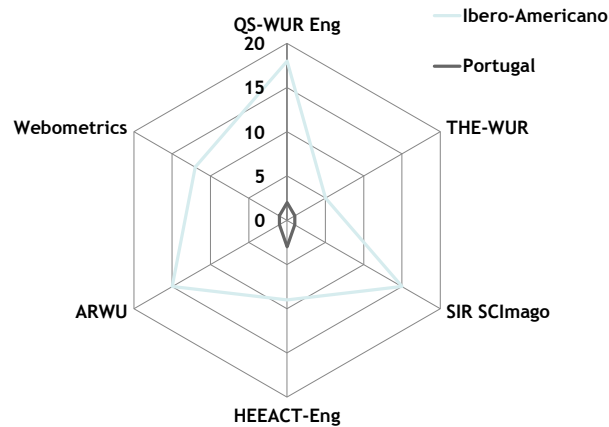
- **Assistive Information and Communication Solutions**

☞ ***IBM Portugal Center for Advanced Studies***

**Enterprise Engineering and Management**

- American Society for Engineering Education (ASEE)
- **Conference of European Schools for Advanced Engineering Education and Research (CESAER)**
- Environmental Association for Universities and Colleges (EAUC)
- European Centre for Strategic Management of Universities (ESMU)
- European Society for Engineering Education (SEFI)
- International Association for Continuing Engineering Education (IACEE)
- European Research Community on Flow, Turbulence and Combustion
- European Energy Research Alliance
- European Federation of Chemical Engineering
- Industrial Energy-related Technologies and Systems
- Institute of Nanotechnology



**Taiwan Rankings\* 2011 - Engineering areas**

	Europe	World
<b>Mechanical Engineering and related areas</b>	<b>13</b>	<b>47</b>
<b>Chemical Engineering and related areas</b>	<b>16</b>	<b>58</b>
<b>Civil Engineering and related areas</b>	<b>25</b>	<b>97</b>

\* Research Productivity(20%); Research Impact (30%); Excellence in Research (50%)

## OUTREACH

**Support 4 Internationalisation : UKTI today ...**

- 126 locations, 96 markets, 98 of global GDP
- 2.300 staff, 55% outside UK
- 24k UK firms assisted to export in 2009
- 1500 new investors brought to UK
- 67% report significant business benefits

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## OUTREACH

### *FEUP Alumni go abroad*



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## OUTREACH

## OUTSTANDING STRUCTURES AWARD - OStrA



**Segadães Tavares**  
Madeira International Airport – Funchal, Portugal  
Outstanding Structures Award 2004



**José Mota Freitas**  
The Church of the Most Holy Trinity, Fátima, Portugal  
Outstanding Structures Award 2010

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## OUTREACH

## Applied Research – some Industrial Partners



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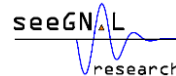
## OUTREACH

## Tech Transfer – Our spin-offs

### SPIN-OFF FEUP



Palcos da Realidade



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## OUTREACH

## Technology Transfer – real application



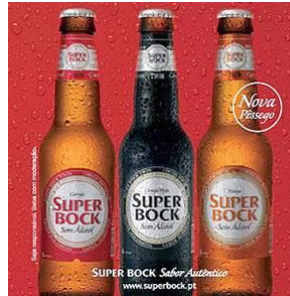
New bone graft for regenerative medicine. Bonelike it is an international patented product.

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## OUTREACH

## Technology Transfer – real application



Launched on the Portuguese market in 2007, the new Super Bock alcohol-free beer is the result of an innovative patented production process, developed in a partnership of Unicer with FEUP. This new process keeps all the original flavour of the beer with the convenience of a 0° alcohol graduation.



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## OUTREACH

## Technology Transfer – real application



Underwater remote operation vehicles.

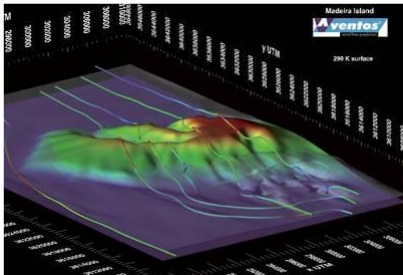


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## OUTREACH

## Technology Transfer – real application



VENTOS - Wind flow prediction software



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## OUTREACH

## Technology Transfer – real application



To support decisive agents in the search for sustainable mobility solutions.



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## OUTREACH

## Technology Transfer – real application



Inspired by the way natural structures work (Biomimicry), specifically the human muscle, **the Organic PreStressing System** is a set of cables, hydraulic jacks, sensors and other components, that are attached to self-launching gantries (large, heavy equipment used in bridge construction), performing in order to compensate the charges the metallic structure is subject to.



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## OUTREACH

## Technology Transfer – real application



Clean technologies and natural resources perfume design.

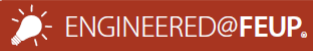


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## OUTREACH

## *Technology Transfer – real application*



Environmental and industrial fluid engineering technologies.  
RIMcop® New Technologies for Reaction Injection Moulding, NETmix® Innovative Static Mixer Technology and ROBpaint® Laboratorial Robot for Decorative Paints Testing.



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## OUTREACH

## *Technology Transfer – real application*



High purity Oxigene and Xenon production unit.



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## OUTREACH

## Technology Transfer – real application



WalkinSense is an easy to use wireless portable patented device that gathers and processes data of lower limb movements during walking, measuring both diabetic patient mobility patterns and plantar pressure.

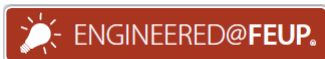


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## OUTREACH

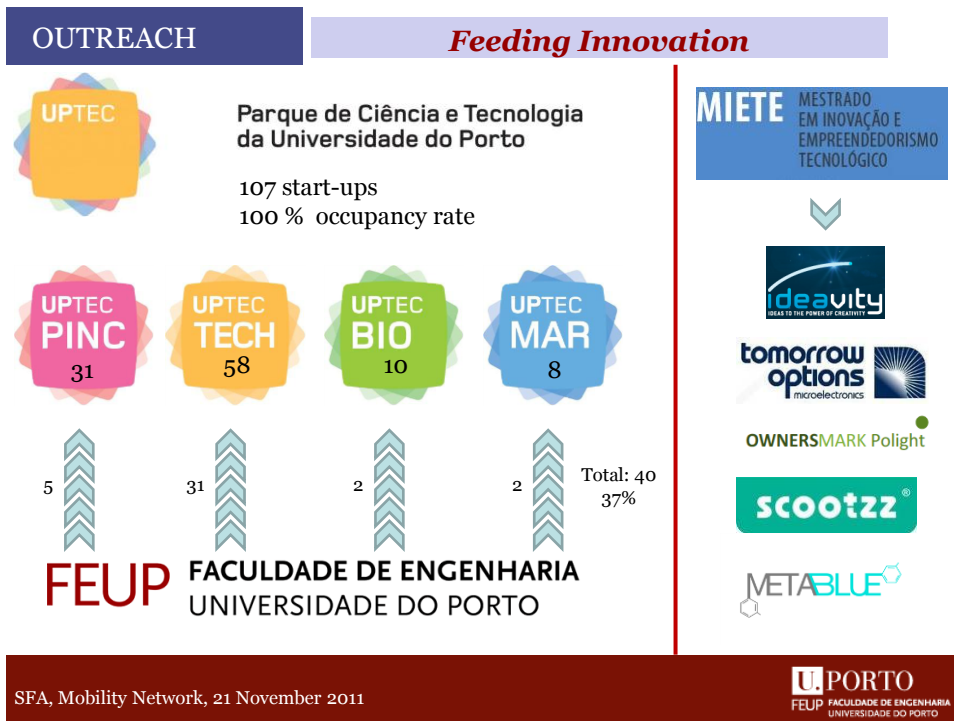
## Technology Transfer – real application



Wireless and portable skinfold caliper wireless developed at FEUP. It allows a reliable and quick way of measuring body fat. It's a patented device.

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**OUTREACH**

***Scientific and Cultural Events***


☞ **The Conference Centre provides professional services related with the production, communication and technical and logistic support of events.**

☞ **The campus has significant facilities for large and complex events**

☞ **225 Events in 2010**

- **33 Internacional Conferences**
- **50 Scientific**
- **68 Academic**
- **27 Institucional**
- **25 Cultural**
- **21 Other external**

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## OUTREACH

## *Institutional Reputation and Media Notoriety*

- ☞ The institution has recognized expertise in a wide number of engineering areas.
- ☞ FEUP attracts the best students in engineering in the country and is committed with the valorization of the knowledge that is created through university research.

### ☞ *Media notoriety in 2010*

Press releases 65 (12 for international media)

#### Media clipping

in press	935
in radio and television	142
online	899

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## TO SAY WHAT I AM GOING TO SAY...

### ① Some historical and institutional notes

- ① Portugal, Porto, The University of Porto, The Faculty of Engineering

### ② The Faculty of Engineering

- ② The Mission: Education; R&D; The third mission within the mission – Facts&Figures and some real applications

### ③ Concluding Notes – Expectations for the future

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## FEUP'S MISSION STRATEGIC PLAN FOR 2011-2015 (I)

Approved by the General Council of the University, on  
November 4, 2011

**Quality and Internationalization**  
two transversal commitments

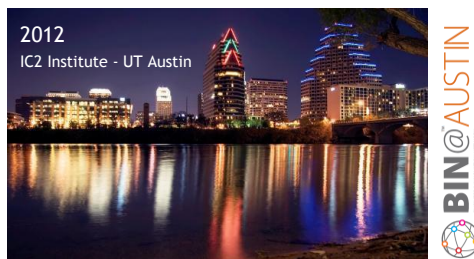
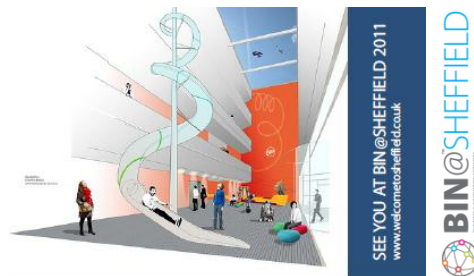
- **Education**
- **Research & Development**
- **Third Mission**
- **Human Factor**
- **Governance and Management**

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### OUTREACH

### *Expand International Partnerships*



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### THIRD MISSION – A MUST...

- ☞ **Our duty within the mission**
- ☞ **Obviously, a significant source of financial support**
- ☞ **But, attention** - a careful balance should be kept between contract work and research work
  - **Knowledge and innovation should go together or in close paths**
  - **Knowledge is the basis for innovation, without creating knowledge the potential for innovation slowly, but steadily would fade away**
- ☞ **The way for the future is tough, but clear...**
  - **Research and Innovation, International Cooperation, Mobility, Trust through quality perceived by all stakeholders**