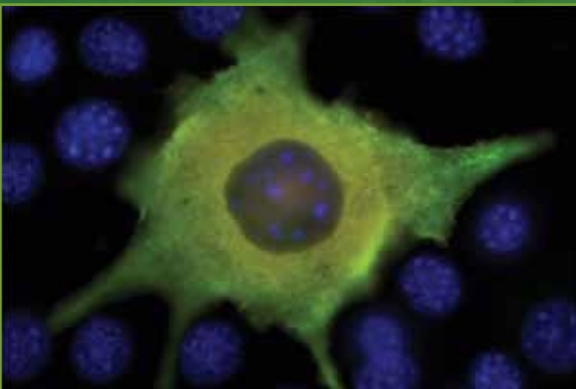


2011 REPORT

UTEN Portugal

University Technology Enterprise Network

Increasing Capacity for Portuguese Technology Transfer & Commercialization to Operate in Global Markets



João Sentieiro

President, Foundation for Science & Technology (FCT)



UTEN Network initiative has been focusing on fostering science and technology transfer and commercialization in Portugal, since 2007, through a network of institutions and with the engagement of the national and international participants. Its operations focused on professional training for network members, namely for Portuguese Universities' technology transfer offices. Many activities were organized and delivered under ambitious yearly plans: International internships, networking initiatives – workshops, training weeks, initiation brainstorming – business competitions, links with Industry and annual conferences, among others.

However, there is still much more to be done.

In the years to come, UTEN should be institutionalized within the context of Portuguese universities, with an increasing participation of network members working on the management and development of the network, and promoting activities focused on outputs.

For this purpose, it was crucial to associate the efforts of the Portuguese technology transfer and commercialization institutions and professionals in close collaboration with the Council of Rectors of the Portuguese Universities and it is a pleasure to observe their resolve in doing so.

Furthermore, the partnerships with the international institutions, which are the base of UTEN, should be continued for another five years or more, namely with The University of Texas at Austin, Carnegie Mellon University, and the Massachusetts Institute of Technology, in order to continue strengthening the interaction between members of the network, creating long lasting University/Industry links, promoting more training opportunities for technology transfer professionals and identifying business opportunities for Portuguese startups in global markets.

Portugal needs it.



António Rendas

President, Council of Rectors of the Portuguese Universities (CRUP)
Rector, New University of Lisbon (UNL)

The “University Technology Enterprise Network, UTEN” was established in 2007, among other important initiatives, as part of the collaborations with The University of Texas at Austin. This program aims the development of international technology commercialization and the professionalization of university technology managers, and comprises a network of about 40 university and research institutions throughout Portugal, encompassing all Portuguese public universities. UTEN, working together with counterparts in the US made possible the incubation of new business ventures, on-the-job training of technology transfer officers, and the development of an international business competition for technology-based startups.

The reports from the External Review Committee, together with the continuous positive feedback that several Portuguese Rectors have received from their students, faculty and stakeholders, do bring us clear evidence about the high value and impact of the UT Austin | Portugal joint venture and of its success in setting best practices in advanced training in Portugal, successfully coupled with advanced research and global technology commercialization activities in close collaboration with Industry.

In addition, UTEN shall continue to focus on the establishment of a professional, internationally competitive, and sustainable technology transfer network within Portugal. The ultimate goal relies on improving the successful knowledge transfer and technology commercialization within the national scientific and technological system, helping to transform the results of scientific research into new commercial products and maximize the social and economic benefits. UTEN shall continue stimulating and supporting the creation and strengthening of the technology transfer institutions and professionals in order to consolidate the network in a stable structure. Future strategy shall thus focus on capacity building through the learning of established and innovative technology transfer and commercialization practices and on the application of international know-how and commercialization networks.

José Mendonça

UTEN Portugal Scientific Director

President, INESC Porto, Institute for Systems & Computer Engineering of Porto



What we may call phase one of the UTEN Program has been completed with visible success and the objectives that were set four years ago have been fully attained. Meanwhile and most importantly, the context in Portugal for technology transfer and commercialization has considerably evolved during these five years.

UTEN and their stakeholders can certainly claim their part in such an important transformation, especially regarding:

- the increasing awareness of the importance of technology transfer and commercialization by universities, research centres, companies, public authorities, as well as university students in science, engineering and management;*
- the fact that more and more knowledgeable and experienced individuals are working in international technology transfer, helping to generate tangible outcomes for both researchers and entrepreneurs;*
- the emergence of a national network of technology transfer offices, sharing knowledge and experience, potentiating their international links and undertaking proactive cooperation activities of mutual interest both at national and international level.*

While the UTEN activity in Portugal is just at the outset, it is becoming increasingly important as even more demanding challenges are confronting the country. These challenges call for “the supreme effort” to transform Portugal’s internationally recognized scientific potential into social relevance and economic value through both leading companies hungry for innovation to leverage their competitiveness and also through a new breed of born-global technology-based startups.

What we now call phase two of UTEN will aim at firstly consolidating the acquired competences through more specialized in-depth international training. Secondly, the successful pilot work that has blazed a pathway to international markets for Portuguese science-based spin offs needs to be broadened and paved. Thirdly, the networking activities at European level that all UTEN members already undertake will be closely coordinated with the many links to The University of Texas at Austin, Carnegie Mellon University, Massachusetts Institute of Technology, and other partners in United States. Finally, and as a natural outcome one should expect for the network of Portuguese technology transfer offices to consolidate into a sustainable association filling an obvious and important gap in the national science, technology and innovation arena.

It becomes clear that the achievements so far are just the start of something of utmost importance and potential impact, but still in need of support and nurture. We all should remember the old saying that advises, “Do not eat the seed corn!” As wise farmers have always done, a country with a future should not eat this seed as it is fundamental for the coming year’s harvests in wealth creation through technology transfer and commercialization.



Robert Peterson

Principal Investigator, UT Austin | Portugal CoLab with UTEN
Associate Vice President for Research, The University of Texas at Austin

Five years ago the Portuguese Ministry for Science and Technology and the Portuguese Foundation for Science and Technology had the foresight and vision to create a novel collaboration—UTEN—for commercializing science and technology innovations emanating from Portuguese universities and research centers that would benefit and, indeed, change society. The goal of the collaboration was ambitious and included professionalizing university technology transfer offices, encouraging an entrepreneurial culture for university researchers, and developing sustainable networks involving academic institutions and private sector entities.

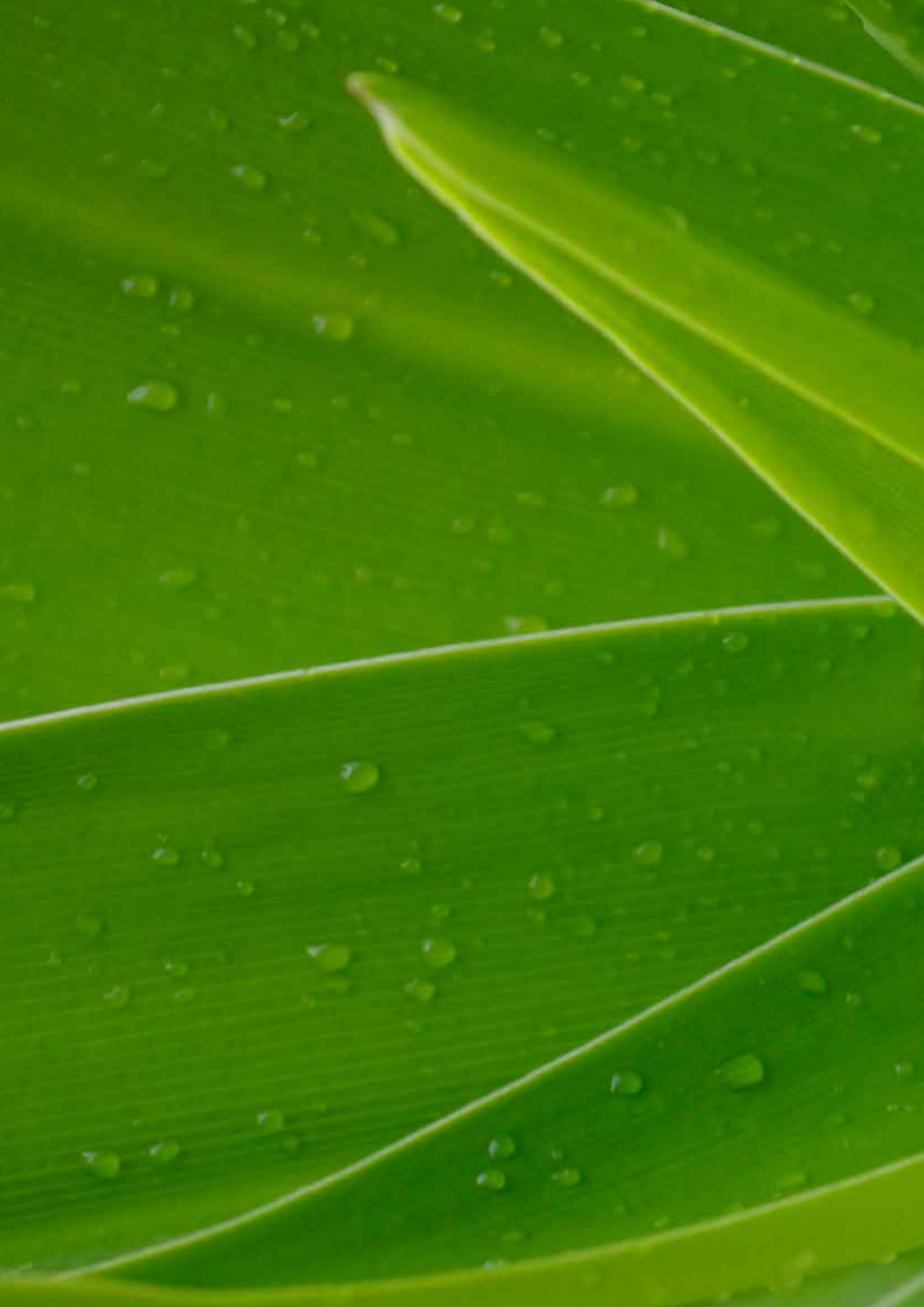
The progress that has been made over the past five years is nothing short of remarkable. The various conferences, workshops, seminars, and training and brainstorming sessions that have been held literally attracted more than one thousand individuals. The knowledge produced and disseminated by such activities and events has been profound. Indeed, the collaboration to date has been extremely successful and has far exceeded the expectations of even the most skeptical observers.

This annual report chronicles the activities and events that have taken place in the most recent year of the collaboration. While these activities and events are most impressive in and of themselves, they should also be considered as constituting the basic foundation of what the future might hold. Read the report at two levels. First, peruse the report to obtain an understanding of the scope and breadth of the activities and events that took place in year five of the collaboration. Then, read the report in detail for the insights and the learning experiences that accrued to participating individuals. The “case studies” and commentaries of the participants reveal much about both the outcomes and subtleties of the collaboration.

In the future it is necessary to institutionalize what has been accomplished by the collaboration so that the know-how and the knowledge that have been attained can be put to productive uses. The benefits of doing so are critical to the economic future of Portugal.

Increasing Capacity for Portuguese Technology Transfer & Commercialization

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1. UTEN Vision, Mission & Strategy

“The UTEN program allowed the adoption of methodologies and criteria to build efficient bridges between universities and companies and to adopt best practices in the field of technology transfer. The program has fostered the consolidation of germane expertise (spin offs, T&T, IPR, etc.) within the Portuguese universities and has also promoted the creation of networks with different American Universities and companies with strong experience in these matters. It is a very good program.”

João Guerreiro
Rector of the University of Algarve

1.1 Vision, Mission, and Strategy

In recent years, Portugal has systematically developed increased competences in technology and commercialization; increasingly Portuguese universities, associated laboratories, and research institutions value specialized technical support for technology transfer and commercialization. The University Technology Enterprise Network (UTEN) has considerably strengthened this movement, as the network engages with scientific and academic institutions throughout Portugal to emphasize technology transfer and commercialization on an international scale. UTEN efforts have been made possible by the promotion and support of The Foundation for Science and Technology (FCT), in close collaboration with the Portuguese Institute of Industrial Property (INPI), and since 2010 with the Council of Rectors of Portuguese Universities (CRUP).

UTEN was launched in March 2007, in close partnership with the IC² Institute at The University of Texas at Austin, within the scope of the International Collaboratory for Emerging Technologies (CoLab). During the past five years, UTEN has grown and evolved with customized training programs and activities while benefiting from enhanced international partnerships promoted through the FCT, including those with Carnegie Mellon University, the Massachusetts Institute of Technology, and the Fraunhofer Society.

The goal is to improve Portugal's knowledge transfer and technology commercialization toward international markets within the national scientific and technological system. Since 2007 UTEN

programs and activities have helped strengthen and consolidate an emerging network of Portuguese technology transfer offices (TTOs). Specialized training has accelerated the development of this professional network of TTOs and has enhanced the commercialization of science and technology in global markets. The goal is to improve knowledge transfer and technology commercialization within the national scientific and technological system, to help transform the scientific research results into new commercial products that realize both social and economic benefits. Objective observations and assessments of UTEN's programs and activities have uniformly shown significant progress, within a modest budget and a relatively short time frame, toward fulfilling UTEN's stated mission.

1.2 Programs and Activities

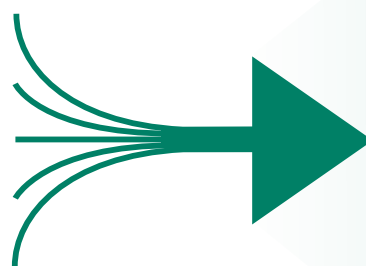
Since its inception, UTEN programs and activities have catalyzed sustainable, value-added partnerships and networks with key international partners while continually increasing its network reach within Portugal by:

- Adding new Portuguese institutional partners
- Expanding its programs to new audiences within these institutions
- Training an increasing number of TTOs.

Established, creative learning mechanisms have focused on capacity building through innovative technology transfer practices, related know-how, commercialization skills, and the development of both formal and informal international networks. UTEN programs and activities include International

UTEN continually focuses on increasing the capacity of individual participants, as well as the capacity and sustainability of the network...

- Networking building & developing programs: **Year 1**
- Establishing the framework: **Year 2**
- Building nationally: **Year 3**
- Sharpening focus: **Year 4**
- Increasing ownership & institutionalization: **Year 5**



SUSTAINABILITY
INCREASING SCOPE

UTEN



Internships, Specialized Training and Networking, Technology Commercialization, Observation and Assessment, and Institutional Building. A brief summary of these follows, while the balance of this report describes UTEN's 2011 progress against these action lines.

International Internships & On-the-Job Training

UTEN has organized FCT-sponsored international internships (both short- and medium-term) to mentor Portuguese professionals and researchers as they simultaneously work on Portuguese technology portfolios for licensing and on-shoring in international markets. Key objectives include securing successful licensing deals and "soft landing" S&T spin offs (enabling technology bundling, cross licensing, and other international partnering activities). UTEN also welcomes foreign TTOs to intern at Portuguese institutions.

UTEN initially hosted interns throughout the state of Texas and has added US internship opportunities at Carnegie Mellon University, Massachusetts Institute of Technology, Boston University, and the University of Southern California. In Europe, some interns were placed with the Fraunhofer Institute, the European Space Agency (ESA) and Cambridge Enterprise. Subprograms of the UTEN International Internship Program include:

- *Train-the-Trainer:* Prepares senior Portuguese TT managers and staff to train emerging TTO managers and staff throughout Portugal to identify and integrate best practices and training resources, develop training material and generally enlarge their capacity to train others.
- *Reverse Internships:* Placing an international technology transfer agent in a Portuguese TTO to help explore partnering opportunities across international boundaries. As a pilot

case, Rosemary French, with the Office of Technology Commercialization (OTC) at UT Austin worked at TecMinho, University of Minho for three months.

- *CoLab's Advanced Digital Media program (ADM):* UTEN helps facilitate company internships for CoLab's ADM program and also provides TT know-how for ADM FCT funded researchers).

Specialized Training and Networking

Professional networking is an important value-add of international workshops, training weeks, in-situ training, leaders roundtables, and initiation brainstorms, which are implemented in close collaboration with Portuguese universities, research centers, associated laboratories, and companies.

International workshops: While UTEN continues to offer S&T commercialization support as in previous years, in 2011 UTEN has increased company interaction and placed new focus on TT specialization in emerging technology sectors.

Training weeks emphasize case studies and industrial liaison (ILO) programs and the development of procedures to improve Portuguese university and industry research collaborations that lead to S&T commercialization and on-shoring of Portuguese S&T in international markets. Training weeks typically consist of an intense two-day workshop followed by face-to-face meetings with invited experts.

In-situation (in-situ) training: Applicant Portuguese TTOs present a specific strategic or operational need; a UTEN program manager then provides on-site training for an extended stay (usually about one week) to incorporate customized S&T transfer and commercialization training to meet the particular needs of the TTO. UTEN mentors help transfer deep know-how, tacit knowledge, and hands-on



experience across the entire office. Topics include internal TTO organization, best practices, and ILO strategies. While exercising care to protect confidentiality as needed, in-situ training results are often disseminated to other TTOs.

Leaders roundtables provide a platform for Portuguese TTOs – together with leaders of associated laboratories and incubators, rectors, and vice rectors – to address specific issues, problems, and challenges faced in accelerating technology transfer and commercialization. International experts help examine institutional development, TTO organization and procedures, and adaptation of United States university methodologies to develop ILO relationships with industry. Each roundtable has a moderator and a rapporteur, to monitor and write up the main conclusions of these high-level discussions.

*Initiation brainstorm*s increase awareness and excitement for both graduate and undergraduate students regarding technology-based entrepreneurship and the creation of new ventures. Initiated in 2011, these sessions expand the UTEN program to connect a new core university audience: graduate and undergraduate students. Promoted and organized in close cooperation with Portuguese university student unions and other student initiatives, the goal is to foster an entrepreneurial ecosystem across the university and across Portugal.

An important UTEN process is to secure survey assessments and other evaluations of UTEN

programs and activities so that the needs of Portuguese TTOs may be met with dynamic and rapid response. This is, in part, the inspiration for new programs such as the Leaders Roundtables and the Initiation Brainstorms introduced this year.

UIDP Visit to California

In April 2011, a UTEN/Portuguese delegation of Vice-Rectors, technology transfer officers, and UTEN staff participated in a University Industry Demonstration Partnership (UIDP) meeting at Pfizer World R&D Headquarters in La Jolla, California in April, 2011. UIDP is an initiative of the United States National Academy of Sciences, designed to facilitate active collaborations between universities and industry. The UTEN delegation also attended a number of exclusive meetings and events with consultants, industry representatives, United States government agencies, and universities interested in exploring international partnerships and collaborations.

Technology Commercialization: Fostering New Business Development in International Markets

ISCTE-MIT Technology Ventures Competitions: UTEN worked closely with ISCTE-MIT and other entities to develop and promote venture competitions across Portuguese universities and to foster the development of successful science- and technology-based business projects.

US Connect for International Business (Pilot Program): In close collaboration with Portuguese TTOs and other

international UTEN partners, this pilot program with the IC² Institute at The University of Texas at Austin identified university-based startups and technology ventures that possessed high capability for international business success and worked with them to establish successful business startups, alliances, and relationships in the US market.

Entrepreneurship in Residence (Pilot Program): Carnegie Mellon University is launching EIR with the UTEN program to help Portuguese companies enter the US market. EIR will include training, mentoring, and provide opportunities for collaborating with potential industry partners.

1.3 Observation and Assessment

The central focus of UTEN's observation and assessment effort is:

- continued observation of case studies as they emerge
- dissemination of successful projects and ventures collection of metrics to help assess and improve the performance of technology transfer and commercialization across Portuguese institutions.

These efforts further the larger goal of the continued professionalization of Portuguese TT managers and staff. To this end UTEN conducts:

- In-depth program evaluations of international internships, international workshops, training weeks, in-situ training, and leaders roundtables
- Annual surveys of national TTOs, performed cooperatively with Portuguese and UT Austin researchers
- Annual surveys administered to all UTEN partner institutions to help monitor the challenges and best practices of technology transfer and commercialization in Portugal
- Case study development associated with new and emerging Portuguese spin offs and university startups.

This information is disseminated through UTEN's yearly reports, annual conferences, and web page.

1.4 Institutional Building: UTEN as a Knowledge Network

To strengthen UTEN's structure, organization, and leadership, UTEN has established routines for its partner institutions (including the existing network of TTOs, the Council of Rectors (CRUP), the Portuguese Institute for Industrial Property (INPI), and the FCT to help build relations and increase collaborations across Portugal and with international partners. Special emphasis has strengthened UTEN's governance model in close collaboration with CRUP,

and the following "governance structure" has been activated:

- *General Assembly:* is co-chaired by the President of FCT and the President of CRUP, and is comprised of representatives from all UTEN Portuguese institutions. The General Assembly reviews past achievements, evaluates and approves planned activities, and discusses the network's major issues and future strategies.
- *Executive Committee:* selected network leaders who collaborate directly with the Scientific Director, in close contact with the Coordination Office at FCT, to implement UTEN's mission, strategy and planned activities outlined in the annual program.
- *Scientific Director:* chairs the Executive Committee, the Coordination Office and Secretariat, and coordinates relationships with FCT, CRUP and INPI.
- *Coordination Office and Secretariat:* manages administrative and organizational issues, as well as the Secretariat and the UTEN website (chaired by the Scientific Director).
- *International Advisory Board:* facilitates experts in technology transfer and commercialization to provide guidance for UTEN development, as well as international promotion and "branding" of technology transfer and commercialization activities in Portugal.
- *External Review Committee:* is an independent body of international experts who monitor UTEN achievements and provide an annual critical assessment.

Dissemination of UTEN Information

- The UTEN program webpage, www.utenportugal.org, provides open (and archived) access as it promotes all UTEN activities and programs.
- UTEN's Technology Database (www.techportugal.com) contains a portfolio of Portuguese university-developed technologies and companies that work with UTEN institutions. Information includes technology descriptions, features and benefits, and contact information.
- *CoLab Square* newsletter publishes monthly updates (September through July) of all activities of the UT Austin | Portugal International Collaboratory for Emerging Technologies including UTEN. The newsletter keeps members updated on events and opportunities.

UTEN continues to collect data and submit research papers for publication in leading journals and conferences. Examples include:

- "Experimenting Innovation through Science and Technology Networks: a new paradigm



for technology commercialization?,” Marco Bravo, Manuel Heitor, and Jose Mendonça, presented at the International Conference on Technology Policy and Innovation 2011.

- “Uma Ferramenta de Análise Subjectiva das Instituições que Transferem Tecnologia,” David Resende, presented at Tecnologia e Sociedade, Universidade Tecnológica Federal do Paraná. Brasil, May 2008.
- “A Tool for Subjective Analysis of Entrepreneurial R&D Institutions,” David Resende, presented at IAMOT 2008, hosted by the British University in Dubai, April

2008. “Diferentes Aspectos Da Transferencia de Tecnoloxia: construindo Unha Rede de Teansferencia de Tecnoloxia Competitiva a Nivel Global,” David V. Gibson and Darius Mahdjoubi, *Revista Galega de Economia*, Vol. 19, (2010), pp. 209-220.

- “Investing in Innovation to Enable Global Competitiveness: The Case of Portugal,” David V. Gibson and Heath Naquin, in *Technological forecasting and Social Change*, (2011), in press.
- “University Technology Transfer,” Margaret Cotrofeld, *Economic Outlook*, 2nd Quarter (2011), pp. 31-33.

UTEN Partners

UTEN programs and activities focus on establishing a professional, internationally competitive, and sustainable technology transfer network within Portugal. The objective is to improve knowledge transfer and technology commercialization within the national scientific and technological system, to help transform the scientific research results into new commercial products that realize both social and economic benefits.

The current UTEN network comprises 33 Portuguese institutional partners. UTEN stimulates and supports technology transfer institutions and professionals as they consolidate, within Portugal, a sustainable internationally-oriented S&T transfer and commercialization network. From its inception, UTEN has focused on building capacity through practicing established and innovative technology transfer and commercialization methods and applying international know-how across commercialization networks.

Summary

UTEN is an initiative to creatively, effectively, and efficiently foster science and technology transfer and commercialization across Portugal. From 2007 through 2011, this initiative has served to build a professional network that engages national and international participants, which provides a range of networking initiatives: workshops, training weeks, initiation brainstorms, that increase both capacity and opportunity for Portuguese research to be transferred to the international market.

Much has been accomplished through the specific initiatives that have been organized and delivered under ambitious yearly plans. At the same time, much remains to be done for UTEN to stabilize into a sustainable, effective network of technology transfer and commercialization institutions and professionals. In the years to come, it is imperative that UTEN be institutionalized within the context of Portuguese universities, as they increase in their role to manage and develop the network. For this purpose, it is germane to advance the collaboration between UTEN and the Council of Rectors of the Portuguese Universities.

It is also crucial to assemble, in participation with the universities, a team of full- and part-time professionals to manage UTEN activities and daily operations. Further, partnerships with the international institutions (including The University of Texas at Austin, Carnegie Mellon University, and the Massachusetts Institute of Technology) act to strengthen and institutionalize interactions across the network, increase training opportunities for technology transfer professionals, and identify global business opportunities for Portuguese start-ups.

1.5 An Evolution of UTEN Strategy: Programs, Activities & Events

Years 1 and 2 (March 2007- August 2008)

- Relationship and network building
 - » Working with the willing
 - » UTEN-sponsored awareness-building visits to Portugal and Texas
- S&T portfolio assessments at select Portuguese universities
 - » Meeting university TTOs, researchers, and entrepreneurs
- Building Portugal S&T database
 - » RapidScreens and MarketLooks
- Pilot “learning by doing” for S&T internationalization
- Building Texas UTEN Partners Network
 - » UT Austin Technology Incubator (ATI)
 - » UT Austin Office of Technology Commercialization (OTC)
 - » UT Dallas OTC
 - » Texas A&M OTC, College Station
 - » South Texas Technology Management (STTM), San Antonio
 - » Triton Ventures, Austin
 - » INCELL (biosciences), San Antonio

Year 3 (September 2008 – August 2009)

- Nine international workshops
- Two international conferences
- Twenty-three international internships
 - » Two two-week intensive workshop training programs at IC² Institute
 - » International intern hosts: *UTEN Austin (15); Fraunhofer (1); European Space Agency (1); Carnegie Mellon University (4); Boston University (1)*
- First UTEN annual report, 2008-2009
- Continued training and network building activities *Portfolio assessments at select universities; meeting university TTOs, researchers, and entrepreneurs; building Portugal’s S&T database; “learning by doing” S&T international commercialization*

Year 4 (September 2009 – August 2010)

- Six international workshops focusing on technology sectors: *Technology transfer @ Cambridge University; Experiencing Technology Transfer: Collaborating with Carnegie Mellon; Commercialization & Technology Transfer in Communication Security and Information Networking; Marine and Bioscience; Nanotechnology Research and Valorization*
- Six regional training weeks for in-depth training *Licensing and Negotiation; Capital Sourcing; Venture Creation; Technology Business Incubation; International Liaison Office Management; Patent Portfolio Strategic Management*
- International internships, second phase *UT Austin, Carnegie Mellon University, Cambridge Enterprise*

- Second UTEN national conference, Lisbon
- Pilot in-situ training: *TecMinho, University of Minho, and FCT, New University of Lisbon*
- Pilot soft-landing: University of Texas and Texas A&M incubators
- First ISCTE-IUL MIT-Portugal ventures competition
- Continued training and network building activities: *Portfolio assessments at select universities; meeting university TTOs, researchers, and entrepreneurs; building Portugal's S&T database; "learning by doing" for S&T international commercialization.*
- Second UTEN annual report
 - » First TTO survey
 - » First university technology academic spin off survey
 - » Portuguese case studies on internationalization

Year 5 (September 2010 – August 2011)

- Six international internships: *UT Austin (3); MIT (1); Carnegie Mellon University (2); University of Southern California (1)* (Note: One intern was hosted by both UT Austin and MIT.)
- One reverse internship, pilot program
- Four thematic workshops: *Development of Social Entrepreneurial Ventures, Commercialization of space Technologies, Research Collaboration & Network Building for Commercialization: Nanotechnology and Life Sciences, Technology Transfer Within Creative Industries, Arts, and Humanities.*
- Three training weeks: *Patent Portfolio Strategic*

Management; Evaluation of Intangible Assets; and From Lab to Market: Deep Analysis of Real Cases.

- Six initiation brainstorming sessions with students, Pilot Program: *Entrepreneurship Day @ AAMinho, AAUTAD, AACCoimbra, IST, FAP, Clube Enova, UNL.*
- Three leaders roundtables, pilot program: *Benchmarking Best Practices on Managing Technology Incubators, Benchmarking Best Practices in Managing an Effective TTO, and Benchmarking Best Practices in International S&T Commercialization.*
- Third UTEN national conference
- Second ISCTE-IUL MIT-Portugal ventures competition
- *US Connect for International Business Development*, pilot program developed with The University of Texas at Austin
- *Entrepreneur in Residence*, pilot program developed with Carnegie Mellon University
- Observation and Assessment
 - » Third UTEN Annual Report
 - » Second TTO Survey
 - » Second University Technology Academic Spin off Survey
 - » Technology Transfer Offices in Universities: Emerging Challenges
- UTEN institution building: *Formation of UTEN General Assembly, Scientific Director and Executive Committee; Coordination Office and Secretariat; International Advisory Board; and continuation of External Review Committee*





2. International Internship Program

“UTEN has been extremely important for INOVISA. First, because it provided a source of formal knowledge on technology transfer and technology-based entrepreneurship through the internships in the United States (Isabel Veiga had a wonderful experience in Austin), as well as the many workshops organized with experts with a longer and richer experience than ours. It would never have been possible to prepare the people that currently work at INOVISA so well and so fast without this help; second, because UTEN promoted the building of a strong network of professionals that work in these areas, both at the national and international levels. This has allowed us to grow and develop our competences and activities with a solid base of partners.”

Luis Mira
President of INOVISA
Vice President of ISA
Technical University of Lisbon

2.1 UTEN International Internships

The overall impact of the UTEN International Internship program cannot be overstated, as it has provided deep and personalized indoctrination in technology transfer methods to key TTO personnel across Portugal.

UTEN has continued to push the envelope of international exchange, training, and institutional partnering for the intern program by providing personalized training for outstanding candidates selected to fulfill the goals/mission of the UTEN program relative to Year 5, including:

- Active engagement of potential US partners (both commercial and academic)
- On-going training and mentorship activities with host organizations
- Networking and relationship-building with key members from business, research, and academic communities
- Market-making activities for select Portuguese technologies.

In 2011, FCT funded fewer UTEN interns, but for longer stays; also, the International Intern program was enlarged in scope to pilot a reverse internship, in which a US-based expert from the Office of Technology Commercialization at The University of Texas at Austin interned at TecMinho at the University of Minho for three months.

Year 5 Interns

As in years past, each internship experience was customized to meet specific academic, research, and business objectives to advance on-the-job training in S&T commercialization including the on-shoring of Portuguese technology ventures. Year 5 Interns (table 2.1) were:

- *Miguel Carvalho, Founder of WeAdapt and Professor of Textile Engineering at U.Minho*, hosted by IC² Institute at The University of Texas at

- Austin, and the Massachusetts Institute of Technology
- *André Fernandes, industry liaison at UPIN*, hosted by the Office of Intellectual Property and Industry Sponsored Research (OIT-ISR) at the University of Southern California
- *Diamantino Lopes with INESC Porto*, hosted by Carnegie Mellon University
- *Luís Rodrigues, Project Manager for Entrepreneurship at CRIA, U.Algarve*, hosted by IC² Institute and the Austin Technology Incubator at The University of Texas at Austin
- *João Simões, Technology Transfer and Innovation Manager at U.Coimbra*, was hosted by Carnegie Mellon University
- *Pedro Torres, Premio ZON Prize Winner and founder of social media company FYI, Lda with offices in Technology and Science Park, U.Porto*, hosted by IC² Institute at The University of Texas at Austin.
- *Rosemary French, technology transfer associate at the Office of Technology Commercialization at The University of Texas at Austin*, hosted by TecMinho at the University of Minho, as a reverse internship.

As part of the strategy and focus of UTEN Year 5 International Internships, each intern initially spent one to two weeks at their prospective host organization to plan their follow-on three- to six-month stay. After their phase one visit, interns submitted a detailed report including a listing of contacts made, meetings attended, and potential individuals and institutions for follow-up. These contacts included potential investors, customers, or partners for collaborating in distribution, product development, and research as well as models of success for case study and program development. A key objective of the International Internship program is to foster potential collaborative partnerships in order to facilitate the long term exchange of ideas, technologies and commercialization opportunities.

Table 2.1 International Internships & Host Institutions, 2011

University of Algarve (CRIA)
Luís Rodrigues, IC ² Institute, The University of Texas at Austin
University of Coimbra (DITS)
João Simões, Carnegie Mellon University
University of Minho (TecMinho)
Miguel Carvalho, IC ² Institute, The University of Texas at Austin; and the Massachusetts Institute of Technology
University of Porto
Pedro Torres (UT Austin Portugal CoLab ZON Award), IC ² Institute, The University of Texas at Austin
Diamantino Lopes, Carnegie Mellon University
André Fernandes, University of Southern California
The University of Texas at Austin (Reverse Internship Pilot Program)
Rosemary French, University of Minho



2.2 Internship Reports

Miguel Carvalho, founder of WeAdapt, Professor of Textile Engineering, U.Minho

May 3 - 17; June 1 - Nov 30, 2011, 2011

IC² Institute, The University of Texas at Austin: Heath Naquin
Massachusetts Institute of Technology: Jose Estabil

During his internship, Miguel Carvalho focused on engaging potential partners to develop and grow the company he founded, WeAdapt, and to explore the possibility of entering the US market. His internship was spent at the IC² Institute at The University of Texas at Austin and the Massachusetts Institute of Technology. At each location he established partnerships with academic, research and commercial sectors. Miguel attracted interest from potential investors, customers and partners to further develop products, concepts and business plan to better position WeAdapt to succeed in the US and globally.

IC² Institute, The University of Texas at Austin

The IC² Institute provided support to Miguel's internship to:

- Build value-added network interactions
- Define strategy
- Improve presentations
- Identify and evaluate possibilities for partnerships
- Consider alternatives to implement partnerships
- Initiate an intensive agenda to understand the

market needs and match them with WeAdapt technologies

- Present his first pitch to a venture capital firm.

Important learning also included discussions with fellow IC² Institute interns from Portugal:

Pedro Torres Assunção, UT Austin | Portugal CoLab ZON

Intern: Pedro's social media technology from U.Porto improved WeAdapt's website by including social networking in its marketing activities.

Luis Rodrigues, CRIA, U. Algarve: Luis shared relevant US contacts and helped Miguel explore potential partnerships with researchers from the University of Algarve.

Important contacts were also made with:

- *Dr. Cowperthwaite*, Director of Research at St. David's Neuro Texas Institute
- *Dr. Thomas Caven*, VP Medical Affairs, Seton Family of Hospitals
- *Dr. Elena Arizmendez*, Executive Medical Director, HealthSouth Rehabilitation Hospital
- *Ursula Copulos*, Physical Therapist, Copulos & Associates Physical Therapy, Inc.
- *Chaula Rana*, The Rehabilitation Group of the Christus Santa Rosa Hospital, San Antonio
- *Dr. Bugao Xu* and *Ockhee Bego*, Professor and Lecturer with UT Austin School of Human Ecology, Textiles & Apparel
- *Eric Alvarez Ortegon*, Entrepreneur, Monterrey, Mexico.

Harvard/MIT

During the time spent at MIT and Harvard, under the guidance of Jose Estabil from MIT Portugal Program, Miguel continued to build valuable connections to meet the objectives of his internship. Event participation was an important part of Miguel's internship, to help create new, targeted networking opportunities. For example, he attended a one week workshop on entrepreneurship that included:

- Entrepreneurial strategy coaching
- Intellectual property for IT/device startups
- Growing the right team.

Miguel was a speaker and presented a poster at the *IdeaStream* conference which was attended by top-name venture capitalists, successful entrepreneurs and MIT researchers. Through these events, Miguel established contacts including *Dr. Elazer Edelman* (Professor and researcher from the Harvard-MIT Division of Health Sciences and Technology and surgeon at the Brigham and Women's Hospital Boston). Two new WeAdapt R&D projects are being prepared with Dr. Edelman that will involve University of Minho and other Portuguese institutions. Dr. Edelman is also helping WeAdapt facilitate learning and access across the entire process of incorporating: US including lawyer selection, positioning, creating the business model, defining and selecting a business development team, and pitching for funding.

Miguel was invited to be a Visiting Professor at the Harvard-MIT Division of Health Sciences and Technology, which will allow access to MIT facilities, resources, information, and networking opportunities. Miguel also participated in a workshop at the Institute for Human Centered Design and an exhibition at *Products and Technology that Change People's Lives*. Miguel presented models for WeAdapt's Everyday Functional Clothing including Kristen McCosh, (Ms. Wheelchair America 2008), Michaela Arroyo (Massachusetts Rehabilitation Commission) and Christopher Hart (Director of Urban and Transit Projects at The Institute for Human Centered Design), who acted as ambassadors for WeAdapt products. Overall this event resulted in rich networking opportunities including:

- Feedback from caregivers, exhibitors, researchers, therapists, special needs experts, and end users.
- A new partnership was identified with a researcher from the University of Rhode Island whose expertise is design for seniors.

Other important US meetings for Miguel include:

- *Clothing brand companies*: Miguel approached Patagonia, Abercrombie & Fitch, Bonobos, and The Cartesian Brand to explore possible partnership in merging these fashion styles with WeAdapt technologies. Direct contact with Paulo Cunha Alves (Consul General of Portugal in Boston) and with ICEP in New

York also generated valuable information to approach US designers, brands, and retailers.

- *Lawyers specialized in startup ventures* provided insight in IP, taxes and funding.
- Miguel attended *Start Smart: An Eight Week Hands-on Workshop* at MIT Enterprise Forum Cambridge, which placed him in extended contact with a series of experts in early stage ventures. The workshop closed with Mock Investor Presentation Sessions.

In Summary

During his internship Miguel launched three R&D projects with partners that include the University of Minho, The University of Texas at Austin, Massachusetts Institute of Technology (MIT), Harvard, and the University of Rhode Island. These collaborations led to a publication in the proceedings of the *14th Annual European Pressure Ulcers Meeting*.

WeAdapt's potential for internationalization has been greatly enhanced through the addition of new US partners to the company's founding team, including researchers from MIT and Harvard, and a surgeon with Brigham Womens Hospital in Boston in addition to his contacts at The University of Texas at Austin and Austin-based hospitals. Miguel stressed that these important connections have continually benefitted from support from TecMinho (particularly Marta Catarino, Pedro Silva, Marco Sousa, Teresa Martins, and Clara Silva) and UTEN mentors Heath Naquin and Jose Estabil. He noted:

"I am very confident that the main objective of this internship will be accomplished and that in the end a valuable network will exist which will be extremely useful to the commercialization of technologies developed in Portuguese universities, in particular for WeAdapt and the existing ready-to-market functional clothing for people with special needs and for the aesthetic prosthetics and medical devices technologies from University of Minho."

André Fernandes, Industry Liaison, UPIN, U.Porto

July 1 - September 30, 2011

USC Office of IP & Industry Sponsored Research: Rick Friedman

With the successful application for a UTEN international internship, the next step was to find a host institution with similar challenges as the University of Porto. André chose the University of Southern California (USC) working with Rick Friedman, who is Senior Director of Technology Advancement and Licensing for the Stevens Institute of Innovation.¹

¹ Rick Friedman began working with UTEN when he was Associate Director of Licensing at UT Austin's OTC; he taught several UTEN workshops both in Austin and Portugal. In 2010 Rick moved his affiliation to USC. This illustrates the organic growth that can occur across the UTEN network: when people shift to new locations and organizations, the network is enlarged, rather than diminished.



Proposed Training Program: “UPIN on the road” targeted the development of skills, practical experience, and methodologies in ILO activities. The objective was to learn about the strategy, organization, and tools implemented by USC in order to attract and to engage long term UPIN partnerships with industry. Special attention was given to USC policies and processes, industry sponsored research cases, and negotiation, as well as to USC marketing and communication initiatives. André also explored affiliate programs at the University of California and the UC Discovery Program.

The “UPIN on the road” project covered the following topics: technology transfer strategies; technology assessment and prior art searching techniques; technology marketing; technology valuation; technology scaling and proof-of-concept issues (i.e., funding opportunities and development road maps); licensing negotiation; and revenue monitoring.

Another important objective of this internship was to analyze the market potential of a number of U.Porto technologies. The plan was to search for local potential licensee companies and/or investors and to present selected U.Porto’s technologies already protected internationally or in process of evaluation for international extension.

André was strongly impressed with the Los Angeles innovation ecosystem flowing from its universities, and particularly the University of Southern California (USC). In 2010, USC saw 52 patents issued and 8 startup companies using USC-based technologies. On average, they close 25 licensing

agreements per year. USC’s size is comparable to the University of Porto in terms of faculty, students and infrastructure, but last year USC received 16 times the amount of R&D funding (largely from public sources). The innovation value chain is fueled by researchers (seniors included) who engage in technology transfer and entrepreneurship programs. R&D results are protected and marketed by USC Stevens Institute of Innovation (SII), making a strong investment in technology transfer to benefit both society and the economy. SII constitutes a group of several teams that focus on specialization as they promote entrepreneurship, technology licensing, patents and compliance, finance and operations, institutional marketing and communications. André worked with the technology licensing team to work with technology marketing, technology license pricing, and negotiating deals with companies. He looks forward to actively utilizing this new skillset in Portugal to promote U.Porto technologies.

Luis Rodrigues, Project Manager for Entrepreneurship at CRIA, U.Algarve

April 13 - 29; July 1 - September 28, 2011

IC² Institute & ATI, The University of Texas at Austin: Aruni Gunasegaram; Heath Naquin; David Gibson

Luis’s work at UALG involves three main areas: entrepreneurship, technology transfer, and business incubation. As he stated, “This international internship to UT Austin represents a great opportunity to become involved in Austin’s rich and vibrant entrepreneurial ecosystem. My expectations were high and I was looking forward to learning more about models for entrepreneurial development and support (seed and startup stage) at UT Austin, and specifically IC² Institute’s Austin Technology Incubator’s programs on campus.”

Luis designed his internship objectives to complement current efforts underway at the U Algarve in the areas of technology commercialization, business incubation, entrepreneurial training, and educational programs. As a result, during his internship Luis met and worked closely with program managers, administrators and program participants to exchange ideas and learn new techniques and approaches, specifically the Creative Industries in Austin, Marine Science with Texas A&M Corpus Christi, and UT Marine Science at Port Aransas.

As a core component of his internship, Luis worked closely with UTEN, IC² Institute, and Austin Technology Incubator (ATI) staff members to identify potential opportunities for ATI member companies to enter the EU through Portugal and for Portuguese companies interested in entering the US market through Texas. As part of this process, he interviewed, analyzed and made recommendations for select companies. This activity proved to be a productive learning experience for Luis as well as a model for on-going areas of collaboration.



Luis conducted extensive interviews with ATI staff to develop deep understanding of ATI's organizational model and its activities on campus in the greater Austin region. ATI has created a suite of programs to foster entrepreneurship at UT and to support development of companies that (while based on UT intellectual property and founded by students or faculty) commercialize a technology-based product or service that is not owned by UT. The basic vision of ATI is to find and help launch the next Dell, Google, Facebook, or Microsoft (all high growth companies that were launched by college students).

Luis was particularly interested in the active role of ATI's Assistant Director leading the university's 3 Day Startup event, Student Entrepreneur Acceleration and Launch (SEAL) program, Dorm Room Wet Lab, and supporting "hatchery" classes as well as acting as a bridge to Austin for the other key UT entrepreneurship programs and organizations, and providing mentorship to entrepreneurial students. ATI's Assistant Director also works directly with the startup companies that are members in ATI's IT, Wireless, Clean Energy, and Bioscience incubators.

The *Student Entrepreneur Acceleration and Launch (SEAL) Program* is an important part of ATI's portfolio of activities on campus. The SEAL program provides a two month accelerator for select UT Austin student-led startups, to focus on the decision of when to *go all in* with a new business venture. ATI directors and advisors deliver coaching and mentoring for students to address structured problem solving with clear deliverables and enforced timelines. Student teams

break down business issues into specific analyses, and perform primary research. ATI also introduces students to relevant industry and technology contacts who help vet students conclusions and, with the members of the ATI team, make recommendations for next steps and long range plans.

3 Day Startup (3DS) helps students go through the steps to start a technology company in an intense three day program. Students from a variety of academic disciplines (i.e. MBAs, computer science, design, engineering, neuroscience, law, etc.) are given guidance through the early stages of the startup experience. Over one intense weekend, 3DS participants brainstorm ideas, conduct market validation, devise business models, build prototypes, create branding, and pitch to investors and successful entrepreneurs. The result is an experience that challenges participants to innovate, build, and launch real companies.

During his internship, Luis observed that business angels seek three strengths in order to validate an investment: market, team, and technology. Questions that he found relevant include: *How close is the technology to the market? At what stage is the prototype and the proof of concept? Are there other legal aspects involved? When will I recover my investment?* Luis also noted that, while some investors prefer a strong team over a well-defined market opportunity, others prioritize market over team. Luis counts his experience as most useful for helping early stage startups prepare to meet with angel investors or venture capitalists.

EU Market Research: Exploring ways to effectively partner ATI companies with Portuguese companies

From the beginning of Luis's internship, ATI company OpenAlgae was open to EU collaboration. Luis met with Hoyt Tomas, President, and Pete Kipp, VP, and provided an attractiveness analysis of several EU markets (Portugal, Spain, France and Italy) across several industry entry possibilities: climate, technology development, incentives and carbon tax. But the most attractive opportunity for OpenAlgae in the European market may be in the Algarve itself. While OpenAlgae is a clean-tech company that develops IP protected solutions for oil recovery, one of the companies in Luis's Algarve portfolio is AlgaFuel, which develops, delivers, and operates bioengineering projects for the industrial production of microalgae.

Collaboration with Marine Sciences Texas A&M Corpus Christi and UT Marine Science Institute (Port Aransas)

Marine Science is an important research area of the University of Algarve (UALG) as reflected in the recently created Mar Algarve (Sea Platform) that brings together five companies, and three municipalities (Faro, Olhão, and Portimão) with the university to increase knowledge and boost the regional marine economy. In September, Luis visited the Texas Gulf Region and met with:

- Frank Pezold, *Dean College of Science & Technology*
- Lea-Der Chen, *Associate Dean of Texas A&M University, Corpus Christi (TAMUCC)*
- Lee Fuiman, *Director, UT Marine Sciences Institute*
- Joan Holt, *Associate Director, Fisheries & Mariculture, UT Marine Sciences Institute (UTMSI) at Port Aransas.*

In Summer 2010 both Frank Pezold and Joan Holt participated in the UTEN Workshop, *Research Collaboration & Network Building for Commercialization: Marine and Bio-Sciences* held at the University of Algarve. Luis targeted a variety of initiatives for further discussion with both UT Austin and Texas A&M including: visiting scholar/internship programs; research projects and curriculum development; knowledge sharing; education and training in S&T transfer, commercialization, and entrepreneurship.

As an example of the benefits of such meetings, this year's winner in the UALG Business Idea Competition (February 2011) was Caviar Portugal which farms four species of Caspian sturgeon in closed recirculation aquaculture systems with the purpose of producing meat, caviar, and value-added products for national and international markets. Dr. Joan Holt (UT MSI), initiated network contacts between Caviar Portugal founders and the Mote Marine Laboratory in Florida which has produced caviar since 2006 and has developed a successful sturgeon commercial demonstration program.

Luis classifies his overall international internship experience as being very rich and positive, with the following results:

- Promoted Algarve-based technology and ventures to the US business community under the mentorship of UTEN Austin Staff
 - » Initiated due diligence, established dialogue for potential collaboration between OpenAlgae and AlgaFuel
 - » Attended valuable training, educational, entrepreneurial events with the effect of increasing contact network, including other Portuguese CoLab and UTEN interns he met at The University of Texas at Austin
- Increased knowledge of:
 - » International UTEN partners in the Texas region
 - » ATI support services for entrepreneurs in exploring European focused markets, partnerships, and funding opportunities
 - » Efforts to add value to companies, i.e. market research
- Increased awareness of new models for entrepreneurial development and support
 - » Learning about the ATI model and processes
 - » University-managed angel funds
- Developed links between Algarve region with
 - » The City of Austin's Creative Industries program and affiliates
 - » The University of Texas Marine Science Institute at Port Aransas, TX
 - » Texas A&M University's Marine Science Center at Corpus Christi.

While Luis perceives the differences as enormous, between Austin, Texas, and the Algarve region of Portugal, in regards to entrepreneurial culture and knowledge creation – he feels he returned to Portugal highly motivated and better equipped to carry out the duties and tasks to help Portugal face its demanding challenges. For example, Luis's internship has helped him formulate a plan for two new programs in the Algarve:

- Developing a Seed Incubator with support services on Gambelas Campus UALG
 - » Opportunity window: Funding available from National Programs (Algarve 21 Operational Program) through 2013/2014
 - » Increasing demand for space and specialized support services by UALG researchers, PhD and Master students, and entrepreneurs
- Focus, Advance, Strategy & Test (FAST) advanced training and coaching program
 - » A 6- to 8-week summer accelerator program to target entrepreneurial teams (including researchers and faculty) who have a technology or a mature business idea

Luis is confident that his enlarged Texas contact network will help leverage development of a richer entrepreneurial ecosystem at the University of Algarve, and that the UTEN program will continue to propel Portugal toward an economy based on knowledge and innovation.

João Simões, Technology Transfer & Innovation (DITS) Manager, U.Coimbra

May 28 - June 5; June - September 18, 2011
Carnegie Mellon University: Tara Branstad

Since 2003, the University of Coimbra has been developing a strategy towards knowledge and technology assessment and commercialization through the establishment of the Innovation and Knowledge Transfer Unit (DITS) at the technology transfer office at University of Coimbra. Over the past years since its creation, DITS has become evermore important to enrich this structure with skilled personal, trained in matters of technology evaluation, IP protection and valorization through licensing or every other way for the commercialization of in-house technology.

João's internship the objective was to acquire training in professional technology transfer skills, with the main objective of leveraging current capabilities and enhancing the potential for the establishment of successful commercialization. Since the US market is one of DITS's main targets for the commercialization of technology, one of João's goals was to gather strategic insights on technology business activities in the US and to begin building a structured network. João crosschecked DITS procedures, tools, and techniques, and learned some new ones in order to significantly improve DITS market assessment skills and business intelligence towards licensing.

It is also DITS's objective to understand and to learn how to conceive and/or to promote access to funds for the valorization of the technology in seed stages, increasing the real value of the technology that is being marketed. For this on-the-job training, João referenced technologies developed at the University of Coimbra for assessment using the methodology adopted by CTTEC at CMU.

Pedro Torres, Premio ZON Prize Winner and founder of social media company FYI Lda, U.Porto

January - June 2011
IC² Institute, The University of Texas at Austin: David Gibson

Pedro Torres founded and manages the social media company, FYI Lda. Pedro was somewhat different among UTEN interns, inasmuch as his internship was awarded through a ZON prize with the Advanced Digital Media program of the UT Austin|Portugal CoLab. Pedro was hosted at the IC² Institute at The University of Texas at Austin, January to June 2011, primarily to strengthen his company's international competitiveness and market position.

Unlike most UTEN international interns, Pedro had not previously benefitted from attending UTEN training events. Therefore IC² staff provided increased one-on-one training for technology transfer, commercialization, and US market assessment. His internship helped him realign his approach for the internationalization of his

company for increased results. He actively engaged with Austin's ICT startup community especially with representatives of Austin's digital media, advertising, and web development companies. Overall, during his internship, Pedro:

- Strengthened FYI's market position
 - » Networked with and learned from social media talent in Austin
 - » Improved FYI's business model for international competitiveness
 - » Attended professional and business meetings such as SXSW (www.sxsw.com)
- US market assessment
 - » Networked with Austin's IT community
 - » Explored possible partnerships and soft-landing opportunities
 - » Refined FYI's international business plan
- Explored the feasibility of pursuing a PhD in digital media and technology transfer and commercialization.

Pedro feels he achieved his first goal through the help and mentorship of David Gibson, who brought insight to Pedro's Mash Me project, and how FYI could best advance in the current economical situation in Portugal. Heath Naquin and Eli Mercer helped him bridge his theoretical perspective to a practical market overview. Rosemary French and Gregory Pogue helped address the challenges Pedro would face on his return to Portugal. He feels these relationships provided rich value in the internship process.

Although Pedro had hoped for greater market success, his exposure to the US market helped him address some specific challenges and adjust the company's approach for the Mash Me program. This change of approach included selling 50% of the product to a Portuguese investor to increase the resources to accomplish the goals for this product.

Pedro found the entrepreneurial ecosystem in Austin rich. During his internship he was interviewed by the Austin Business Journal, and he pursued many networking opportunities including working with an MS student group from Monterrey, Mexico. The six-month internship seemed short to Pedro, and he strongly felt that an extended stay would have enabled him to take his products and company to an even higher level.

The personal focus of technology transfer staff was highly valuable, and something he misses now. He met with professors at UT in various disciplines of research – some very close to the work he is pursuing. Having accomplished good deal with the Mash Me project during his internship, Pedro hopes to propel his product forward with new results now that he is back in Portugal, while he pursues his Austin contacts for new projects in which he might add value.



Diamantino Lopes, INESC, Porto

May 28 - June 5; October 18 - December 24, 2011
 Carnegie Mellon University: Tara Branstad and Curt Stone

During his Phase One visit, Diamantino initiated:

- Preliminary contact visits to develop networking aiming to identify potential partnerships
- A detailed work plan for phase 2
- A preliminary report for each of the chosen technology transfer and commercialization projects.

Objectives of Diamantino’s internship are to:

- Internalize knowledge and to expand the scope of entrepreneurial activity in medical devices
- Study methodologies, techniques and tools for technology transfer and compare them with the ones applied in Portugal, specifically at INESC Porto
- Promote national technologies, in particular INESC Porto’s, aiming for their licensing in the US market
- Identify complementary technologies, between INESC Porto and CMU, in order to establish technological partnerships
- Establish and encourage a long term cooperative relationship between INESC Porto and CMU for research projects
- Assess available technologies at CMU and evaluate their adequacy to Portuguese Technological Startups
- Create critical networking to maintain a technology transfer and joint ventures pipeline between INESC Porto and CMU.

2.3 Pilot program: Reverse Internship

Rosemary French, Technology Transfer Officer, Office of Technology Commercialization, UT Austin

March 1 - May 15, 2011
 TecMinho, U.Minho

Rosemary French participated in a three-month “Reverse Internship” pilot program at TecMinho, the TTO for the University of Minho in Guimarães, Portugal. There were three main objectives for Rosemary’s internship: to observe and recommend practices that might increase the success of TecMinho’s office, to promote Portugal technologies in the international market, and to strengthen the cooperation between U.Minho and The University of Texas at Austin.

During her internship in Portugal, Rosemary attended several UTEN events including the *Initiation Brainstorm* held at UMinho’s campus in Braga, the *Leaders Roundtable #1: Specialized Workshops in International Technology Transfer* in Coimbra, and the *Leaders Roundtable #2: Benchmarking of best practices on running an effective technology transfer office* in Porto.

Rosemary noticed a common theme in these discussions: the realization that the greatest value of a Portuguese TTO to the university may not be its licensing capacity but rather its impact on the ability to serve as an interface between research and industry. In order for a TTO to become core to the mission of the university (rather than marginal), its work needs to show a lasting impact on research and basic funding. At the same time, in order to have a solid foundation, the technology transfer office needs to be good at licensing, protecting intellectual property, increasing the number of disclosures submitted by inventors, and encouraging entrepreneurship among faculty and students.

However, above and beyond these expectations, the TTO *must actively engage in strategic partnering efforts* in order for commercialization projects to have a lasting impact on the benefit of university-based research and the community.

For example, in Rosemary's experience at UT Austin's OTC, the overall focus of the office was on licensing, because the number of licenses signed per year has traditionally been its major benchmark. However, the general outcome of university-based licenses, in terms of revenue and the survival rate of startup companies, has historically been very low for institutions across the globe. As Bart Bohn, Assistant Director at ATI, pointed out in his roundtable presentation, only about 1% of licenses generate more than \$1 million dollars total. Therefore, in order to enhance the market viability of the technology and thus its value to potential investors, the focus of a TTO should shift to the generation of meaningful partnerships and funding options for technology projects, over obtaining a high number of licenses. This shift would help develop a more robust technology, and in turn increase its potential economic and societal value.

Rosemary also observed several tactics employed by the TTO at Texas A&M University which have potential benefit for Portuguese TTOs. For example, in addition to their traditional benchmarks, Texas A&M's annual reports include a detailed qualitative analysis to examine the impact of the TTO on the university. This qualitative analysis includes:

- The amount of technology funding captured by the TTO
- New strategic partnerships generated, including outcomes
- Novel ways that the TTO has participated in changing the university culture, outreaching to students and faculty to outline the commercialization process and encourage entrepreneurship.

Rosemary's three years of experience in technology transfer at the OTC at UT Austin served as an appropriate springboard for her work at TecMinho, where she focused on connecting UMinho inventors and startup company leaders with international commercialization partners. Rosemary worked with the TecMinho team to reach out to international research and development partners, sponsors, physician champions, and industry experts to explore collaboration opportunities on multiple UMinho technologies, ranging from medical devices to bioinformatics to biofuels. These conversations focused on how to best develop UMinho technologies into commercially viable products, and align potential technology applications to clinical and market needs. Rosemary's efforts gained insightful market validation from industry leaders and helped forge new connections with clinical research partners, research sponsors, and other international

partners interested in involvement with specific UMinho technologies. In one case, Rosemary was successful in connecting a Portuguese startup company with a partner in Austin, Texas, to conduct clinical trials in Austin and make the company's product line available to patients.

Marta Catarino, Director of TecMinho offered the following feedback regarding Rosemary French's internship:

We consider this pilot internship as a very successful activity, mostly following two perspectives: the connection with the OTC/UT and Rosemary's personal profile. Considering the latter, Rosemary has proven to be a highly valuable colleague in terms of commitment to the work plan, going beyond established objectives, competencies and experience demonstrated, level of autonomy and personal interrelationship skills, creating a useful and positive empathy with coworkers, researchers, entrepreneurs and company representatives. Highly promising contacts were established, concerning:

- *Identifying and introducing key people to technologists from UMinho;*
- *Performing market validation research through interviews with opinion leaders from industry;*
- *Support in identifying key applications for early stage technologies through market feedback;*
- *Fostering connections with new contacts to pair with researchers to solve specific technology development needs;*
- *Identifying and making first contact with potential licensees, partners, and investors for UMinho's researchers and entrepreneurs.*

Meanwhile Rosemary was also able to benefit from the exposure to and hands-on experience with TecMinho's strategies, processes and methodologies for technology commercialization, which she easily got familiar with.

While this period of three months was very fruitful in establishing leads and promising contacts for further development, both by our team and by Rosemary herself, I believe that, like Pedro Silva's internship at the OTC, the greatest outcome will be achieved following the internship period, which acts as a springboard for strengthening relationships. With this in mind, I am interested in pursuing this pilot internship with a further collaboration that might include extending the internship phase in order to allow new periods of internships at TecMinho.

I strongly believe it is important to leverage the opportunity of this three-month experience into a long-lasting collaboration; and that it would be a great loss in terms of the impact of this internship's potential for TecMinho as well as other TTOs in Portugal, if we leave the follow-up of these established contacts and the on-going work to informal and voluntary activities.



3. Specialized Training & Networking

“UTEN is a major opportunity for training and network building. Junior staff can have first class training on location and more senior staff gets the chance to network, brainstorm and get collaboration opportunities. Personally, I’ve had the chance to meet very interesting people. More importantly (or at least ‘as important’) IPN firms have had business opportunities and we implement some ideas in our activities that arise during UTEN’s work.”

Carlos Cerqueira
IPN Innovation Director
University of Coimbra

3.1 Overview of Training & Networking

University Technology Enterprise Network provides a host of training events as one of the organization's core activities. These events include thematic workshops, training weeks, In Situ training, leaders roundtables, and initiation brainstorming with students. Training events focus on emerging technology sectors to increase specialization in technology transfer and commercialization, and are implemented in close collaboration with universities, research centers, associated laboratories, and companies.

UTEN is strongly committed to enlarge both the scope and the impact of the organization; therefore, training events and methods have been continually scrutinized for potential improvement. Feedback is assimilated from all UTEN participants: speakers, mentors, event hosts, technology transfer professionals, entrepreneurs, and students. This enables a dynamic, responsive training program that evolves new methods of delivery for new audiences.

Workshops have provided the core of UTEN training since its inception. International experts provide best practices for venture creation, business incubation, and a broad spectrum of commercialization practices, including industry-specific insight for technology areas such as nanotechnology and life sciences as well as marine sciences.

Training Weeks were instituted in 2009 to expand the learning process beyond the workshop level for both TTOs and entrepreneurs. Increased interaction and deeper exploration was provided on topics from intellectual property management to technology valuation, to facilitate technology transfer processes from research to commercialization.

In Situ Training, also started in 2009, provides an inter-national expert as an on site mentor to engage closely with a TTO to improve internal processes and procedures, and help catalyze a team approach with increased efficiency. In Situ training helps the TTOs maximize its talent base to meet regionally specific commercialization needs.

Initiation Brainstorming with Students enables UTEN to engage directly with the life force of the university: the students. This new activity catalyzes autonomy for both graduate and undergraduate students to approach technology-based venture creation and international markets. An important component of this program is working in close cooperation with Students Unions and other student initiatives to foster a student-focused entrepreneurial ecosystem across Portuguese universities.

Leaders Roundtables are a new activity that brings national and international experts into discussion with directors of the Portuguese TTOs, presidents of the associated laboratories, rectors, and Vice rectors to address specific issues, problems, and challenges for Portuguese technology transfer and

commercialization. Topics examine higher echelon questions such as vision, mission, and strategy; funding; output metrics; staffing; and institutional support. Special emphasis is placed on institutional development, TTO organizational procedures, ILO relationships with industry, and exposing Portuguese institutions to US university methods that strategically develop robust joint research with industry partners. Each roundtable features a moderator and a reporter to help capture each session's main conclusions.

In 2011, UTEN provided four workshops, three training weeks, three leaders roundtables, and six initiation brainstorming with students. These events help to:

- Establish a national dialogue on taking technologies from the research laboratory to the international market increase national capacity for technology transfer
- Facilitate networking that increases both national and international partnering opportunities
- Promote an entrepreneurial ecosystem across Portugal.

The year 2011 has brought special focus on the role of the Industrial Liaison Office (ILO) to improve university-industry collaboration to promote S&T commercialization and on-shoring of Portuguese S&T in US markets.

Additional Networking Opportunities

UIDP Visit to California: In April 2011, a UTEN delegation participated in a University Industry Demonstration Partnership (UIDP) meeting in La Jolla, California. High level follow-on meetings occurred with University of California Irvine, University of Southern California, and University of California San Diego.

UTEN Annual Conferences: This yearly event provides a pivotal opportunity to celebrate the sum of UTEN's efforts and explore new opportunities as an organization. Describing accomplishments and trends, sharing goals and plans, and setting the frameworks for new expectations, is an important component in creating organizational autonomy and directing the UTEN network toward increasing success.



3.2 Workshops

Workshops are hosted by a leading institution that specializes in the thematic area and are organized with national and international partners who present the workshop sessions. These events are planned to facilitate an audience of 10 to 20 specialist participants including TTOs, principal investigators (PIs) and researchers, and technology entrepreneurs. This year's themes include:

- Development of social entrepreneurial ventures
- Commercialization of space technologies
- Increasing commercialization outcomes for university nanotechnology laboratories
- UTEN copyright workshop for creative industries.

Table 3.1 UTEN Workshops 2011

Feb 7, 2011	W#1: Development of Social Entrepreneurial Ventures	<ul style="list-style-type: none"> • Instituto de Empreendedorismo Social (IES), DNA Cascais • INSEAD Social Entrepreneurship Initiative
Jun 6, 2011	W#2: Commercialization of Space Technologies	<ul style="list-style-type: none"> • Industry Policy Committee (IPC) • FCT Space Office • Instituto Superior Técnico, Technical University of Lisbon • European Space Agency (ESA)
Sep 19, 2011	W#3: Increasing Commercialization Outcomes for University Nanotechnology Laboratories	<ul style="list-style-type: none"> • New University of Lisbon (UNL) • IC² Institute, The University of Texas at Austin
Oct 14, 2011	W#4: UTEN Copyright Workshop for Creative Industries	<ul style="list-style-type: none"> • PINC, Creative Industry Center of U Porto S&T Park • IC² Institute, The University of Texas at Austin



Workshop #1

● Development of Social Entrepreneurial Ventures

February 7, 2011: Instituto de Empreendedorismo Social (IES), and DNA Cascais
Presented by IES and INSEAD Social Entrepreneurship Initiative

Social entrepreneurs are the new, unlikely heroes at the World Economic Forum meetings in Davos. They are becoming a driving force for societal change and business innovation as they lead in the rising field of social enterprise. What does it mean to be a social entrepreneur? In what ways are social entrepreneurs unique? Why do they succeed in addressing profound societal problems in areas where governments, markets and charities have failed?

This workshop introduced the growing field of social entrepreneurship and the role of technology and innovation in developing effective solutions to humanity's most intractable problems. Specific goals were to:

- Clarify the concept and mechanism of SE and the role that corporations can play in driving social innovation
- Introduce the ecosystem players for social entrepreneurship in Portugal, identifying their main opportunities and challenges
- Reflect upon the role of technology transfer and innovation as enabling mechanism for SE
- Share best practices and experience between TTOs and SE practitioners, creating a platform for discussing future projects at the interface between SE and tech innovation.

Session topics included:

- What is social entrepreneurship and how it will change the world
- Social enterprise: *Vitamimos* case study
- The Social Entrepreneurship ecosystem in Portugal with leading social innovation investors, incubators and accelerators
- Innovations at the base of the pyramid
- Technology & business together to solve a societal problem: *Solar Ovens* case study
- The roadmap to support new technology projects with social impact.

International Expert

Filipe Santos, Associate Professor of Entrepreneurship, Director of the Maag International Centre for Entrepreneurship, and Academic Director of INSEAD Social Entrepreneurship Initiative. His research lies at the intersection of strategy, organization theory, and entrepreneurship. His current focus is the field of social entrepreneurship and social innovation. He is particularly interested in understanding the processes through which entrepreneurs construct new firms and markets. He is also interested in the growth and processes for scaling new ventures in order to maximize economic and social impact.



Workshop #2

● Commercialization of Space Technologies

June 6, 2011: Instituto Superior Técnico, Technical University of Lisbon, with Industry Policy Committee (IPC), and FCT Space Office
Presented by European Space Agency (ESA)

The main objective of this workshop was to discuss the present state of Portuguese space technology transfer and determine recommendations to improve its support mechanisms. Portuguese investments in the space sector have shown high return on investment, both tangible and intangible, with high national economic impact. A recent survey concluded that Portuguese participation in ESA shows a multiplier factor (spin off factor) greater than two, which means that every euro invested in ESA has generated two euros in economic activity for our national space community (companies and academia) and that this trend could be leveraged increasingly in the coming years. In the past ten years, Portugal invested around 111M€ in ESA and the direct return in contracts was 95M€. It can now be concluded that an additional 95M€ was also realized in indirect return.

The ESA has helped develop a strong, dynamic network or ecosystem of Portuguese high-tech companies, research institutes, universities, and public entities. This network has prospered outside the ESA environment to *create jobs*, and *internationalize* and *export* Portuguese technology and know-how: points which have become critical in the current economic context. Space technologies currently show non-space application in areas such as telecommunications, earth observation, and satellite-based navigation. It is important for Portugal to enlarge its share in these non-space markets, and increasingly develop terrestrial applications (which provide the strongest economic and societal impact). Discussion focused on the three stages of

ESA's TT model: *generation and concept, validation and demonstration, and completion and operations*). The main discussion points are being consolidated into a draft for follow-up initiatives.

Stakeholders and experts had the opportunity to discuss determinant aspects of the future of Space TT in Portugal. A key message was that some countries comparable to Portugal in terms of dimension (i.e. the Netherlands), are implementing high impact initiatives in Space TT, and that Portugal should benchmark and adapt these successful initiatives to its national paradigm. Sessions included:

- ESA technology transfer and national technology transfer initiatives
- ESA Portuguese brokerage model
- Terrestrial market applications
- Funding entrepreneurs.

International Experts

Cornelius J. J. Eldering, *Speaker title, ESA*, “How to get space technology to non-space markets?”

Nuno Soares, *Speaker title, Inova+*, “Which are the barriers and how to overcome them?”

Diamantino Costa, *Critical Software* and **Pedro Venceslau**, *MDU Space*, “Which markets to address and how to be disruptive?”

Ricardo Marvão, *Novabase (former CEO Evolve)* and **José Esperança**, *AUDAX ISCTE/MIT*, “Can space tech new ventures fit in the existing schemes?”



Workshop #3

● Increasing Commercialization Outcomes for University Nanotechnology Laboratories

September 26, 2011: Universidade Nova de Lisboa
Presented by IC² Institute, The University of Texas at Austin

Workshop #3 presented *best practices models* to showcase how university nanotechnology facilities can be tied early on to commercialization outcomes through leveraging industrial inputs, correctly focusing research, and attracting of key staff. Workshop sessions included:

- Positioning university nanotechnology research for commercial success
- Impact of collaboration in nanotechnology research – an industry perspective
- Leveraging nanotechnology regional competency to increase regional development
- Uncovering new partnership opportunities.

The ecosystems of innovation are undergoing a profound change both at regional level, where universities play key roles as economic development engines, and at industry level, with the open innovation paradigm. As universities become key sources of discovery and play an increasing role in how industry innovates, it is increasingly recognized that *people* and *networks* are the foundations on which

to effectively connect academic institutions with the business community. Global competition, rising R&D costs, and the need to get more products to the market sooner are some factors that force companies to reach out to research universities for new ideas and capability. Licensing, corporate sponsored research, consulting engagements, venture capital investment, gifts, and recruitment of graduate students are just some of the ways used to build strategic relationships between industry and universities, and are becoming a regular part of the developing open innovation environment. In the final session, *Uncovering New Partnership Opportunities*, the following case studies were discussed:

Paper-e technology applies field effect transistors on and with paper, as well as non-volatile memory paper transistors, based on the gate floating concept. In addition to providing structure, the paper acts as the dielectric, an active and integral part of the transistor. FET components are fabricated onto both sides of the paper sheet. Paper-e opens the way for inexpensive, disposable, biodegradable paper displays, smart labels, RFID technology, logic circuits

(with and without memory effects), disposable nonvolatile memory circuits, and more.

Novatissue develops products for regenerative medicine. Its unique technology is based on the creation of 3-D porous structures that include a pre-vascular network capable of delivering nutrients to cells. Products derived from this technology allow faster regeneration of human tissues, enabling faster patient recovery.

DPL-Screen provides an portable device for the early, non-invasive diagnosis of diabetes. The test is painless, low cost, and provides immediate results in an asymptomatic population, including children. Existing market solutions examine only one biomarker (blood glucose), while DPL-Screen measures, quantifies, and analyzes both a set of specific biomarkers in exhaled air, and other markers of blood vessels. This results in a deep-knowledge metabolic and physiological profile of the individual.

TreatU addresses the pharmaceutical industry need for efficient tumor-specific treatments. Cancer treatment is characterized by nonspecific toxicity giving rise to adverse side effects, which implies anticancer chemotherapeutics are often administered at sub-optimal dosages. This can result in therapy failure, the development of drug resistance, and metastatic disease. TreatU has developed a novel, versatile platform for targeted drug delivery (PEGASEMP), allowing increased concentration of a therapeutic agent to be effective only where it is necessary

International Experts

Bruce E. Gnade, *VP Research, University of Texas at Dallas*. Bruce Gnade managed several research and technology groups during his 14 years at Texas Instruments. From 1996-1999 he was on a temporary assignment at the Defense Advanced Research Projects Agency (DARPA) as a program manager. His current research interests focus on flexible electronics, and nanostructured devices and materials for electronic applications, with applications ranging from radiation sensors to microelectrode arrays for cellular recording.

Servando Aguirre-Tostado, *Director, Nanotechnology Incubator of Nuevo Leon, and Research Professor at CIMAV-Monterrey*. In September of 2009 Dr. Aguirre-Tostado was appointed as NINL Director to lead a novel incubation model for nanotechnology businesses startups in Nuevo Leon, Mexico.

Rafael Antunes, *Director of Strategic Sourcing, Hovione (www.hovione.com)*. Rafael is the Hovione ambassador for the Faculty of Science and Technology (FCT/UNL), and co-inventor of two patents.

Mariana Brandão, *CFO and CHRO of Biocant – Technology Transfer Association, the first Portuguese*

Science and Technology Park specialized in Biotech. In the past few years she has been working as a project manager and business developer of biotech SME's. Her main research interests include technology and science park management and internationalization, and cluster management.

Nuno Correia (Paper-e), *Researcher at CENIMAT/CEMOP at the New University of Lisbon*. His current research interest includes the development and optimization of paper as an electronic substrate, whether to be used in the electrochromic technology or in the Field Effect Transistor (FET) technology.

Brian A. Korgel, *Professor of Chemical Engineering, The University of Texas at Austin*. His research focuses on developing new methods to synthesize nanostructured materials, studying their properties, and fabricating devices based upon these materials.

Rodrigo Martins, *Head of the Materials Science Department of the Faculty of Science and Technology of New University of Lisbon*. He is an expert in micro/opto-electronics and nanotechnologies. He holds more than 60 patents.

Juan Ramón Morante, *Professor, Department of Electronics, University of Barcelona; Director of the research group on Electronics Materials and Energy M-2E; Director of XaRMAE (Leading Centre in Advanced Materials for Energy of the Generalitat of Catalunya)*. His research focuses on the mechanisms for energy transfer in solid interfaces; the development of renewable energy devices and systems for applications based on nanomaterials and their functionalization; with special focus on advanced materials and systems for energy storage and energy conversion. He has several patents.

Vera Moura (TreatU), *is co-founder (with João Nuno Moreira and Sérgio Simões) and CEO of TreatU, Lda*. Moura is co-inventor of the patent “Capsulating system binding to nucleolin,” providing the foundation for the spin off company TreatU, Lda, from the Center for Neurosciences and Cell Biology, the University of Coimbra, located at Biocant Park.

João Paulo Miranda Ribeiro Borges (Novatissue), *Professor in Materials Science and Engineering at FCT/UNL, responsible for the Biomaterials area*. His current research interests focus on biopolymers, bioceramics and biocomposites, with applications in the field of Tissue Engineering (soft and hard tissue regeneration). He has authored/co-authored five Portuguese patents and two international patents.

Valentina Borissovna Vassilenko (DPL-Screen), *Assistant Professor of Physics at FCT/UNL. DPL-screen*. Her research is primarily in atomic and molecular physics, and her present research interests include developing devices, sensors and non-invasive methods of assessment and intervention in human health; breath biomarkers of various diseases; analytical techniques for characterization of biological matrices and medical devices.



Workshop #4

● UTEN Copyright Workshop for the Creative Industries

October 22, 2011: PINC, the Creative Industry Center of the University of Porto Science & Technology Park
Presented by IC² Institute, The University of Texas at Austin

This workshop addressed the new challenges of managing intellectual property in the creative economy. Traditional business models in design-, arts- and content-based industries face an array of changing conditions: technological changes, of course, but also legal and cultural ones. Consumer expectations about the pricing of digital content; artists' desire to reuse and remix cultural capital; participatory media, whether in the form of "free culture" (creative commons, open source) or signed away under a Terms of Service Agreement; the legal strategies of large IP holders; and local differences in an increasingly global market – all are in a state of rapid change. The UTEN Copyright Workshop for the Creative Industries provided some basic tools and points of reference for creative professionals, entrepreneurs, researchers and TTOs facing these challenges. Sessions included:

- Common ground: Intellectual property basics every creative should know
- Global differences: IP trends in Europe/Latin America/North America
- New models for IP: Creative commons, open source, free culture
- Cases from PINC companies.

This workshop followed Future Places Multimedia Festival in Porto, a UT Austin|Portugal CoLab event.

International Experts

Sérgio Branco, Ph.D. *Fundação Getúlio Vargas, Brazil.* Sérgio is Research Assistant Professor of Intellectual Property Law at Fundação Getulio Vargas Law School, at Rio de Janeiro. Former General Attorney of Brazilian Information Technology Institute – ITI, in Brazil. He is author of the books *Copyright Law and the Internet*, *The Use of Other People's Works*, and *Public Domain in Brazil*.

Teresa Nobre, J.D., LL.M. *Legal Project Lead, Creative Commons, Portugal.* Teresa's research in the digital public domain enabled her to represent the Portuguese Member Catholic University of Portugal (UCP) in COMMUNIA. Teresa serves as senior legal counsel in two Portuguese companies and provides consultancy and research services on intellectual property to both private and public sector organizations.

Gregg Perry, J.D. *Assistant Professor in Digital Media Management, St. Edwards University, Austin, Texas, US.* A former counsel with the international law firm of Jones Day, Gregg has represented Texas Instruments, Estee Lauder, Hotels.com, Travelocity, Expedia, and entertainer Diana Krall. He is a certified Apple trainer for Final Cut Pro; he designed and teaches in St. Edward's video game design degrees; has worked in the radio, television, and film industries.

3.3 Training Weeks

Training weeks are held in collaboration with various international partners and this year's focus was on S&T commercialization and entrepreneurship. This highly specialized training is made available to experienced professionals by invitation, and limited to 15 participants per event. Presentations emphasize real cases, and each training week typically consists of an intense two-day workshop followed by in-depth meetings between speakers, participants, and local stakeholders including university administrators and entrepreneurs:

- Patent portfolio strategic management
- Evaluation of intangible assets
- From the lab to the market: Deep analysis of a real case.

Table 3.2 Training Weeks

April 26-29	TW#1: Patent Portfolio Strategic Management	<ul style="list-style-type: none">• National Institute of Industrial Property (INPI)• UTEN Portugal
May 9-13	TW#2: Evaluation of Intangible Assets	<ul style="list-style-type: none">• UATEC• University of Aveiro• Carnegie Mellon University
Oct. 24-28	TW#3: From the Lab to the Market: Deep Analysis of a Real Case	<ul style="list-style-type: none">• University of Algarve• The University of Texas at Austin





Training Week #1

● Patent Portfolio Strategic Management

April 26-29, 2011: National Industry of Industrial Property (INPI)
Presented by UTEN Portugal

In order to be successful with technology transfer and commercialization, one should start early with the identification of valuable ideas to be protected and commercialized. This includes deciding when to start the process of seeking protection, nurturing the patent examination process domestically and internationally, and seeking marketing opportunities to license a technology protected by a strong patent. One of the most important aspects of a strong patent is its domestic and foreign prosecution worldwide. Training Week #1 built on the 2009 training event on intellectual property and included:

- A review of patent preparation and prosecution
- When to file for protection of a new idea
- Interacting with outside counsel handling your individual case, domestic or priority filing and foreign prosecution
- Portfolio management
- Searching for licensing opportunities.

Cases were provided by participating institutions to examine questions such as:

- Are the claims strong enough?
- How to protect new advancements in the invention?

Participants were provided the opportunity for one-on-one meetings with the speakers to discuss specific/confidential cases of IP management.

International Experts

Mardson Q. McQuay, *Vice President and Chief IP Counsel, CGG Veritas, Paris, France*. Dr. McQuay provides in-house counsel on IP-related matters; preparing freedom-to-practice opinions; drafting, negotiation, and managing licenses, third party technology developments, and non-disclosure agreements; evaluating invention disclosure submissions; preparing and filing United States and foreign patent applications; and supervising the work of outside counsel.

Laurence B. Bond, *Senior Partner, TraskBritt, Salt Lake City, Utah, US*. As head of TraskBritt's foreign intellectual property department, Mr. Bond practices before the United States Patent and Trademark Office. This practice includes intellectual property law with an emphasis in formulating domestic and international design patent protection programs and registrations for consumer products. He has also established the firm Laurance Bond Solicitors with an office in Cambridge, England, independent of TraskBritt, through which he represents clients in international intellectual property matters in the European region.



Training Week #2

● Valuation of Intangible Assets

May 9-13, 2011: University of Aveiro
Presented by Carnegie Mellon University

Since the overwhelming value of most early stage companies resides in their intellectual assets, and it is vital to understand the valuation process. Training Week #2 focused on the valuation of intangible assets to help universities and startups monetize their inventions and companies for processes such as licensing, joint-ventures, sales, and raising capital. Training days were organized into three sessions, each with hands-on training based on case studies.

- *I: Valuation of technology in the university setting*
 - » What's important in technology valuation?
 - » License structures
 - » Traditional and non-traditional valuation models
 - » Use of "fixed price" deals for licenses & startups
- *II: Valuation of early stage companies*
 - » Key components in company valuation
 - » Valuation models
 - » Funders, funding models, and funding stages
 - » Role of non-equity funding and convertible debt
- *III: Should the university own equity in startups?*
 - » Shareholder agreements and more
 - » Exits: what is it worth?

International Experts

Tara Branstad, Associate Director, Center for Technology Transfer and Enterprise Creation (CTTEC) CMU. Tara

works primarily with faculty in robotics, biomedical engineering, computational biology, computer science, cylab (computer security), and the Tepper School (business). Tara has worked with a variety of licensing models, including traditional commercial, open source, and new company creation.

Barbara Carryer, Adjunct Professor, Entrepreneurship; Innovation Advisor, Institute for Social Innovation, Carnegie Mellon University. Barbara teaches technology commercialization through the University of Pittsburgh's Offices of Enterprise Development and Technology Management. She is also President of Carryer Consulting, which provides services to the software and life sciences sectors. She also co-founded LaunchCyte, a development company that creates, seeds, and harvests life sciences innovations from leading research universities across the US.

Raymond F. Vennare, President, CEO and Co-Founder of ThermalTherapeutic Systems. An accomplished senior executive and serial entrepreneur with more than fifteen years of experience building and growing information technology, informatics and biotechnology companies across diverse markets. Raymond's expertise includes executive management, corporate governance and the commercialization of emerging and innovative new technologies.



Training Week #3

● From the Lab to the Market: Deep Analysis of a Real Case

October 24-28, 2011: University of Algarve
Presented by IC² Institute, The University of Texas at Austin

The setting for this Training Week #3 was opportune, providing a forum to discuss the realities associated with technology innovation and commercialization in the midst of changing governmental policies and an uncertain world economic situation. Such challenges necessitate strategic thinking and focused action. Innovation during challenging times has been the cornerstone in economic turnarounds and determining which regions lead in the ever-evolving world economy. Training Week #3 consisted of three sessions, spread across three days, addressing critical issues experienced driving technologies from the laboratory to the market:

- The startup experience and support role of the regional entrepreneurial ecosystem
- Practical experience in valuation of intangible assets and deal negotiation
- Technology identification, disclosure and assessment.

Training Week #3 was organized and led by Gregory

Pogue from the IC² Institute of The University of Texas at Austin. Each day saw approximately 15 participants and was designed to provide both the operational principals, practical exercises and opportunities for vigorous discussions between speakers and audience. The goal was for deep understanding to emerge related to key practices required to take early stage technologies from the laboratory and move these toward monetization in the marketplace.

Day 1 explored the process required to take nascent technologies from the laboratory, develop a product and/or service concept and reach the market through startup or licensing approach. Dr. João Vargues da Camara from the Municipal de Faro. João presented the Project Algarve Sea (CRLA) program which is a partnership between government, university, and private company participants. The sea has always been a key resource for the Algarve region, and Portugal as a whole, and the CRLA program seeks to catalyze a new effort to capture

value from the sea in the form of new businesses, new science and new technology initiatives. João Navalho, CTO Necton SA and Algafuel SA, and Helen Vieira, CEO of Bioalvo. were guests speakers from leading Portuguese marine science technology companies. Drs. Navalho and Vieira shared their experiences during the company startup and product marketing phases. Vibrant question and answer sessions allowed TTOs to explore the mind of an entrepreneur, understand their challenges and understand how their vantage point can assist startups at various phases of development. Further, Luis Rodriguez detailed highly successful efforts to establish international business relations and co-development arrangements for startups in both the US and Portugal: direct outcomes from his UTEN internship at the IC² Institute.

Each presentation provided an opportunity for the audience and speakers to jointly investigate creative ways to support new ventures and establish the necessary business and scientific linkages to assist in their growth. The in-depth analysis of these startup experiences created a broader dialogue among the entrepreneurial ecosystem in Portugal and identified the best approaches to initiate and sustain new enterprises in the country.

Day 2 of the Training Week focused on the practice of technology valuation and deal negotiation. We explored benchmarks used to value intangible assets, such as intellectual property, and described various resources to be used to measure the likely market entry for a given technology. Using these points of reference, we applied various valuation techniques to obtain a defensible negotiation position. Several methods were discussed to value both a technology and a licensing deal, with or without equity. The principal of not trading deal value, but amounts and timing was presented and illustrated through active examples.

The second half of the session focused on the art and practice of business negotiation. We explored the negotiation room, the players, the agendas, and common strategies used to obtain advantage during the deal process. Special attention was given to university-company negotiation scenarios and best approaches for small company or university participants. We practiced communications skills and negotiation methods to keep discussions on point, make equitable value trades and drive a deal to closure under terms that are mutually attractive. This session provided TTOs with skills and experiences to craft defensible licensing strategies to both established and startup companies.

Day 3: The third day was added to provide particular value to those new in the TTO setting. It was titled: *Untying the Gordian Knot: Providing Order in the Invention Disclosure Process*. This session was team-taught between Gregory Pogue and Pedro Silva from TecMinho to provide the principals behind each concept and dual perspectives on how

these principals are applied, using The University of Texas and TechMinho as examples. This day focused on defining strategies to build faculty-TTO relationships, scouting new inventions from scientific innovators and crafting an invention disclosure process that is responsive and stimulates collaborations between science and business. The value of relationships and critical aspects for disclosure were illustrated in a convergent fashion when the UT Austin and TechMinho processes were reviewed. Strategies for assessing technologies as to developmental status, market readiness and innovator support were described. This included the RapidScreen tool used by UTEN and a second strategy adopted by TechMinho. Each tool could be readily used to prioritize investments in intellectual property and focus efforts on business development. This was a very interactive session where operational principals were reduced rapidly to practical actions using the illustrations of two proven processes.

International Experts

João Navalho, *founder and executive board member of NECTON and Chief Technology Officer for A4F, Algafuel*. Under João's leadership, NECTON conceived and implemented production of marine salt through traditional methods, for which the company received international recognition for its work in preserving biodiversity. Necton has also been a leader in the production and commercialization of microalgae solutions for aquaculture. Recently, A4F received several awards for helping develop CO₂ sequestration using microalgae cultures.

Gregory Pogue, *Senior Research Scientist, IC² Institute, The University of Texas at Austin*. Dr. Pogue leads research in technology commercialization, and venture creation and early operations. He serves Emergent Technologies, Inc. (ETI) as President and Managing Director for portfolio companies Receptor Logic, Inc. and Pure Protein, LLC. As Vice President of Business Development at Emergent Technologies, Dr. Pogue evaluates the commercial potential of new technologies, determines both technical and market trajectories, and builds effective partnerships for product commercialization.

Luís Rodrigues, *S&T Manager, Division of Entrepreneurship and Technology Transfer (CRIA), University of Algarve*. Luís works in supporting entrepreneurs and early stage companies and as a manager of incubation spaces inside the campus. He also developed a 2011 UTEN International Internship at the IC² Institute and the Austin Technology Incubator, The University of Texas at Austin.

Helena Vieira, *President and CEO, Bioalvo*. Helena has held research positions in Portugal and the United Kingdom, in the fields of molecular & cellular biology, and human molecular genetics. She has been Principal Investigator at the Biomedical Nucleus at the Engineering Faculty of Catholic University of Portugal.

3.4 Leaders Roundtables

The main objective of the UTEN roundtables is to deepen knowledge and enhance networking activities among the more experienced TTOs, entrepreneurs, and related stakeholders. These events address specific issues, problems and challenges which Portuguese experts face in building sustainable relations with Portuguese industry and international technology transfer and commercialization. Portuguese TTOs, presidents of associated laboratories, rectors, and Vice rectors, work with invited national and international experts to examine institutional development, TTO organization and procedures, and adaptation of United States university methodologies to develop ILO relationships with industry. Each roundtable has a moderator and a rapporteur, to monitor and document the main conclusions of these high-level discussions. Sessions centered on benchmarking best practices for:

- Running a technology incubator
- Running an effective TTO
- International S&T commercialization.

Table 3.3 Leaders Roundtables 2011

Mar 28 - 29	Benchmarking Best Practices on Running Technology Incubators	• Instituto Pedro Nunes (IPN) • The University of Texas at Austin
Apr 14 - 15	Benchmarking Best Practices on Running an Effective Technology Transfer Office	• University of Porto, UPIN • The University of Texas at Austin
May 23 - 24	Benchmarking Best Practices on International S&T Commercialization	• University of Lisbon • The University of Texas at Austin





Leaders Roundtable #1

● Technology Incubator Management

March 28-29, 2011: Instituto Pedro Nunes (IPN)
Presented by IC² Institute, The University of Texas at Austin

International Experts

Teresa Mendes, *President Instituto Pedro Nunes; Professor, Dept. of Informatics Engineering, U. Coimbra.*

Rua Pedro Nunes, *Executive Director, Instituto Pedro Nunes.*

Bart Bohn, *Operations Director, Austin Technology Incubator IT & Wireless, IC² Institute.* At ATI, Bart is responsible for identifying promising early stage companies and providing strategic business assistance for companies to achieve growth objectives.

Barbara Carryer, *Director, Project Olympus, Carnegie Mellon University.* Barbara is President of Carryer Consulting, which provides strategic marketing and business planning services to technology companies and organizations in the software and life science sectors. She co-founded LaunchCyte, a development company that creates, seeds, and harvests life science innovations from leading US research universities.

Technology Incubators: In-Depth Training

Overview by David Gibson, IC² Institute
UTEN Director, UT Austin

The first Leaders Roundtable examined incubator best practices including:

- Attaining financial self-sustainability
- Establishing & maintaining meaningful connections with industry
- Incubating new companies and experienced entrepreneurial and business talent, to build a viable entrepreneurship mentoring network
- Selecting, building, and sustaining a pipeline of quality technology companies to incubate
- Fostering a university and regional innovation ecosystem.

Leaders Roundtable #1 provided extended opportunity to learn from and discuss Q&A with the leaders

of what is regarded as one of the most successful and most sustainable technology incubators in the EU (IPN) and in the US (ATI) as well as a highly regarded and successful university-based effort at CMU to foster a culture of entrepreneurship among students and faculty and the broader community of Pittsburgh, Pennsylvania.

Instituto Pedro Nunes (IPN), Coimbra

Since its inception in 1995, IPN has focused its incubation efforts on the University of Coimbra's Applied Research Labs.

- It has been important to have faculty and staff in these labs work with IPN staff. An ongoing challenge for any incubator is to manage meaningful connections with industry.
- IPN relies on five highly qualified project managers who have business education and training (most come from Coimbra University faculty of economics), and further discussion emphasized the need for incubator companies to have mentors with actual entrepreneurial and business experience.
- With its track record, IPN is effectively launching companies that can provide “real-life” entrepreneurial models and business experience. Thus IPN is fostering the creation of its own pool of experienced entrepreneurial and CEO talent.
- IPN is incubating experienced entrepreneurial and exceptional business talent as well as companies and this is helping to build an entrepreneurship mentoring network throughout Coimbra.
- IPN relies on professors and lab support to provide needed technical expertise.
- The management of an incubator's total environment was stressed as being important including:
 - » Finding the right mix and balance of stakeholders and then being able to provide sustainable value creation for these stakeholders
 - » How to best manage the deal flow of applicant companies – it is important to provide useful feedback/advice even to the companies that are not admitted – it is about fostering the entrepreneurial spirit for all applicants.
- It is an ongoing challenge for IPN to:
 - » Educate each person in the TT/Incubation value chain to be aware of the entire value-added process
 - » Retain top program manager & mentoring talent
 - » Continually provide high level of support services.
- Entrepreneurial commitment is key to success.
 - » Even within IPN's accepted pool of applicants many need assistance with their business plan and incubator program managers help with this.
 - » Some entrepreneurs will drop out if they are not really committed or if their business idea proves to be not that great.
- Rent: maintaining an attractive price policy for rent is important – one where the companies are expected to pay more over time.

- Facilities need to be well located which means facilitating personal contact with important stakeholders - being close to entrepreneurial talent, encouraging a sense of entrepreneurial excitement to build enthusiasm – it is great to be ambitious but it is also important to be realistic.
- It is important to realize that with all its success, IPN is part of a much larger innovation/entrepreneurial ecosystem which is anchored by Applied Research Labs and other talent and resources at the University of Coimbra.
 - » Comment: The Austin Technology Incubator (ATI) similarly benefits tremendously from cooperative programs with the City of Austin as well as the Greater Austin Chamber of Commerce and other public/private organizations located in Austin. The Austin Innovation Ecosystem is tremendously important to ATI.
 - » It was stressed that the City of Austin sees a significant return on its public investment in ATI – largely measured in jobs and taxable income.
- Metrics for success for incubation are complex and can include size and growth of graduating companies, direct and indirect jobs created, external financing raised, investment and follow-on funding, company acquisitions, internationalization, etc.

II. The Austin Technology Incubator

- ATI, as part of the IC² Institute, reports to the VP for Research at The University of Texas at Austin.
- Since its founding in 1989, ATI has changed and evolved as the City of Austin has grown to become a major technology center.
 - » Austin's innovation/technology ecosystem has encouraged/forced ATI to evolve to find ways to continue to provide value-add.
- ATI has evolved from a general technology incubator to focused “deep dive” support in four industry verticals: IT, Wireless, Clean Energy, and Biosciences.
 - » Market making activities in these sectors drives ATI to be more international – global perspectives are required – incubation alliances in these sectors make the most sense for ATI.
 - » ATI stresses market making activities which include building industry networks, attending industry trade shows, and generally building relationships with industry.
 - » ATI wants to help attract all the talent it can to Austin in its targeted industry sectors – to help build critical mass in these sectors.
- Over the years ATI has expanded its involvement in a range of community events that significantly contribute to ATI's leverage – these events/activities include regional high tech events; establishing a wet lab at UT Austin; links to UT Austin's Wireless Research Group; Smart Grid Initiatives; a partnership with Austin Energy; etc.

- ATI's "sweet spot" is to help its companies prepare for Series A funding – but increasingly ATI focuses on building sustainable business models for its companies rather than heavy emphasis for acquiring VC or Angel funding.
- A key value-add by ATI is providing its companies with significant Pro Bono
 - » Advisory Board support comes from experienced industry veterans and serial entrepreneurs knowledgeable about a particular technology vertical – deep knowledge advising.
- Deal Flow and developing a pipeline for talent is important for ATI's success. Out of about 250 applications/year, about 125 formally apply for admittance to ATI, and 6 to 9 are admitted.
- ATI has a "landing pad" operation for international companies to establish a presence in Austin. Support focuses on introductions and access to the most appropriate networks to help the company get up to speed faster and smarter.
- The 3 Day Startup Program is a quick way to supercharge young talent for launching entrepreneurship ventures – to change the culture for a new generation and to hopefully launch a couple of successes.
- Sustainable financing of ATI activities is a constant challenge and involves securing contributions/grants from the City of Austin; Austin Energy (the city's power company); the state of Texas; and research grants (i.e. ATI is currently managing the launch of clean energy incubators in San Antonio and El Paso, Texas.)
- ATI works to maintain strong relationships with graduate companies and they often become part of ATI's support network
- ATI is continually launching and looking to partner with select university programs that foster entrepreneurship (e.g., 3 Day Startup Program, Venture Labs competition, Idea2Product competition). There is a lot of learning-by-doing.
 - » For example, ATI has a ten week summer "SEAL Program" that focuses on heavily engaging entrepreneurial talent on a real business opportunity – to develop a logic tree based on the technology and business opportunities and at the end of the program make a "go" or "no go" decision.
- For-profit incubators have had a limited track record of success and they typically need cash flow to cover one to three years of operating expenses. They typically focus on "rockets": companies capable of a rapid, but high cost, launch.
- It is important to realize that, in the US, by far the largest percentage of financial return to universities comes in the form of gifts from student generated "non-university-based IP" (e.g., Microsoft, Yahoo, Face Book, DELL, etc.) significantly more than faculty-based IP. Consequently, it is very important to encourage



and to work to facilitate a regional environment for successful entrepreneurship and to foster a culture of “giving back.”

Non-Univ-based IP	Smaller returns €	Larger returns €
	Smaller returns €	Smaller returns €
Univ-based IP	Faculty-based	Student-based

III. Project Olympus, CMU: Overview and Select Lessons

- Project Olympus is three years old and stresses the importance of teaching entrepreneurship from the entrepreneur’s point of view: which is different from working with a large company.
- Project Olympus was started in the school of computer science and it was set up to bridge the gap between (1) world class research and (2) successful innovation and commercialization
 - » To foster entrepreneurship
 - » To benefit our communities
 - » To improve the success rate of our spin off companies
 - » To help attract leading faculty and keep top graduate students in Pittsburgh after graduation.
- Needed funds are provided through micro-grants and matching funds – small office space and some equipment are also provided.
- A major value add of Project Olympus is the mentoring, advice, and education provided for the entrepreneurs
 - » IP advice, market analyses, networking for key contacts, and enhanced visibility
 - » All the above to help get the entrepreneurs ready for funding opportunities.
- PO oversees a “lock down” where the student entrepreneurs have 48 hours of focused work to solve a particular problem.
- A key prerequisite for Project Olympus is commitment to the entrepreneurial effort.
- Being quite close (walking distance) to the university has been very important.
- Project Olympus also works with CMU Professors to enhance their understanding of entrepreneurship since most have not taken entrepreneurship classes themselves.

» We do this through special mentoring, speaking events, roundtable discussions, and informal seminars with their peers.

- “Show and Tell” events are used to showcase CMU technologies and involve regional participants to engage the surrounding community. It is important to note that Project Olympus took a while to “take off” and to receive important local support.

Additional Discussion & Summary Points:

- Many Portuguese entrepreneurs come to us with “0” business plan and we build it with the help of MBA students – this is also good for a CTO (Chief Technology Officer) as writing a business plan is a good learning experience that helps clarify challenges.
- Having business experienced mentors is very important for successful incubation as is being able to attract experienced CEOs as the company grows – MBAs often lack the needed business experience and deep industry networks – in emerging entrepreneurial areas it is really important for incubators to, over time, grow their own experienced mentors and CEOs.
- UT Austin’s OTC focuses on two types of IP protection:
 - » I. Patents based on a determined industry/market need
 - » II. Patents based on S&T novelty of faculty-based research.
- It was emphasized that with all its success, IPN (as other successful incubators) is only a part of a much larger innovation/entrepreneurial ecosystem which is anchored by, in the case of IPN, the Applied Research Labs and other talent and resources at the University of Coimbra and surrounding community.
- “Putting strategy into practice and involving all key stakeholders” was a key subject of this roundtable that also discussed the challenges of US on-shoring and the financial and legal realities for US startups.
- Metrics for success for incubation are complex and can include size and growth of graduating companies, direct and indirect jobs created, external financing raised, investment and follow-on funding, company acquisitions, internationalization, as well as research and education in technology venturing and the entrepreneurial experience.



Leaders Roundtable #2

● The Effective Technology Transfer Office

April 14-15 2011: University of Porto

Presented by IC² Institute, The University of Texas at Austin

In preparing for this roundtable, Portuguese technology transfer officers and directors were invited to submit their key questions and concerns related to benchmarking the effectiveness of technology transfer operations in Portugal. The following agenda emerged:

- Making technology transfer commercialization part of the mission of the university
 - » What does this mean for how we negotiate deals and set goals
 - » What does this mean for metrics and how we show impact to the university
- Encouraging university wide entrepreneurship
 - » Make the TTO a place that inventors 'want to work with' instead of 'have to work with'
 - » Training future entrepreneurs.

As these topics and questions were discussed, Mr. Cornwell and UTEN staff worked to discuss key benchmarking examples in use both internationally and within the United States and talked about how these best practices and guiding principles might best interface with the current reality of the Portuguese technology transfer ecosystem.

A key outcome of this roundtable was a variety of metrics and measures which attendees hoped to bring back to their university operations and put into active practice, which included such broad topics as:

- Startup companies as a tool for commercialization

- Developing business plan competitions and entrepreneurial activity as a way to actively engage student body resources.

Key reporting metrics for TTOs were discussed included:

- Number of sponsored research projects completed and sourced into the university system
- Total monies attracted to the university through licensing and sponsored startups.
- Extensive metrics on the amount of outreach done to by technology transfer offices to the student and faculty bodies of university ecosystems.

Mr. Cornwell capped his visit to Porto by visiting with Technology Transfer staff in the country and further suggesting a variety of ongoing linkages and interactions between both startups in Portugal with international potential as well as research linkages for faculty and departments.

International Expert

Brett Cornwell, *Director of Commercialization Services for the Office of Technology Commercialization at the Texas A&M University System.* Brett is responsible for the New Ventures Division which delivers services including screening stage market assessments, business plan development, marketing plan development, market research studies, strategic business planning, and the development of venture pitches.



Leaders Roundtable #3

● International S&T Commercialization

May 23-24, 2011: University of Lisbon

Presented by IC² Institute, The University of Texas at Austin

Dr. Pogue's presentation on *International S&T Commercialization* emphasized life sciences. He brought his experience as a life scientist, startup company executive and commercialization professional, and also presented the Emergent Technologies venture capital model based on his personal experience. Major topics were:

- Strategies to accelerate new technology ventures
- The Emergent Technologies, Inc. hybrid venture model
- Strategies to implement funding strategies with different types of products and ventures
- Manners to measure the outcomes of commercialization
- Strategies to identify true platform technologies
- The Receptor Logic, Inc. story and learnings
- Methods to value intangible assets
- Sources of royalty, deal tools: MedTrack, Business Insights, and La Merie business intelligence were discussed among others
- Networking strategies
- Documenting partnership candidates and contacts
- Inventor vetting/characteristics
- University/market/user relations.

Attending the Roundtable 3 were managers and staff members from Portuguese university technology transfer offices and incubators, as well as UTEN Portugal staff and Portuguese Ministry of Science representatives. The larger UTEN education schema was discussed, and the following topics were suggested for consideration in planning future UTEN events:

- Creative approaches to launch startups and structure effective companies to match limited capital availability

- How to access proof of concept funds to drive innovations across key development risk points, addressing sources, amounts, and issues with obtaining such funds
- UTEN strategies to support TTO offices in deal negotiation processes
- Training support for entrepreneurs; determining the structure and nature of such training.

Discussions also brought out the need for new resources such as:

- A resource to assist TTO officers vet deals, determine valuations, and establish initial positions for royalties, milestones, and up front payments
- An advisory committee to help support commercialization, entrepreneurs, and new ventures.

The importance of the UTEN program to the TTO officers for ongoing support and training was repeatedly communicated. While UTEN training has provided a growing independence for Portugal's TTO workers, there is high concern for training to be available for new TTO officers, due to job creation or

turnover. In addition to this training, a new phase of support for startups and entrepreneurs was strongly desired by the attendees and startups. The launch of the US Connect Program was also discussed and the program was outlined for participating TTO officers and companies.

International Expert

Greg Pogue, *Senior Research Scientist, IC² Institute, The University of Texas at Austin*. Dr. Pogue leads research in technology commercialization, venture creation, and early venture operations. He also serves Emergent Technologies, Inc. (ETI) as President and Managing Director for portfolio companies Receptor Logic, Inc. and Pure Protein, LLC. As Vice President of Business Development at Emergent Technologies, Dr. Pogue evaluates the commercial potential of new technologies, determining both technical and market trajectories, and building partnerships to effectively commercialize products.

- Inventor vetting/characteristics
- University/market/user relations
- Product development risk points.

3.5 Initiation Brainstorms

To help catalyze entrepreneurial thinking in both graduate and undergraduate students, the Initiation Brainstorm program provides an interactive program in close cooperation with local student unions. These sessions help indoctrinate a new audience to UTEN, while they help promote an entrepreneurial ecosystem among those who statistically have the potential for initiating the most successful technology startups: university students. Serial entrepreneurs and technology transfer experts address students with a high-energy program designed to spark an enthusiasm for creating technology business ventures.

The Initiation Brainstorms were presented as Entrepreneurship Days, in which speakers visited several universities for detailed sessions. There were two main waves of Entrepreneurship Days. In March, Initiation Brainstorms were held at UMinho, UTAD, UCoimbra and IST. These sessions provided an introduction and “catalytic” programs on entrepreneurship. June sessions were presented at FAP and Clube ENova (UNL), with a focus on Social Entrepreneurship.

Table 3.4 Initiation Brainstorms with Students, 2011

Mar 21	Initiation Brainstorm #1 Entrepreneurship Day@AAMinho	<ul style="list-style-type: none"> • University of Minho Student Union • AAUM Office of Entrepreneurship • The University of Texas at Austin • Carnegie Mellon University
Mar 22	Initiation Brainstorm #2 Entrepreneurship Day@AAUTAD	<ul style="list-style-type: none"> • University of Trás-os-Montes and Alto Douro Student Union • AAUTAD • The University of Texas at Austin • Carnegie Mellon University
Mar 23	Initiation Brainstorm #3 Entrepreneurship Day@AACCoimbra	<ul style="list-style-type: none"> • U Coimbra Student Union • U Coimbra Students Association (AAC), Office of Entrepreneurship • The University of Texas at Austin • Carnegie Mellon University
Mar 25	Initiation Brainstorm #4 Entrepreneurship Day@IST	<ul style="list-style-type: none"> • JUNITEC • IST Student Union • The University of Texas at Austin • Carnegie Mellon University
Jun 7	Initiation Brainstorm #5 Entrepreneurship Day@FAP no BAIRRO	<ul style="list-style-type: none"> • FAP • OPorto’s Student Union • Instituto de Empreendedorismo Social (IES) • INSEAD Social Entrepreneurship Initiative
Jun 8	Initiation Brainstorm #6 Entrepreneurship Day@Clube ENova	<ul style="list-style-type: none"> • New University of Lisbon • Clube ENova • Instituto de Empreendedorismo Social (IES) • INSEAD Social Entrepreneurship Initiative





Initiation Brainstorms 1 through 4, March 2011

Entrepreneurship Days: Encouraging Entrepreneurship

March 21, 2011: UMinho; March 22, 2011: UTAD; March 23, 2011: UCoimbra; March 25, 2011: IST
Presented by The University of Texas at Austin and Carnegie Mellon University

The first series of Initiation Brainstorm sessions in March 2011 focused on Encouraging Entrepreneurship, and took place at:

- U Minho, Campus de Gualtar, Braga
- U Trás-os-Montes e Alto Douro, Vila Real
- U Coimbra
- IST, Lisbon.

Workshop agendas began with a session titled *Encouraging Entrepreneurial Thinking* with keynote speakers from The University of Texas at Austin and Carnegie Mellon University, followed by discussion. Speakers were:

- Barbara Carryer, *Adjunct Prof. Entrepreneurship, Embedded Entrepreneur, Project Olympus, Carnegie Mellon University*
- Dave MaWhinney, *Serial entrepreneur and investor, Adjunct Prof, Entrepreneurship, Tepper School of Business and Heinz College, Head of i6Program – Agile Innovation System, Carnegie Mellon University*
- Gary Hoover, *serial entrepreneur and entrepreneurship teacher, author, Austin, Texas*
- Tara Branstad, *Center for Technology Transfer and Enterprise Creation (CTTEC), Carnegie Mellon*

A second session, *Entrepreneurship is Cool* was led by Cam Houser, Austin Texas, Vice President of Bizdev at 3 Day Startup, and Advisor at Mass Relevance.

Notes by Tara Branstad.

The Initiation Brainstorm events included meetings with university leaders, faculty and students, with managers from TTOs, incubators, and science and technology parks, and with start-up companies to explore the innovation ecosystem in the Portuguese environment and provide perspectives from Carnegie Mellon University.

The leaders we met, from Rectors to government officials, understand the importance of creating an entrepreneurial environment for students and faculty. The students we met were easily engaged in discussion to openly discuss the challenges, both local and global, that they face in pursuing new ventures. Students are also acutely aware of the challenges they face in securing employment in traditional careers, and are consequently excited to explore alternate choices such as entrepreneurship.

It is evident that Portugal has invested a great deal in developing the infrastructure to support the growth of technology-based ventures in all of the regions we visited. Many incubators are in place and have

functioned successfully for some time. We were impressed to learn that many high level university officials have participated in entrepreneurial ventures personally, and we believe that an important component of creating an entrepreneurial culture is making connections between those that have “walked the walk” and those who are learning, and provide the emerging entrepreneurs with direct access to those who possess the tools of the trade. Specifically in areas such as Porto and Coimbra, there are many examples of early stage companies experiencing success. Strengthening the ties between the individuals involved in these companies (entrepreneurs from the community) and the local universities provides a great opportunity to enrich the entrepreneurial ecosystem in Portugal.

Each university we visited had some version of one or more courses in entrepreneurship. These courses focus on teaching the business planning tools to evaluate a potential business opportunity. IST, in particular, has integrated entrepreneurship courses in their engineering curriculum. Experience has taught us that, to reach students and faculty, it is important to make programs and courses available to them within the contexts of their discipline (i.e. most engineers will not cross-register for a business course if it is offered in the business school).

Portuguese TTOs within the universities were consistent to present themselves as professional, maturing organizations with many qualified, motivated individuals genuinely interested in promoting the universities technologies and creating revenue-generating opportunities for the university and their regions. TTOs provide a key connection point between the university and the entrepreneurial ecosystems of the various regions, and the country in general.

International Experts

Tara Branstad, Associate Director, Center for Technology Transfer and Enterprise Creation (CTTEC), CMU. Tara works primarily with CMU faculty in robotics, biomedical engineering, computational biology, computer science, cylab (computer security), and the Tepper School (business). She has worked with a variety of licensing models, including traditional commercial, open source, and new company creation. In her capacity as Associate Director of CTTEC, Tara oversees Enterprise Creation (startup) activities and manages CMU’s Gap Fund program. S Tara came to CMU in October 2005.

Barbara Carryer, Director, Project Olympus, Carnegie Mellon University. Barbara is President of Carryer Consulting, which provides strategic marketing and business planning services to technology companies and organizations in the software and life science sectors. She co-founded LaunchCyte, a development company that creates, seeds, and harvests life science innovations from leading US research universities.

Gary Hoover, *Serial Entrepreneur, Entrepreneurship Teacher, and Author, Austin, Texas.* At the age of 30, Gary took the plunge and created Bookstop, a pioneering book superstore that helped change the nature of book shopping in America. This company was sold to Barnes & Noble for \$41.5 million cash when it was 7 years old, and became a cornerstone for their industry-dominating superstore chain. Gary then launched Hoover’s, the world’s largest Internet-based provider of information about enterprises. Like Bookstop, Hoover’s has changed the way we do things and today employs over 300 people. In 2009-10 Gary served as Entrepreneur-in-Residence at the Herb Kelleher Center for Entrepreneurship at the McCombs School of Business at UT Austin.

Cam Houser, *VP of Bizdev at 3 Day Startup, Advisor at Mass Relevance.* 3 Day Startup is a student-focused entrepreneurship education initiative with programs in the United States, Germany, Spain, and the Netherlands. He regularly delivers boot camps and workshops on market validation, product development, and marketing emerging technologies to established and nascent markets. Cam advises and mentors student startup founders on topics such as bootstrapping and the path to seed incubators and angel funding.

Dave MaWhinney, *Serial entrepreneur and investor; Adjunct Professor, Entrepreneurship, Tepper School of Business and Heinz College, CMU; Director, i6 Agile Innovation System.* Dave co-founded mSpoke, a next-generation artificial intelligence software (semantic Web) company which was acquired by LinkedIn in 2010. Prior to mSpoke, Dave was a general partner for the venture capital firm PNC Technology Investors. Dave’s first startup, IndustryNet Corporation, was a pioneering internet marketing and commerce company which merged with AT&T Business Network to form Nets, Inc.

A Whirlwind Tour of Student Entrepreneurship in Portugal

Excerpts from 3DS Blog
Posted June 1, 2011 by Cam Houser
<http://3daystartup.wordpress.com>

Recently, the IC² Institute invited Joel Hestness and I, along with Carnegie Mellon University and Gary Hoover to speak at Portuguese Universities to discuss ways to encourage entrepreneurship and explore challenges that Portuguese students face regarding startups. We were honored and excited





for the opportunity to explore entrepreneurship in this culture, speak to the next generation of Portuguese entrepreneurs, and discuss challenges with Portuguese students and administrators.

We gave short talks and long Q&A sessions in auditoriums in the mornings and performed one-on-one mentoring and coaching sessions with aspiring, nascent, and active entrepreneurs each afternoon. The programmed activities were superb. In each case the students, administrators, and government officials were engaged and genuinely interested. These events, in combination with evening talks, shaped our understanding of the student perspective on the university experience, the implications of starting a company, and students' feelings about taking an entrepreneurial path in Portugal.

On a surface level, we noticed many indicators of a country ripe for a burgeoning culture of student entrepreneurship. Every student at every school we visited was aware of and inspired by established startup success stories and the hot new startups in Europe and the US. Portuguese students were just as familiar with and active on new technologies, web services, and social media tools as students we see throughout US, Europe, and Latin America.

In some ways, the entrepreneurship challenges facing Portuguese students are the same structural issues in campuses across the world. The "silo problem"

is very real in Portugal: students in one discipline have few opportunities to connect with students in other disciplines. Computer science students do not interact with the business students, who do not interact with the design students, and so on.

We shared the stage with notable young startup entrepreneurs in several cities, including bio-informatics entrepreneur Simão Soares (Silicolife) and CEO Jorge Pereira (Seegno) in Braga. At the University of Coimbra grad student Mariana Neto (Exa4life) explained how she got involved in a healthcare startup and Rafael Jegundo shared lessons learned from his success founding student consulting shop Jeknowledge. Ana Teresa Freitas pitched us on her HeartGenetics startup and Daniela Couto, as CEO pitched the biotech startup Cell2B.

Crises of Confidence

A key issue is entrepreneurial confidence and the perceived high cost of failure. A lack of entrepreneurial confidence is not unique at the university level: no matter what university we visit, there are always some students interested in entrepreneurship but hesitant because they do not know if they "have what it takes" or if startups are a viable path for them. Fear of failure has a heavy influence on Portuguese entrepreneurship culture. Numerous people we met told us that if one attempted to start a business and failed in Portugal,

that failure would haunt that individual for the rest of his career. An unsuccessful business venture represented a black mark on a career requiring extensive damage control and whitewashing at every future investor pitch or job interview. Not only would it create difficulty for a business, career, and social life but it would also carry heavy costs for family life.

Accordingly, some students and administrators perceived us as the “crazy Americans” because we are so deep into startups and we chase our own startup dreams. But we are quite comfortable in this role. Not that we are admitting to insanity, but sometimes startup life is all about creating your own reality.

I explained that in the US a failed startup is a badge of honor. The multidisciplinary skills, resourcefulness, and “big picture” thinking that the pursuit of entrepreneurship instills in young people are valued by your next set of investors or job interviewers. I explained that student status justifies a greater risk tolerance than non-students because *a)* lifestyle advantages such as the time to course correct over a long remaining career runway, and *b)* how most students have the luxury of not having to financially support a family. I laid out the benefits of surrounding oneself with the bright, ambitious minds that are attracted to a university. I pointed them to classic Paul Graham essays. I related the Wayne Gretzky quote about missing 100% of the shots you don’t take and how Babe Ruth became the record holder in home runs by becoming the record holder in strikeouts.

Entrepreneurship in Portugal

Summary thoughts by Gary Hoover

As part of the Initiation Brainstorm team, I spent a week exploring Portugal, meeting people, observing their economy, and speaking to teachers and faculty at four universities. Most of the trip was shared with entrepreneurship educators from Carnegie Mellon and all of it was shared with two of the leaders of 3 Day startup in Austin. The team reinforced the message “It’s not about technology, it’s about customers. Most new businesses fail because they are not listening to their customers...”

At each university, the teachers had sound philosophies, and they have the opportunity and the ability to make a big difference in the lives of their students. Some of the administrators come from entrepreneurial backgrounds. But more entrepreneurs are needed to mentor students. While high focus is placed on technology entrepreneurs, 90% of Portuguese entrepreneurs are active and prosper in the remainder of the economy – people who build hotels, restaurants, fast food chains, resorts, and many other service and product businesses. This talent base should not be overlooked as mentors for a new generation of entrepreneurs.

Each campus had several “rockets” – young people with intense drive, the persistence and ideas to make a difference in the world. They do not have the support network that, say, a startup entrepreneur in Austin would have, with thousands of people in





the “same boat.” This presents the challenge of how to link these loners together in spite of disparate geographies. There is no question in my mind that these students are receiving excellent education and have a good view of the world, living in Portugal so close to so many other nations and cultures. One possibility not to be overlooked is partnering potential (entrepreneurial, funding, etc.) in Brazil, where many of them have travelled and 90% of the world’s Portuguese speakers live. Two questions resurfaced in every location:

1) *What if we fail?* We often heard the sentiment, “We would never get a second chance.” This is not unique to Portugal, but developing an entrepreneurial culture requires that both entrepreneurs and their backers get over this. Failure rates can be mitigated by increased mentoring by experienced entrepreneurs, and the development of savvy angel networks. Society’s attitudes can also be shifted with positive press (literally) of success stories. Portugal’s entrepreneurs should be more highly celebrated; and the challenges they faced – failures they may have made – need to be shared. This can have a twofold effect: to help entrepreneurs mitigate the fear of failure, and for society to be more forgiving of business failure. One reality that is impressed throughout the US culture is that “most new businesses fail.” But this doesn’t mean you don’t start a new business – it means that you try to start

a *better* business. And if that fails, you examine your failure for lessons learned, and then you try to start an even *better* business.

2) *We have little venture capital and the banks are highly risk averse: How can we finance these businesses?* Most entrepreneurs these days seek ways to prove their concept or develop their prototype using their own savings, credit cards, partnerships with customers and suppliers, and other means. This eliminates the need to share equity too early, or to talk to bankers. The lean startup seemed to be a new concept to most participants – the idea that they might not need the affirmation of outside funding, and that it is possible to succeed without external seed funding.

One of the most important things that the Portuguese can do is to increase its supportive entrepreneurial networks. More entrepreneurs from more places, in more industries, in more age brackets, with different experiences, need to be drawn “into the conversation,” and frequent cross-border mentoring would be ideal. Admittedly, this is difficult in the Portuguese society where entrepreneurship is sparse and most people work for large corporations, large non-profits, or government entities. Yet this is a global reality that is present in many nations, as well as most communities across the United States. But the entrepreneur (and his various partners) finds creative creates solutions to address these challenges.



Initiation Brainstorms, June

• Entrepreneurship Days: Social Entrepreneurship

June 7, 2011: FAP no Bairro; June 8, New University of Lisbon

Presented by Instituto de Empreendedorismo Social (IES), INSEAD Social Entrepreneurship Initiative

The second series of Initiation Brainstorms were presented at FAP and New University of Lisbon in June, to examine social entrepreneurship. Over the past two decades, the citizen sector has discovered what the business sector learned long ago: There is nothing as powerful as a new idea in the hands of a first-class entrepreneur.

The objective of Initiation Brainstorms #5 and #6 was to foster the early awareness of social entrepreneurship and the creation of new ventures among graduate and undergraduate students.

FAP no Bairro

Initiation Brainstorm sessions were opened by Luís Rebelo, *President of FAP*, and José Mendonça, *Scientific Director of UTEN Portugal*. João Cotter Salvado, with the *Instituto de Empreendedorismo Social* addressed the question: What is Social Entrepreneurship? Scott Sherman, *UT Austin, Institute of Transformative Action* provided the keynote address, “The Science of Making the World a Better Place: What separates

the most successful social change campaigns from those that fail?”

Scott spent seven years researching how people win when they are trying to change the world. In this presentation, he talked about his findings noting that most of the traditional attempts to change the world, including politics, law, and even science, were unsuccessful. The most successful strategies looked much like the new field of social entrepreneurship.

Scott emphasized why social entrepreneurship is one of the most promising ways to change the world. Just as entrepreneurs change the face of business, social entrepreneurs act as the change agents for society, seizing opportunities others miss and improving systems, inventing new approaches, and creating solutions to change society for the better. An interactive panel presented a series of social entrepreneurship cases for review:

- Margarida Coelho, *FAP Programa Aconchego*
- Teresa Branco, *Fundação Porto Social*
- Scott Sherman, *Institute of Transformative Action*.

New University of Lisbon, Lisbon

Sessions at UNL were opened by the Pro-Rector, Paulo Pinho, and Vasco Varela, FCT-UTEN Portugal. This first session, *What is Social Entrepreneurship and how it will change the world* was led by Filipe Santos, INSEAD. Social entrepreneurship cases were provided by an interactive panel moderated by Miguel Alves Martins:

- Ana Quintas, *Vitamimos*
- Maria João Santos and Heidir Correia, *Moinho da Juventude*
- Nuno Gonzaga and Pedro Rocha e Melo, *Escolinha Rugby da Galiza*.

Other main topics included *Successful Practices for Social Innovation* and Scott Sherman's address, *The Science of Making the World a Better Place: What separates the most successful social change campaigns from those that fail?* Additional speakers were:

- Jorge Mayer, *EDP, Projecto Kakuma*
- Bernardo Macedo, *InPakt*
- João Simões, *ENOVA*.

International Experts

Heidir Correia, *Socio-Cultural Animator of Moinho da Juventude since 2004, Co-director of the Sabura Project, and coordinator of the Music Studio.* **Maria João Santos**, *Project Manager and management assistant to the Direction of Moinho da Juventude since March, 2010.*

Co-director of the Sabura Project. Both Heidir and Mari work with the Associação Cultural Moinho da Juventude, a non-profit organization situated in the Cova da Moura neighborhood, a suburb of Lisbon. In December 2007, the Portuguese Parliament awarded the association with the Human Rights Prize for the work in the neighborhood that was developed according to the principles based on communication, empowerment, solidarity and respect for differences in politics, sexual orientation, religious, and cultural belongings.

Bernardo Sousa de Macedo, *entrepreneur and social entrepreneur.* He has worked in marketing and communication at IGMMarketing (Interactive Global Marketing) and has been CTO at Go Find, Lda since March 2011. He is creator of the first online social network for social responsibility, Inpakt.com.

Miguel Alves Martins, *Executive Director at IES, Social Entrepreneurship Institute.* He holds a master degree in social economy at ISCTE and a professional certificate in non-profit management from Kellogg School of Management. From INSEAD, he holds a certificate from the management acceleration program (MAP) and attended executive education in social entrepreneurship. Miguel is an invited teaching assistant at Nova School of Business and Economics.

João Cotter Salvado, *Research Manager, IES, Social Entrepreneurship Institute.* He holds a Master's Degree in Economics from Universidade Nova de Lisboa



(UNL) and a Master Degree in Non Governmental Organizations (NGO) Management and Development from London School of Economics and Political Science (LSE). He was research assistant at Autoridade da Concorrência and teaching assistant at Faculdade de Economia of UNL. He was co-founder of two international NGOs which work currently in Mozambique and São Tomé e Príncipe. His fields of interest are social entrepreneurship, nonprofit management and social business model innovation.

Filipe Santos, *Associate Professor of Entrepreneurship, Academic Director, INSEAD Social Entrepreneurship Initiative, Director, Rudolf and Valeria Maag International Centre for Entrepreneurship (Maag ICE)*. Filipe's research lies at the intersection of strategy, organization theory, and entrepreneurship. His current focus is the field of social entrepreneurship and innovation. Professor Santos teaches courses on entrepreneurship and social entrepreneurship in the INSEAD MBA, EMBA and Executive Education programs. A native of Portugal, Professor Santos holds a Ph.D. in Management Science and Engineering from Stanford University, with a focus on entrepreneurship. He also holds an MSc. Degree in Industrial Strategy and Management from Lisbon Technical University, and an Economics degree from Lisbon New University. He was the recipient

of the Lieberman Fellowship at Stanford University, an award recognizing outstanding scholarship and institutional contributions. He also received in 1996 the award for best MSc. student. His doctoral thesis "Constructing Markets and Shaping Boundaries: Entrepreneurial Action in Nascent Markets" was finalist for the Heizer 2004 Entrepreneurship Award.

Scott Sherman, *Executive Director of the Transformative Action Institute*. TAI's mission is to train the next generation of social entrepreneurs, innovators, and change makers. He is currently writing a book, *How We Win: The Science of Solving Society's Problems*. Over the last decade, Sherman has taught courses on social entrepreneurship and social innovation at numerous universities, including Yale, Princeton, NYU, and Johns Hopkins. He won the outstanding teaching award from the University of California at Berkeley. In 2004, he was nominated for the National Society of Collegiate Scholars' Faculty of the Year award for the entire US. Besides his work as a grassroots community organizer, lecturer, and author, Sherman has worked with the Natural Resources Defense Council and the Environmental Law Foundation. Since 2000, he has been an adjunct faculty member in UCLA's School of Public Affairs. In 2005, the global nonprofit organization Echoing Green recognized Scott as one of the world's "Best Emerging Social Entrepreneurs."





3.6 UIDP Visit to California

In April 2011, a UTEN delegation of Portuguese Vice Rectors, technology transfer officers, and UTEN staff participated in a University Industry Demonstration Partnership (UIDP) meeting at Pfizer World R&D Headquarters in La Jolla, California. UIDP is an initiative of the United States National Academy of Sciences, designed to facilitate active collaboration between universities and industry; UIDP develops policies, agreements, legal documents, and organizational frameworks that are available to the public, to serve as a starting point when beginning a new engagement between universities and industry.

The UIDP meeting included senior representatives from major US universities and international corporations. The conference facilitated sessions on issues such as contract accords, regulations, negotiations, and common understanding of the unique cultures and points of view involved. Joint teams worked on common issues to foster and initiate working relationships and institutional ties to facilitate collaboration and increase opportunities for joint projects. The UTEN delegation was invited to participate in these sessions. It was quickly deduced that, beyond region-specific regulatory differences, the challenges faced in the United States and in Europe are very similar. It was also agreed that Portuguese/international presence and participation was a valuable addition for the

conference and there was discussion of potential affiliate memberships and other avenues for follow-on participation and collaboration.

The UTEN Delegation also attended a number of exclusive meetings and events with consultants, industry representatives, United States government agencies, and universities interested in exploring international partnerships and collaborations. Pfizer hosted a private tour of its facilities, and the delegation was invited for a session on biomimicry (a leading-edge initiative of the San Diego Zoo designed to incorporate lessons learned from nature to enhance product development, scientific discovery, and R&D in a broad range of disciplines).

Following the conference, the UTEN delegation was invited to visit a number of administrative, academic, and research units related to international partnerships at three premier California universities: University of California Irvine, University of Southern California, and University of California San Diego. These activities included an entrepreneur's forum at UC Irvine, a visit to the Office of Technology Commercialization at USC, and a visit to the School of Engineering at UCSD. These hosts arranged meetings with professors, administrators, and senior university officials. UTEN looks forward to continuing the international dialogue with these institutions and exploring avenues for potential collaboration and exchange.



3.7 UTEN Annual Conference

UTEN Portugal's second Annual conference was held October 25, 2010 at the New University of Lisbon, Reitoria UNL, Campolide Campus. The conference was opened with presentations by:

- João Sentieiro, *President, Foundation for Science and Technology*
- António Rendas, *President, Council of Rectors of the Portuguese Universities*
- José Mariano Gago, *Ministry of Science, Technology and Higher Education*
- David Gibson, *Associate Director, IC² Institute, The University of Texas at Austin.*

The conference keynote lecture was given by Kevin Cullen, *Director of Research & Enterprise, University of Glasgow* in a session chaired by João Guerreiro, *Rector, University of Algarve* with discussants Telmo Vilela, *INPI, Instituto Nacional para a Propriedade Intelectual* and Rodolfo Condessa, *TT@IST, Instituto Superior Técnico.*

Session I, "New Challenges in S&T Commercialization Case Studies," was co-chaired by José Castanheira da Costa, *Rector, University of Madeira;* and Maria Amélia Loução, *Vice Rector, University of Lisbon.* Session discussants were Pedro Silva, *TecMinho, University of Minho* and José Ricardo Aguilar, *Instituto Pedro Nunes, VCI.* Four case studies were presented:

- Kytogenics /Genmap, Inc., Ashley J. Stevens, *Special Assistant to the Vice President for Research,*

Technology Development, Boston University, Co-founder and Director of Kytogenics, co-founder and General Manager of Genmap, Inc.

- Tomorrow Options, Paulo Santos, *CEO;* Maria Oliveira, *UPIN, University of Porto*
- PETSYS, Pedro Almeida, *Board Member*
- NANOGAP, José Rivas, *Founder.*

Session II, "International partnerships leveraging access to international markets," was co-chaired by Jorge Gonçalves, *Vice Rector, University of Porto* and Carlos Pascoal Neto, *Vice Rector, University of Aveiro.* Discussants were José Paulo Rainho, *UATEC, University of Aveiro;* Alexandra Marques, *CRIA, University of Algarve;* and Nuno Silva, *ULInovar, University of Lisbon.* Three cases were presented:

- Medipix, Giovanni Anelli, *Technology Transfer Officer, CERN,* Emir Sirage, *FCT, ILO for CERN, ESO, ESA, ESRF*
- Paper-e®, Rodrigo Martins, Elvira Fortunato, *Centro de Investigação de Materiais (CENIMAT|I3N) FCT-UNL,* Dina Chaves, *Technology Transfer Office, FCT-UNL*
- Feedzai, Nuno Sebastião, *CEO, in collaboration with the Carnegie Mellon|Portugal Program.*

Session III was on "New Technology-Based Firms for International Markets" and was co-chaired by Fernando Ramôa Ribeiro, *Rector, Technical University of Lisbon* and Paulo Esperança, *Pro-Rector, ISCTE-IUL.* Discussants were Luis Mira, *INOVISA, ISA-*

UTL, *Technical University of Lisbon*; Gonçalo Amorim, *Innovation and Entrepreneurship Initiative Program, AUDAX, ISCTE-IUL*; and Carla Mascarenhas, *Technology Transfer Office, University of Trás-os-Montes e Alto Douro*. This session featured four winning projects from the ISCTE IUL-MIT Portugal venture competition:

- *Life Sciences: Plux*, Creating innovative solutions for Healthcare, Sports and Scientific research by Hugo Silva
- *Sustainable Energy & Transportation Systems: Waynergy*, A technology based company to act on renewable energy and energy efficiency markets by Francisco Duarte
- *IT & Web: Bips*, Bluetooth Indoor Positioning System by Roberto Colazingari
- *Other Products and Services: WeAdapt.Eu*, The inclusive fashion store by Miguel Carvalho.

The closing session of the conference was chaired by António Rendas, *President, Council of Rectors of the Portuguese Universities* and featured a presentation of the UTEN Survey on Technology Transfer and Spin offs in Portugal by Aurora Teixeira, *School of*

Economy of the University of Porto and James Jarrett, *IC² Institute, The University of Texas at Austin*. A conference wrap-up was presented by José Manuel Mendonça, *UTEN Scientific Director*; David Gibson, *UTEN Director, UT Austin* with closing remarks by Manuel Heitor, *Secretary of State of Science Technology and Higher Education*.

2011 Conference Agenda

The UTEN Annual Conference 2011 is scheduled for November 14, hosted by FEUP, U.Porto. This third annual conference takes place in tandem with the *Iberian Expert Workshop: Strategic Approaches for Knowledge Transfer and Intellectual Property Management from Universities and Public Research Organizations*, organized by the European Commission. The morning session of the UTEN conference and the workshop will take place jointly; in the afternoon, both events will proceed in separate parallel sessions. The planned agenda and invited speakers includes:

- Opening Session
 - » José Mendonça, *UTEN Scientific Director, President of INESC Porto*
 - » Antonio Rendas, *President of CRUP*



- » João Guerreiro, *Rector, University of Algarve*
- » Jose Carlos Marques dos Santos, *Rector, University of Porto*
- » Robert Peterson, *Associate Vice President for Research, UT Austin*
- » Francisco Larios, *Ministry of Science and Innovation (Madrid, Spain)*
- » Leonor Parreira, *Secretary of State for Science, Ministry of Education and Science*
- Panel I – Emerging challenges in technology transfer and commercialization
 - » Moderator: João Guerreiro, *Rector, University of Algarve*
 - » Keynote speaker: Rick McCullough, *VP Research and Lord Professorship of Chemistry at Carnegie Mellon University, Pennsylvania, US*
 - » Discussants:
 - José Mendes, *University of Minho*
 - Teresa Mendes, *IPN, University of Coimbra*
 - Luis Mira, *INOVA, ISA, Technical University of Lisbon*
- Panel II – Professionalizing technology transfer and commercialization: challenges and opportunities for career development
 - » Moderator: Robert Peterson, *Associate Vice President for Research, UT Austin*
 - » Keynote speaker: Søren Hellener, *Office for Research and Innovation, Technical University of Denmark*
 - » Discussants:
 - José Ricardo Aguilar, *IPN and University of Coimbra*
 - Nuno Silva, *ULLInovar, University of Lisbon*
 - Aurora Teixeira, *FEP, University of Porto*
- Round Table discussion: Career development in technology transfer and commercialization in Portugal
 - » Moderator: José Mendonça, *UTEN Scientific Director, President of INESC PORTO*
 - » Brief testimonies:
 - Maria Oliveira, *UPIN (Internship at MIT/Boston University)*
 - Pedro Silva, *Tecminho (Internship at University of Texas at Austin)*
 - Ana Rita Remígio, *UATEC (Internship at South Texas Technology Management)*
 - Sofia Vairinho, *CRIA, University of Algarve (Internship at CMU/Cambridge Enterprise, UK)*
 - Luís Serina, *FCT (Internship at European Space Agency)*
 - João Simões, *UC (Internship at Carnegie Mellon University)*





4. Technology Commercialization Activities

“It is very gratifying to recognize that universities and other networks like UTEN are having an increasingly prominent role in the structuring of business opportunities and activities for technology transfer, not only through competition of ideas and business plans built, but also training around these specific topics.”

Goncalo Amorim
ISCTE-IUL Program Director

4.1 The ISCTE-IUL MIT-Portugal Venture Competition

The ISCTE-IUL MIT-Portugal Venture Competition is the largest technology-based entrepreneur's competition in Portugal. This international venture competition launched last year as the result of comprehensive research based on the existing entrepreneurship programs and business plan competitions in Portugal and the US. Over the past two years, more than 160 teams have entered the annual competition in which 20 teams emerge to pitch their ideas to a packed house of an enthusiastic audience. The 2011 competition calendar follows:

2011 Competition Calendar

February 14	Universities road show begins
March 10	Open for submissions
May 15	Submission deadline
June 30	Semifinalists announced
July 13 - 15	3-Day Crash Course
September 22	Track finals
November 17	Grand finale

On June 30, a nine-member jury panel (see table 4.1) selected 20 semifinalists (five teams from each of the four technology tracks) to participate in an intense hand-on approach boot camp (E-teams I). Semifinalists then were assigned weekly workloads and deliverables. Throughout the summer, 50 one-hour meetings facilitated coaching of individual teams. Semifinalists submitted their final Go-to-Market plans in early September, and presented three-minute elevator pitches at the Track Finals event in September 22.

Specialist Jury panels selected and announced the four finalists; Caixa Empreender+ awarded each of these four teams 100,000€ in financial support to implement their Go-to-Market plans. From these four finalists, a Grand Finalist will be selected, who will see its prize doubled to 200,000€. Each of the four finalists can double their awards upon meeting a set of individual milestones established to minimize investor risk. A subset of these projects will be invited to Cambridge, Massachusetts in the Spring of 2012 to network with entrepreneurial and innovation thought leaders, investors, angels, VCs, and other early stage US-based ventures. Figure 4.1 provides an overview of the competition process.

Venture competition goals & differentiating aspects

Goals of the venture competition are to:

1. Identify and reward projects at an seed/early stage with a clear global value proposition
2. Enable a 10x to 20x pre-money valuation for competition finalist projects in initial two to three years of venture phase
3. Connect the finalists (global innovators) to global investors.

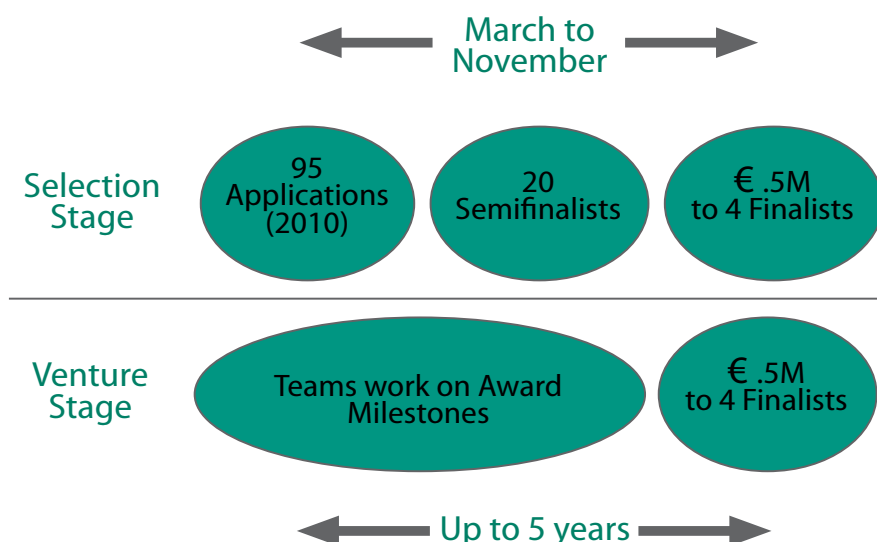
The ISCTE-IUL MIT-Portugal Venture Competition differs from typical business plan competitions as it promotes technology-based ventures to enter the global market place. Unique features include:

- Providing up to 1M€ in prize monies and in-kind contributions to be awarded to the eight finalist teams (four winners and four honorable mention awards).
- Fostering entrepreneurial attitudes and learning-by-doing.

Table 4.1 Jury Structure for Semifinalist Selection

	Jury Structure	Judge Representative	Affiliation
Judge 1	MIT Judge 1	Charles Cooney	Director of Deshpande Centre for Technological Innovation
Judge 2	MIT Judge 2	José Estabil	MPP-IEI Program Director, MIT
Judge 3	Award Partner	José Furtado	CEO Caixa Capital / CGD
Judge 4	Strategic Partner	Esmeralda Dourado	Member of the Board, SAG SGPS
Judge 5	Expert 1 (Track 1)	Nuno Arantes de Oliveira	Founder & CEO of Alfama Pharmaceuticals
Judge 6	Expert 2 (Track 2)	José Jesus	Co-founder Dueto SGPS
Judge 7	Expert 3 (Track 3)	José Basilio Simoes	CEO Intelligent Sensing Anywhere
Judge 8	Expert 4 (Track 4)	João Neto	CEO Diligence Capital
Judge 9	ISCTE-IUL Dean	José Paulo Esperança & Gonçalo Amorim	Vice Rector & MPP-IEI Program Director, ISCTE-IUL

Figure 4.1 The ISCTE-IUL MIT Portugal Venture Competition Process



- Motivating long term results: half of the financial prize is awarded upon selection (500,000€), and the other half upon fulfillment of mutually agreed upon milestones, actions and time scales.
- Engaging 20 semi-finalist teams with unique educational experiences including hands-on boot camp (E-teams), delivered by ISCTE-IUL and MIT’s Sloan faculty and staff. This is a unique international catalyst program supporting a 9- to 12-month venture phase with these teams.
- Providing networking and industry linkages opportunities, including the Boston/MIT entrepreneurial ecosystem events.

Submissions and selection process

A partnership with JC Decaux facilitated a nationwide MUPI campaign with media coverage (TV, newspapers, social networks) as well as street publicity. Information about the competition was also spread via the Internet (www.mitportugal-iei.org, Facebook, LinkedIn, Twitter), and a monthly newsletter launched in March. Sixty teams entered this year’s competition which, in total, represented 230 professionals, researchers and students from Portugal and, for the first time, Belgium, Spain, the

United Kingdom, the United States, and Argentina, increasing the impact of competition internationally.

Over half of the teams in the 2011 competition were technology-based startup companies (see table 4.2). Across the four tracks of the competition, about 50% classify as *Information Technology and the Internet*, 20% as *Products and Services*, 18% as *Life Sciences* and 13% as *Sustainable Energy and Transportation*. This year’s competition strategy focused on identifying the most market-ready candidates.

Startup companies comprised a large portion (48.7%) of the submissions (see table 4.3). Submissions were screened by Program Directors and then placed before the jury for ranking. The jury included academic and professional members who ranked the entries against the following criteria:

1. *What is the fit of each team member with the project?* Describe each team member’s core knowledge and expertise, as well any areas of competence needing to be developed within the team. Be as open and honest as possible. Describe the team’s access to knowledge and expertise in any specialist field outside yours, which is required to your solution (i.e. product/service).
2. *How big is the problem you are trying to solve?* Provide a short description (a two to three sentence

Table 4.2 All Submissions by Track

Track	# Submissions	%
IT & Web	29	48.3%
Consumer Products & Service	12	20.0%
Life Sciences	11	18.3%
Energy & Transportation	8	13.3%
Total	60	100.0%

Table 4.3 Startup Submissions by Track

Track	# Startups	%
IT & Web	11	39.3%
Consumer Products & Service	8	28.6%
Life Sciences	5	17.9%
Energy & Transportation	4	14.3%
Total	28	46.7%

statement) to describe your customer and the problem that your product/service will help solve. Characterize clearly and quantitatively how existing solutions (competitors) currently meet the this need.

3. *What is the technology that underlies your product or service and in what way is your solution unique vis-a-vis to existing ones?* Quantify the importance of managing an Intellectual Property (IP) protection strategy for your solution. Describe your current stage of technical development, and the next critical steps needed to make your solutions market ready. Participants must refrain from disclosing confidential information (i.e. do not describe how your technology works), but rather explain what your product/service supplies and how it meets your customers' needs.
4. *What makes your product or service innovative? How?* Clearly describe your solution and the benefits for the customer and how it overcomes the problems identified in item 2. Be as quantitative as possible to describe benefits such as cost or performance advantage.
5. *What is the market and its size? Is there an opportunity for global impact?* Describe the market characteristics (margins; consolidation, other) and the ways in which your value proposition is an attractive investment opportunity, including financial return. Focus on the sizes of the *total market* and the *addressable market* respectively, and describe what economic, political, regulatory issues may limit market access. It is equally important to establish the market's growth profile, and its foreseeable growth potential. Always quote and reference your sources.
6. *What are the major legal considerations and risks?* Today's global investors expect companies to apply international best practices to help minimize risks and achieve project objectives. Such risk management needs be balanced with the opportunities presented in a timely and cost effective manner. Clearly identify the main risks involved in the project, starting with team. Document the risks and severity of any legal/regulatory risks entailed (i.e. international standards, FDA/EMEA clinical trials, IP

disclosures and protection strategies). Provide a discussion of the budgetary implications of dealing with the above risks, being honest about possible costs, no matter how uncertain such estimates may be.

E-teams / Boot Camp Training

Five semifinalists in each track were announced on June 30, 2011 (see table 4.4). The entrepreneurship teams (E-teams) were invited to a boot camp held at ISCTE-IUL from July 13 to 15, 2011. The boot camp was attended by 57 out of 81 team members, with representation from all 20 teams. The syllabus consisted of five main areas to help the teams develop their competitive edge:

1. *Team building* (Rui Lança, Ana Rita Leal):
 - The definitions of the different roles of Belbin
 - Important rules of brainstorming
 - Concepts for new products to take advantage of the crisis situation
 - Basic presentation and non-verbal communication skills.
2. *The Value Proposition Process* (Virgínia Trigo, Vasco Trigo):
 - Entrepreneurship: From idea to market
 - Profiling the problem, mapping the opportunity & knowing the technical advantages
 - Fundamentals for communicating to non-tech audiences
 - Preparation of elevator pitches
 - Poster preparation.
3. *The Go-to-Market Plan* (Gonçalo Amorim, Walter Palma & José Paulo Esperança):
 - Competitors & differentiation; market size & structure
 - Value creation & pricing strategy; business model & IP strategies
 - Technology roadmap & development; operations & commercialization strategies
 - Financial projections & funding.
4. *Industrial Property and Companies Law* (Wolf Greenfield, Clarke, Modet & Co., Portugal, Portuguese IP Office, INPI, Cerqueira, Gomes & Associados):

Table 4.4 Semifinalists Breakdown

Track	Semi Finalist Team
Life Sciences	AlphaSIP, Blueworks, Cyclotech, Media Omics, Metablue Solution
Energy & Transportation	Actual Sun, Greenlamp, Strato Power, SunOK, Watt Intelligent Solutions
IT & Web	All-Desk, Eunoia, euPA, NetMust, One Care
Consumer Products & Services	GolMow, Hole 19, Law for All, Musikki, wi-GO



- IP fundamentals, European and PCT tracks
- Advanced strategies for biotechnology patents
- IP strategy development and implementation
- Companies & shareholders law, term sheets.

5. *Entrepreneurship and Innovation* (Luís Reto)

- Nicolau Santos moderated this panel discussion with Carlos Alves, João Neto, José Jesus, José Paulo Esperança, José Basilio Simões, and Paulo Trezentos.

Over 23 potential catalysts from multi-disciplinary backgrounds from the finance, industry and entrepreneurial communities met and mingled with venture competition participants during the “speed dating” portion of the program. Among them, there were three alumni teams – 2010 finalists.

Track Finals Ceremony

The Track Finals ceremony was held September 22 at ISCTE-IUL with more than 500 guests, in a universe of:

- ISCTE-IUL representatives (Rector, Vice Rector)
- MIT Boston and MIT Portugal representatives (Charles Cooney, Edward Roberts, Elazer Edelman, José Estabil)
- Members of the jury

- Companies (Caixa Capital, EDP, Microsoft, Selfenergy, Dueto SGPS, Pathena, ASK, Beta Capital, among others)
- ISCTE-IUL and MBA students
- Alumni.

Five media partners covered the event: RTP2, *Ciência Hoje*, *Aula Magna*, RUM (Rádio Universitária do Minho), RUC (Rádio Universitária de Coimbra) and *Diário Económico*, *Público*, Canal UP.

E-teams II Boot Camp Training

The four track finalists, four honorable mentions with four Go-to-Market wizards totaling 26 participants (see table 4.5), were invited to attend a three-day workshop to further develop their Go-to-Market strategies. This event took place in the week following the track finals event, September 27 to 29, and was led by MIT lecturer, Luis Perez Brea. The purpose of E-teams II was to *accelerate the rate of business development*. This workshop examines the key challenges of the teams’ Go-to-Market plans, as input to an action-based learning approach to market introduction. The curriculum builds on the i-teams approach at MIT, and was divided into three components delivered:

Day 1: Teams’ projects, boot camp pedagogy, and homework assignments

Table 4.5 Track Finalists, Honorable Mentions, and GtMP Wizards

Track	Finalist	Honorable Mention	GtM Wizards
Life Sciences	Media Omics	Alpha Sip	Cyctotech
Energy & Transportation	Greenlamp	Watt IS	Actual Sun
IT & Web	All-Desk	Net Must	Eunoia
Consumer Products & Services	Musikki	Wi Go	Hole19

Day 2: The customer decision process and developing an opportunity roadmap, high-level value chain segmentation, product positioning and introduction strategies, and homework assignments

Day 3: teams present NEW 12-slide pitch deck.

Metrics From The 2010 Edition

The key metric of success for competition organizers is the readiness of a team to pursue *Series A* funding (and in follow-on development, to secure it). *Series A* funding is defined as a company's first significant round of venture funding, typically in the range of €1 million to €5 million, intended to capitalize a company for six months to two years as it develops its products, performs initial marketing and branding, hires its initial employees, and otherwise undertakes early stage business operations.

It is difficult to accurately measure the impact of the MPP-IEI initiative since its launch in March 2010, inasmuch as many of the planned initiatives and strategies are still in the deployment stage. But initial inquiries show that, out of the 20 semi-finalist teams of 2010, eleven teams have raised an average of 217,250 €, showing a median of 250,000 €, with a maximum of 1,000,000 €, and a minimum of 80,000 €. Inquiries are still under way to determine the number of jobs created by these companies.

Caixa Empreender+ Awards

Total financial award of the competition is up to €1 million. Awards are provided to the founding shareholders of the four Finalist teams. This financial support is granted solely upon formation of the company and solely for development and commercialization of the winning project, consisting of a technology-based product/service. This also applies to existing companies. There is a fixed and variable component. The fixed component (50% of the financial award) is provided upon completion of the selection stage. The remaining 50% is dependant on the company fulfilling its critical milestones (technical and commercial) set for the venture stage.

These milestones are negotiated between the organizers of the competition and individually with teams. Milestones typically include six commercial goals and six technical validations, all of which, combined, are meant to enable a sound valuation

using established methods. Such valuation goals are in the range of €2 to €4 million, as a minimum. All four winning finalist teams have access to these variable components:

- €200,000 to the Grand Finalist, which includes a €9,900 cash prize
- €100,000 to each of the three track finalists, which includes €4,900 cash prize.

In all cases, Caixa Capital will be entitled to a €100 shareholding (which meets the minimum requirement under Portuguese law for a venture capital organization).

Competition organizers have conducted extensive analysis of the use and outcomes of several prizes and have determined that the most important single aspect of such a prize is not the money, but rather the support provided to teams in, for instance, *getting ready* for a Series A round.

This competition focuses on helping new ventures enter the international market for long term success. That goal is not achievable with a small amount of money, as considerable resources are required to develop a global business. As such, the organizers focus on providing funding in very preferential terms meant to mitigate technical aspects and commercial validations in the initial one to two years that follow the selection stage.

Catalyst program

MIT has developed an entrepreneurial coaching process to support new ventures. This process, in place for more than 20 years at MIT, utilizes the talents of "serial entrepreneurs," who have created and sold more than one business or technology-based company. This rich ecosystem has proved to be an important success factor in the creation and high survival rate (over 75%) of more than 30,000 businesses created by MIT members.

From the moment teams are selected, organizers start working on an individual process, team to team, to identify how to maximize the chances for each project to succeed. One key program towards this goal is the Catalyst program, which aims to guide the teams to accelerate the commercialization process of their technologies for the benefit of public stakeholders. It also enables the bridging of



some competence gaps in the short term. To achieve this goal, the program invites volunteers from the global business community with experience in the issues surrounding innovation, technology commercialization, entrepreneurship, and legal aspects of the business ventures, to participate. These experts are matched with teams to address their gaps. They do not represent any company interests in their role as Catalysts.

The program starts at the end of the E-teams I Crash Course. Catalysts are asked to personally meet with their teams for one hour, at least twice a month, and maintain regular communication availability via e-mail and/or phone. They will work together for 9 to 12 months to mitigate risks, make contacts with investors, accelerate testing, and identify actions needed to take the solution to the market quickly. In case of finalists and Grand Finalist, catalysts are asked to meet no less than one time per month.

Closing Remarks

Despite a decrease in the number of submissions (95 in 2010 and 60 in 2011), the second year captured the interest of a larger number of more mature startups with stronger value propositions and stronger teams. International participation increased (13.6%) to countries like Argentina and Belgium, thus revealing a growing interest from the international tech-based community.

In little over a year, the MPP-IEI has branded itself to key stakeholders, including top investors, as a must-attend event. It has established itself as an engine for innovation and technology-based entrepreneurship, both nationally and internationally. This attracts innovators and technologists as they seek new opportunities in a global marketplace. This important initiative will continue to have a measurable impact in the creation of an entrepreneurial ecosystem in Portugal: fostering durable bonds with investors and business catalysts, while developing a strong Alumni network of entrepreneurs.

Semifinalist Companies

Track: Life Sciences

Alpha SIP is a medical diagnostic laboratory developing a digital biochip that instantly measures the electrical signals produced by an antibody during an immune response. The chip ASIP allows fast patient diagnostic and monitoring. Based in the Spanish Business Innovation Centre (CEEI) of Zaragoza, AlphaSIP is also present in Barcelona, Madrid and Boston. The Company's strategic partnership with Alpha Szensor Inc., an American semiconductor company and access to more than 400 patents licensed from Harvard University, guarantees best of class and robust sensor platform.

BlueWorks is a company dedicated to the development of innovative solutions to support both clinical

and research decisions in ophthalmology. We act in the fields of early screening of visual diseases, information integration for improved clinical workflow and support research through data-mining, remote validation of patient compliance to therapy. Our team of four biomedical engineers has over three years of experience working inside the most differentiated and productive private ophthalmology clinic in Portugal.

CYCLOTech is a high-tech multi-skilled, multi-disciplinary team, named after its core project, a “Method for direct production of 99mTc-Technetium using cyclotrons.” This radiopharmaceutical is used in about 80% of all nuclear medicine procedures (around 35 million per year) representing more than three billion euros in the global market. Current production methodology is based around five very old and obsolete nuclear reactors. CYCLOTech has developed an innovative proprietary methodology using cyclotrons (existing around 450 cyclotron centers worldwide) to directly produce the 99mTc.

Media Omics: Biomedicines provide a new generation of therapeutics to treat complex diseases. The production of these compounds is based on cell cultures with low yields, high production costs and systemic capacity shortage. MediaOmics has a patented technology to design high performance culture media, a market worth 0.80 billion USD. Our technology is of broad applicability to any cell type, enabling doubled productivity, cost reduction, and spared production capacity, helping pharmaceutical companies getting more from their cells.

MetaBlue Solutions: Otitis affects 93% of young children up to seven years old. Metablue’s otoscope is a diagnosis device which incorporates an optical technology to measure color changes in the tympanic membrane. Unlike traditional otoscopes designed only for professionals it is user friendly. For households around the world, a timely diagnosis helps avoid doctor’s appointments, unneeded antibiotics, and sequel infections, allowing great savings for families and health systems.

ActualSun is a business analytic solution for solar parks. It provides access to independent, reliable, scientifically rigorous and elegantly presented data to investors and insurance companies, helping them to manage their investments and risks. ActualSun collects relevant real-time data into an online platform, comparing solar irradiation, the actual sun, with the expected and the actual electricity output. The four dimensional service installs, connects, compares, aggregates & analyzes solar resources and plant performance data.

Greenlamp C&C is an intelligent LED lighting system, devised to save lighting energy in buildings by reducing lighting wattage and usage: “just the right amount of light only when needed.” Real-time information and analysis on usage helps users achieve further savings. Conceived in 2007, with a provisory

pending patent, development was outsourced. Production started in May 2011 and software will start beta testing next quarter. IS GREEN II, created in April 2011 to commercially exploit Greenlamp C&C. Funding is under negotiation with Caixa BI.

Strato Power: The project is intended to develop and exploit an airborne wind turbine. The higher altitude in relation to conventional wind turbines will allow it to use faster and more reliable winds. This turbine is designed in a way where it can be installed offshore, in depths far higher than conventional offshore turbines allow exploration of previously unusable areas. It’s also designed in a way where it can be assembled on land, to increase safety and reduce costs, and then allowed to float up and be towed into position where it can be installed in a matter of hours.

SunOK has marketed the best solar oven worldwide for three years. Sales have been growing but the consumer trend to adopt natural materials is being increasingly felt. Consequently SunOK started the design of a new oven with iconic design and a high proportion of cork. Social responsibility will be emphasized by making clear for affluent customers that sales will subsidize lower cost ovens for poorer people. An investment of 100.000€ will enable us to accelerate these undergoing developments and guarantee an adequate 2012 world product launch.

Watt Intelligent Solutions provides high value-added services to electricity suppliers that will contribute towards a better understanding of the consumption patterns on the residential sector by analyzing the data collected by smart meters, which are being deployed worldwide. Watt-IS will enable suppliers to have proper consumer segmentation in the residential sector without requiring any additional investments.

Track: IT & Web

All-desk is a platform that allows workers to find the best place for them to work, when and where they need it and for the time they need it, while at the same time allowing owners of under utilized space to monetize it. We aim to take advantage and support the changes currently happening in the ‘work’ world while at the same time allowing under utilized spaces like offices, NGOs, universities, hotels, golf courses, airports, train stations and why not, even houses, to monetize their areas.

Eunoia seeks to redefine how digital media is distributed by enabling reselling of previously purchased content. Our model eliminates 35% of the total costs in purchasing digital content, and allows for a near “zero marginal cost” market. This proprietary solution enables customers to become active resellers and be part of the value chain. This proposal supports market growth by promoting the reduction of illegal copying and eliminating the barrier for entry of new content providers.

euPA We are facing a major social problem due to population aging (45 million in EU, 2008). With aging several chronic conditions appear requiring constant monitoring. This brings a problem to elders as independency is lost. In this context we've developed the mobile application euPA; a solution that connects sensors to mobile technology, providing real-time assistance. It contains a full panic response that sends alarms, position, and vital signs to a pre-defined contact, complemented with an advanced fall detection system.

Net Must Internet and digital technology created serious challenges in terms of Intellectual Property (IP) protection and management of digital content assets, for both end-users, be they content right holders or content distributors and rights collecting and distributing societies. The purpose of NetMust is to provide a set of IT-based services oriented towards the empowerment and digital enablement of all these actors while addressing the digital content rights management challenges posed by this digital age, and by traditional uses (public performance and broadcast) adding value to the content provided by associated authors, producers, and performers – and offering better and faster services to the digital content business and individual end-users.

OneCare The increase in chronic diseases and the aging population are affecting the quality of life of people and rising healthcare costs. OneCare focuses on prevention, allowing remote, continuous monitoring of a patient's wellbeing and health condition. Users measure their vital signs in the comfort of their homes. Caregivers are notified if there is a change in the patient's condition and provides patient follow-up via a web portal. OneCare offers a better quality of life while improving care delivery and reducing costs.

Track: Products & Services

GolMow is an industrial autonomous system that allows mowing any surface without any operator to control the machine. This is an unmanned ground vehicle that is fully electric and able to move in located outdoors. The traditional lawn mowers are driven by an operator, moving by fossil fuels and have high costly maintenance. It is precisely in these three components that an autonomous system can reduce the costs of operation at golf courses. GolMow will enable golf courses to reduce 60% of its high operating costs maintaining the lawns.

Hole19 is where golf performance optimization meets social networking. Hole19 is a caddie-in-your-pocket: a mobile app that supports golfers with information on the golf course complemented by an online platform allowing golfers to analyze & share their results with instructors that can help them to improve. We also provide complete golf course profiles including the possibility for golfers to book tee-times. We connect the world of golf by

integrating golfers, golf instructors and golf courses all into one platform.

Law for All focuses on making the lives of individuals and businesses easier and more efficient by offering a web-based solution to a global need: it allows people to access and understand various legislation that affects us on a daily basis without having to pay for lawyer fees. Law for All will revolutionize the way companies and individuals have access to and perceive the law. In its website Law for All will display legislation in plain language, in a simple format, translated into many different languages, at accessible cost and always updated. This solution can be transposed into a number of different countries worldwide so as to explain different national laws and legislation. This project is about demystifying the law and democratizing citizens' and companies' access to and understanding of the law.

Musikki is a music search engine. With just one click it is possible to get all the information in one unique page result. Unlike Google, which results in a page of several links to each one of its sources, Musikki data is retrieved from different locations, then structured and presented to the user in one unique page layout. With just one click the user assembles in one page the artist's biography, videos, photos, concert agenda and discography, among other things, generating a dynamic music artist profile.

wi-GO is an autonomous device that is being developed to follow a given disabled person wherever he/she goes, enabling him/her to carry objects autonomously and in a dynamic way, avoiding obstacles and hazards. The dimensions of the prototype, already developed and tested in a shopping mall, are about $1m \times 0,50m$. The current loading capacity is approximately 50 kgs. wi-GO is unique, and we have filed a patent. The solution can be used in airports, shopping malls, hospitals, stores, at people's homes and in open space environments. Our preliminary contacts suggest that our solution could help them improve accessibility, differentiation and thus an opportunity for increased profitability.

4.2 US Connect: Pilot Program, IC² Institute, UT Austin

Business Development & Commercialization

Essential tasks for any technology transfer professional are the promotion of licensable technologies, promotion of spin off companies, and advancement of their related products and services. UTEN has continually provided a mix of portfolio review, technology analysis, and networking and business development services that was focused for training technology transfer managers and staff while providing material benefits to the technologies emerging from Portuguese institutions. Through most of the UTEN program, these efforts focused on upstream (early stage) research and emerging



technologies. US Connect is a pilot UTEN initiative in which the IC² Institute works with startup entrepreneurs to focus on business development that will help them enter international and US markets.

UTEN Years 1 through 4: Capacity Building & Results

In Years 1 through 4, UTEN focused primarily on the early commercialization pipeline, consistent with the UTEN theme of training TTOs by focusing on research emerging from Portuguese institutions. These efforts consisted of four elements: portfolio analysis, technology analysis, training, and networking/business development.

Portfolio Analysis

Through support from GAPI, and its related offices established at Portuguese public universities, a number of Portuguese TTOs developed technology portfolios prior to the start of the UTEN program in 2007. To varying degrees, this portfolio development had created challenges related to:

- Procedures for vetting of technologies
- Budget concerns in supporting large patent portfolios
- Optimal strategies for patenting in the portfolio decision-making process.

UTEN addressed these issues systemically through workshop training in the application of the *RapidScreen* early commercialization evaluation process. The *RapidScreen* process is a method to assess, in four to eight hours, the viability of an early stage technology for commercialization. *RapidScreen* examines the early stage commercialization issues of inventor support, institutional support, development

status, IP status, ownership, market size, and market relevance.

RapidScreen assessments were performed in collaboration with Portuguese technology transfer office staff for 69 technologies. Working independently, Portuguese staff performed *RapidScreen* assessments on an additional 25 technologies. Through this process, TTO staff were trained in the issues most relevant to early commercialization decisions, and to determine which technologies were most worthy of continued support. These procedures also provided the opportunity for UTEN participants to essentially survey Portuguese technologies across geographic regions and fields of interest, as they captured this information in a database that is now available on line at the UTEN Technology Portfolio web site (www.techportugal.com, see figure 4.2). Currently, 162 technologies are in the database.

Technology Analysis

The most competitive Portuguese S&T technology ventures were selected for an in-depth *MarketLook* assessment which is a 40- to 60-hour analysis to help reveal the voice of the market. Unlike most market assessments that rely on secondary research, *MarketLook* relies heavily on primary research – to initiate interviews with potential customers, end users, partners, and expert validators in the technology's potential markets. For technologies with promise, the *MarketLook* process results in initial Go-to-Market strategies. Perhaps more importantly, the *MarketLook* process exposes assumptions, misunderstandings, and similar

challenges of the marketplace, and provides insight that gives the analyst the authority and credibility of one deeply embedded in the target market. Together, the RapidScreen and MarketLook processes help optimize the limited time available to technology transfer staff.

Training

The mission of UTEN is to help Portugal develop a sustainable, globally competitive technology transfer system. That mission is being accomplished through training of technology transfer staff and their associated researchers and entrepreneurs. The RapidScreen and MarketLook methodologies have been used to reinforce UTEN training through practical application. Both technology assessment methodologies contain many “on the ground” lessons that help reveal (and therefore avoid) pitfalls.

TTO staff from twelve Portuguese institutions received introductions to RapidScreen and/or MarketLook and applied these processes against technologies in their portfolios. RapidScreen and MarketLook can be similarly effective for university researchers (and entrepreneurs), providing a clear methodology to examine the commercialization potential of an emerging technology.

Year 5: IC² Institute Pilot Program

US Connect is a pilot program of the IC² Institute, The University of Texas at Austin working with UTEN

to help startup ventures make the transition to global markets, primarily by closing business deals in the United States. US Connect has focused on university spin offs with demonstrated success in Portuguese markets, but have yet to expand internationally.

US Connect: Stage One

The US Connect application requires companies to document success in the Portuguese market and demonstrate potential for the US market. Applicant information includes company background, product background, current users, intellectual property, potential US and international markets, perceived product benefit to these markets. Applicants are requested to demonstrate understanding of how their accomplishments to date can be strategically leveraged to achieve success in the US marketplace. Companies are selected for US Connect against four weighted criteria:

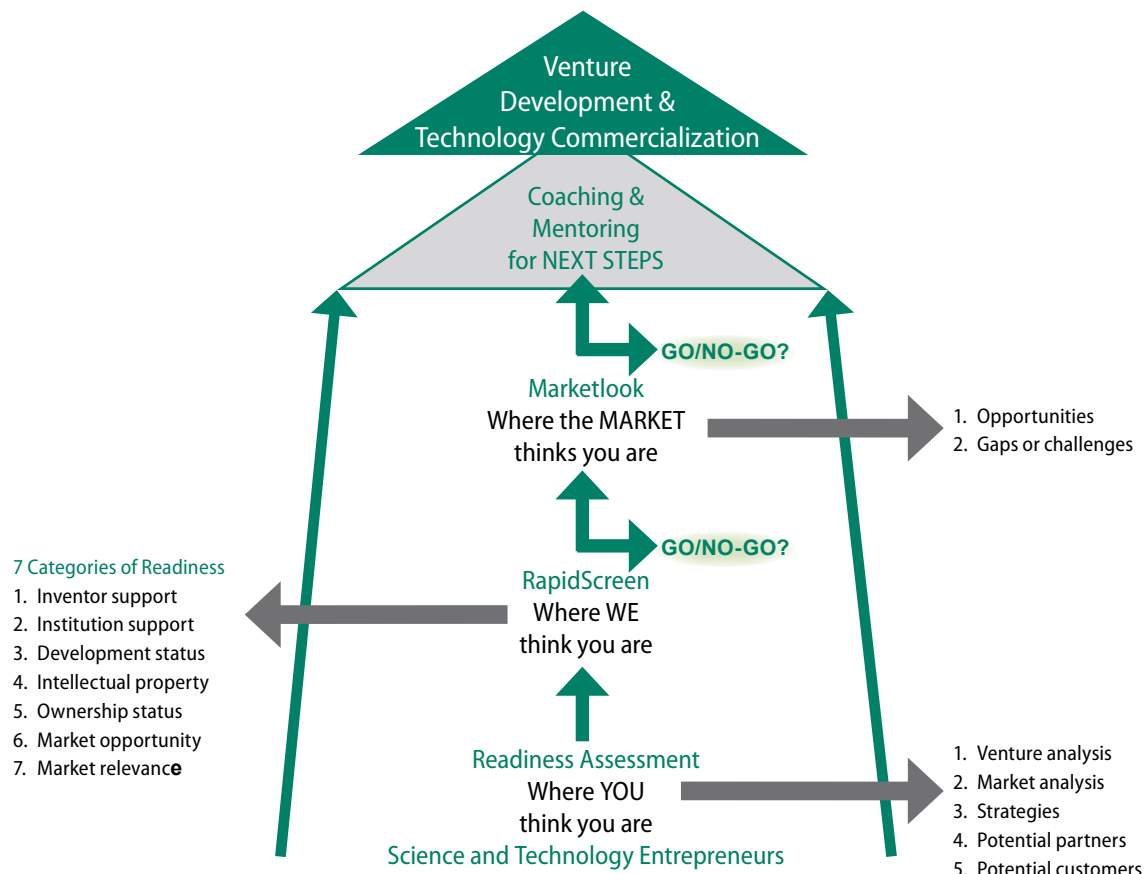
- 35%: Revenue from products and services
- 25% Prospective competitive advantage in the US from those same products and services.
- 20%: Commitment of CEO/executive staff* to make a two-week visit to the United States during Phase Two; including in-hand financial resources to support the trip, and resources to follow-through on trip results.
- 20%: A strategic fit of the company with the IC² Institute’s market making activities.

Figure 4.2 UTEN Technology Portfolio (www.techportugal.com)

The screenshot shows a web browser window displaying the UTEN Technology Portfolio website. The page title is "Welcome to the UTEN Technology Portfolio". Below the title, there is a brief description: "Our portfolio contains technologies and technology-based companies who are working with UTEN, or with UTEN partner institutions in Portugal. To inquire about these technologies, submit the inquiry form you will find on the technology's web page, or send email to info@techportugal.com." Below this, there is a section titled "Technology Portfolio" which contains a table with the following columns: Name, Sponsor Institution, Inventor, and Primary Industry.

Name	Sponsor Institution	Inventor	Primary Industry
Alert-Online		de Azeredo, Maria Joao	Software
Alfama – Small-Molecule Drugs for Inflammation Diseases		Arantes-Oliveira, Nuno	Bioscience
Bioskin – Technology for artificial skin and bone		Santos, Marta	Medical
Catalyzing Reactions with the Energy from Quantum Vibrations			
Centro de Genetica Clínica – Genetic testing services		Ferreira, Manuel	Medical Diagnostics
Continuous monitoring system for application in shock absorbers		Santos, Raul Morais	
Delphine – Economic telemedicine			Medical
EditOnWeb.com – Tagging, ontology, and semantic web			Software
Excolinhas			
Excolinhas		Lopes, Mário	
In-Place Composting of Deceased Animals			
Intelligence Sensing Anywhere – Telemetry and M2M communications			Sensors
Isotope Consulting – Radiopharmaceutical production			Medical
MODULE AND PROCESS OF EXTRACTION OF VOLATILE AND SEMI-VOLATILE SPECIES BASED ON GAS-DIFFUSION			

Figure 4.3 Technology Screening for TTO Staff and Entrepreneurs



Eleven ventures were selected for Stage One of US Connect:

- *Bioalvo*, Drug discovery and development using the company's GPS D2 platform
- *Digital Minds*, International and Internet radio for the iPhone and iPad
- *FeedZai*, Seamless integration of real-time data and historical information, producing high value analytics
- *Inesting*, Digital platform for mobile marketing
- *Inovapotek*, Consulting, research and development for the pharmaceutical and cosmetics industries
- *Plux*, A biofeedback system specifically designed for physical rehabilitation and physiotherapists
- *SilicoLife*, Computational solutions for the fast growing industrial biotechnology market
- *Technophage*, A multiplatform biotech company involved in the R&D of new molecules in diverse therapeutic areas
- *Tecla Colorida*, Official school web spaces for collaboration, communication and sharing between students, parents, and elementary school teachers.

- *Tomorrow Options*, Electronic medical device for use in clinical activities to assess the condition of patients' lower limbs and help physicians improve treatment
- *WS Energia*, Solar trackers that keep solar photovoltaic (PV) panels best oriented toward the sun.

To maximize the opportunity for positive outcomes in the US market, UTEN Austin staff works with the management of these ventures to help *a)* identify potential customers and collaborators in the US market, and *b)* improve and sharpen the marketing messages and other strategic needs. These companies receive UTEN and IC² Institute support to hear the voice of the market for their products and services.

US Connect: Stage Two

The goal of US Connect Stage Two is to conclude business deals involving contracts for sales, collaboration, or further development as dictated by the market. To engage in Stage Two activities, the CEO's and staff are expected to spend up to two weeks in the United States performing business development activities with UTEN and IC² Institute staff. Companies are selected for Stage Two US Connect training against the following criteria:

- 30%: Number of potential customers, partners, or scientific collaborators
- 30%: Commitment for needed travel to the US, including financial resources for travel.
- 25%: Potential size of the prospective deals.
- 15%: A strategic fit of the company with the IC² Institute's market making activities.

Five ventures have advanced to US Connect Stage Two, to focus on in-depth business development for international markets. UTEN and IC² Institute staff will work with these managers to define a strategic plan for the entrepreneurial venture and execute market making activities including phone calls to experts, prospective clients or partners; in-person visits to sites (with related travel); sharpen existing pitches; assist with contracts and term sheets; and other activities that progress the venture toward deal closing. These five companies include Bioalvo, FeedZai, Innovapotek, Tecla Colorida, and WS-Energia. Descriptions of the eleven US Connect companies are showcased in the following pages.

4.3 Entrepreneurship in Residence at Carnegie Mellon University

Carnegie Mellon University has launched the UTEN Entrepreneurship in Residence pilot program to help Portuguese companies enter the US market. EIR will include training, mentoring, and provide opportunities for collaborating with potential industry partners.

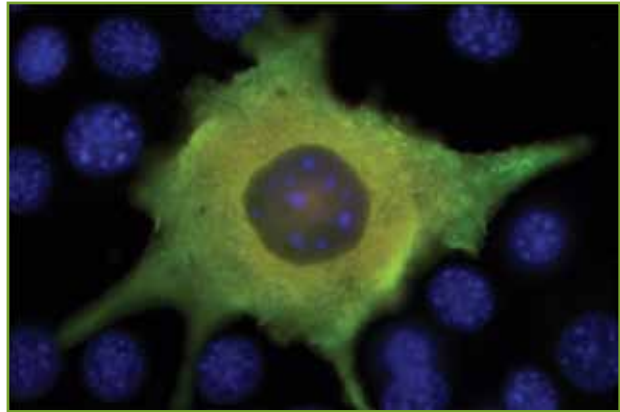
EIR team members Tara Branstad, Barbara Carryer, Dave MaWhinney, Raymond Vennare, and Michael Ranson will work with industrial participants WiZi, Dognaedis, FeedZai, ObservIT, and TreatU through a three phase process. Companies are required to commit to having one representative from upper management present at all sessions. Phase One provided a two-day workshop on how to pitch a technology venture to: 1) potential funders and 2) potential customers. Phase Two will provide further mentoring and Phase III will provide a business week in Pittsburgh for international market making activities.



Bioalvo

A US Connect Company, www.bioalvo.com

BIOALVO designs and develops several applications derived from its technology platform, GPS D2 (Global Platform Screening for Drug Discovery), aimed at the discovery of new drugs. These applications comprise entirely innovative solutions that allow the identification of a drug's therapeutic potential for unmet medical needs. Using the diverse applications of BIOALVO's innovative and patented platform, GPS D2, the company accelerates and improves the efficiency of the first stages in the discovery of new drugs, reducing significantly the duration time and, consequently, the costs of this process. Coupling this powerful tool with a unique and proprietary source of new leads – PharmaBUG Collection – Bioalvo fosters the discovery of new and more efficient drug candidates to our own and our partners' portfolio.



Digital Minds

A US Connect Company, www.digital-minds.pt

Digital Minds is a global leader in delivering local, international and Internet radio for the iPhone and iPad. The company's radio applications make it the first company in Portugal to have more than 1,000,000 downloads in the App store. With these applications, users can listen to more than 35,000 radio stations worldwide. These applications reached first place in over 40 countries in the music category in the App store.



FeedZai

A US Connect Company, www.feedzai.com

FeedZai Pulse is a turn-key “real-time business appliance” that once connected to existing data sources immediately starts producing information that matters. Uses of Pulse include real-time monitoring of bank transactions, real-time ETL of call-detail-records for telecommunication operators, smart grid energy monitoring for large scale deployments, or wind farm operational performance compliance verification. Having at its core a powerful event processing engine, FeedZai Pulse seamlessly integrates real-time data, historical information, and predicted forecasts, creating a complete platform for managing and extracting value from the huge data volumes flowing on the modern enterprise. FeedZai was featured as the only company in Gartner’s 2011 Cool Vendor’s report in the area of real-time operational intelligence.



Inesting

A US Connect Company, www.inesting.com

Designed for marketers, Inesting’s Direct100 is a platform for mobile marketing. Direct100 has no activation costs, monthly standing charges or monthly minimal usage limits. The basic features of Direct100 are SMS message transmission, support for WAP links, contact management, group management, and optin/optout capability. Other features include customized senders, detailed statistics, message history, and user management. The latest version of Direct100 adds support for voice message marketing, bi-directional communication features, and integration with online advertising campaigns with text or banner ads using Google AdWords, and for full integration of all features to create marketing campaigns.



Inovapotek

A US Connect Company, www.inovapotek.com

Inovapotek performs consulting and research and development services for the pharmaceutical and cosmetics industries. In the cosmetics industry, fast and innovative product development while assuring good stability, efficacy and safety is the key to success. To help its clients in facing this challenge, inovapotek presents a broad range of R&D and testing services, including formulation development, stability studies, efficacy, safety and acceptability evaluation of active ingredients and/or cosmetic products and also consulting and R&D management services. Pharmaceutical industries have been under pressure to reduce drug development costs and the time needed to bring new drugs to market. At the same time, the intensification of regulatory requirements has led to an increased need for development and validation of reliable analytical methods and for the optimization of formulations in order to accomplish strict stability specifications. Inovapotek provides customized formulation development services, from classic formulations to new drug delivery systems, development and validation of analytical methods, quality control studies, and also consulting and R&D management services.



Plux

A US Connect Company, www.plux.info

PLUX Wireless Biosignals focuses on creating innovative solutions for healthcare, sports and scientific research by developing devices with advanced biosignal monitoring capabilities, wireless connectivity, integration of sensor solutions with personal communication technologies and improved usability. BioPLUX clinical is a biofeedback system that includes both hardware and software components that provide new levels of usability, specifically designed for physical rehabilitation and physiotherapists as a tool to modernize clinical practice, improve physical therapy treatments, and reduce the burden to society.



SilicoLife

A US Connect Company, www.silicolife.com

SilicoLife is a company devoted to create computational solutions for the fast growing Industrial Biotechnology market. It benefits from the expertise and international exposure of the team in the fields of Bioinformatics and Systems Biology, to provide highly specialized services in an area most often absent in biotech companies. SilicoLife provides dedicated models, robust algorithms and user-friendly software tools to accelerate strain design and bioprocess optimization, accelerating R&D efforts and shortening the time to market of new biotechnology-based products. The company's services include construction and validation of models, custom software development, analysis and integration of experimental data, and contract research and consulting.



TechnoPhage

A US Connect Company, www.technophage.pt

TechnoPhage, SA is a multi-platform biotech company involved in the R&D of new molecules in diverse therapeutic areas. It was founded in 2005 by multiple researchers and Portuguese companies from the healthcare and pharmaceutical industries. Technophage is a Drug Discovery and Development company run in three business units, each of which focused on a particular technological platform: R&D of novel bacteriophage-based products, for the treatment, diagnosis and prevention of bacterial infections; the technology of Antibody Fragments; and innovative approaches to drug discovery using the zebrafish as an in vivo model system. The company has several patent applications, partnerships with several small and mid-sized pharmaceutical companies and 13 programmes in its R&D pipeline. It develops therapeutics up to CTA and expects to partner with pharmaceutical companies in subsequent stages of development.



Tecla Colorida

www.schoooooools.com

Tecla Colorida, through its product, schoooooools.com, provides official school web spaces to support collaboration, communication and sharing of schools' contents and activities between students, parents and teachers in K1-6. Schoooooools.com is designed for use in classroom, at home, and everywhere, for educational purposes. It is an appealing space to use also in leisure time, to learn by playing, chatting, etc. Features include:

- Pictures & photos
- Calendars
- Messages and private chat
- Content publishing
- Class plans
- Student information
- File Sharing
- School and Parents Portals
- LMS Integration & 3rd Party Tools Integration



Tomorrow Options

A US Connect Company, www.tomorrow-options.com

Tomorrow Options designs and commercializes electronic devices for the medical and sports markets. The company's first product, WalkinSense, was launched in 2010, as the first electronic medical device simple and affordable enough to be used in clinical activities (as opposed to laboratory analysis) to assess the condition of patients' lower limbs, helping physicians prescribe the best treatment, for medical areas such as orthopedics, podiatry, neurology, etc. The main application of WalkinSense is in diabetic foot disorders, in which US\$12 billion per year is spent in Europe and America in treatment.

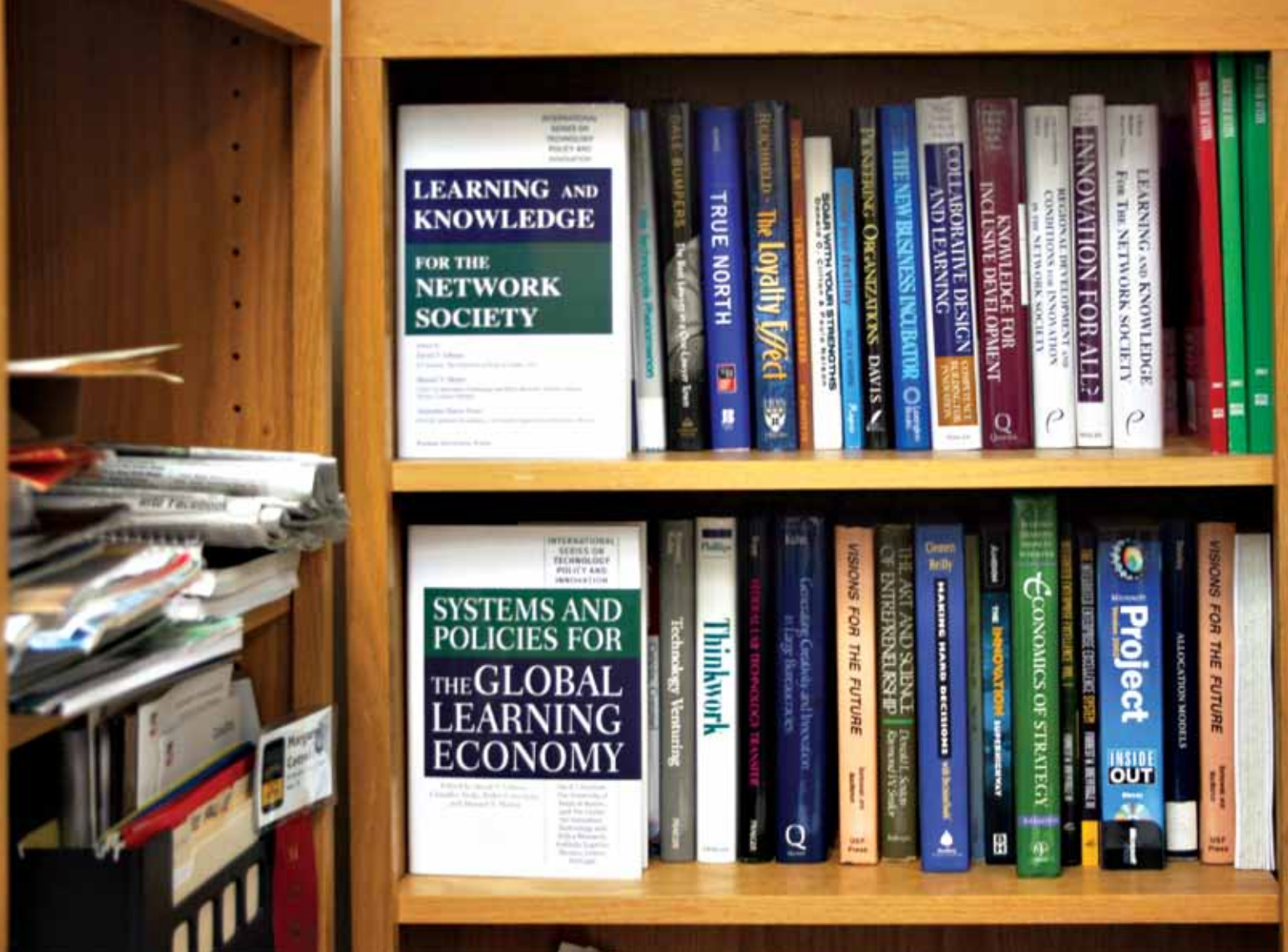


WS-Energia

A US Connect Company, www.ws-energia.com

Since 2006, WS Energia designs and produces solar trackers that keep solar photovoltaic (PV) panels oriented toward the sun throughout each day of the year. A good single-axis tracker can increase the energy yield of most PV panels 20%. WS Energia offers solar trackers capable of supporting over 80 PV panels. Their trackers have been in operation over four years in 150 sites. The WS Horizon single axis tracking system is a fully integrated solution, designed to expedite the development of solar plants. This tracker brings to the market one of the lowest cost solutions and a design that simplifies installation and reduces maintenance.





5. Observation, Assessment & Reporting

“Moreover, the analysis sustains the view that academic spin offs are a potentially useful means to boost economic development and wealth creation through their impact on employment, income generation, and internationalization prospects.”

Aurora Teixeira, Professor
Faculty of Economics, U.Porto
Associate Researcher
CEF.UP, INESC Porto & OBEGEF

5.1 Characteristics & Trends: Portuguese TTOs and Academic Spin Offs

A report by Aurora Teixeira, *Assistant Professor with Habilitation, Faculdade de Economia, Universidade do Porto; Associate researcher of CEF.UP, INESC Porto & OBEGEF*, and James Jarrett, *Senior Research Scientist, IC² Institute, The University of Texas at Austin*. James Jarrett wrote the section on TTOs, and Aurora Teixeira wrote the section on Academic Spin Offs (ASOs) with the research assistance of Marlene Grande, having benefitted from comments from James Jarrett.

1. Context

In the 1990s important changes occurred in Europe regarding technology transfer issues and the role of universities in this new institutional framework. Entrepreneurship was also recognized as a key instrument of technology innovation, and spinning off new ventures from academic labs gained acceptance in Europe as a valid method of technology transfer.

It was not until the middle 2000s though that, in Portugal, this new academic entrepreneurial wave entered effectively and explicitly into the agenda of both politicians and academics. In 2006, under the auspices of the then Minister (Mariano Gago) and State Secretary (Manuel Heitor) of Science and Higher Education, three major international cooperation programs (Carnegie Mellon|Portugal, MIT|Portugal and UT Austin|Portugal) with a central aim, among others, to promote the commercialization of scientific knowledge [1]. These partnerships mark a true paradigm shift for Portugal where academic institutions have traditionally considered that technology transfer and commercialization were outside their mission and entrepreneurship has not been as developed as in the United States and other more developed European countries.

Technology Transfer Offices (TTOs) have been established to assure professional commercialization of the knowledge generated within the universities. These developments have received extensive attention worldwide with researchers focusing initially to a larger extent on the direct implications of licensing and patenting [2]. Recognizing that TTOs are only a part (though an important one) of university knowledge spillover, [3] growing emphasis has been placed on university or Academic Spin Offs (ASOs) [4, 5, 6]. ASOs are firms whose products or services are based on scientific/technical knowledge generated within a university setting, where the founding members may (or may not) include the academic inventor [7]. In short, ASOs are firms created to exploit technological knowledge that originated within universities [8].

In what follows, we present documentation of the

main traits and dynamics of TTOs (section 2) and ASOs (section 3) in Portugal over the last decade. We argue that such trends, depicting TTOs and ASOs as key university related technology transfer mechanisms, might in large part be connected with the institutional changes observed in Portugal in this period, associated with the creation of transnational programs, namely the University Technology Enterprise Network [9].

2. UTEN Survey of Technology Transfer Offices

In 2011 the second annual UTEN network survey of technology transfer offices was conducted to develop a more comprehensive view of technology transfer in Portugal. To encourage responses, TTO directors were promised that only aggregate results would be released and that no responses from individual TTOs would be disseminated.¹ A summary of key findings follows.

2.1. Organization and Budget

Basic organizational structure: Most TTO respondents are an integral part of their institutions. One is a private, not-for-profit subsidiary of its university while two TTOs are external organizations that provide technology transfer services to multiple institutions. Several TTOs serve research institutes and other entities, such as an incubator and school of science and technology, besides their own universities.

Maturity of TTOs: Many of the TTOs are recently established. Only one TTO is at least a decade old, while another was created in 2001. The others are more recent, having been established in 2003 or later, including one in 2009 and another in 2010.

Employee duties: The number of full-time technical/professional employees ranges from 1 to 16 per office. A total of 81 technical/professional employees work in the offices of the TTOs that responded. Across the different TTOs, on average employees allocate their time to several key functions: entrepreneurship, licensing, grants, industry liaison, intellectual property, fund raising, coordinations, and other (see figure 5.1).

Budget expenditures: Resources vary considerably across the TTOs. In 2010, expenditures were €50,000 or less at four TTOs and more than €200,000 at

¹ Twenty offices were contacted. Responses were received from 18 TTOs (two were partial responses) as of late September 2011: Catholic University of Portugal, Instituto Gulbenkian de Ciência, Instituto Politécnico do Porto, ISCTE-IUL, New University of Lisbon, Technical University of Lisbon, Tecminho, University of Algarve, University of Aveiro, University of Beira Interior, University of Coimbra (IPN), University of Coimbra, University of Evora, University of Lisbon, University of Madeira, University of Porto, UTL-Reitoria, and University of Trás-os-Montes e Alto Douro. The two researchers with primary responsibility for the survey were Dr. James Jarrett of the IC² Institute and Dr. Aurora Castro Teixeira of the University of Porto. We wish to thank all of the technology transfer offices for their cooperation and effort in providing information.

six TTOs. The total resources expended in 2010 by the 16 TTOs responding to this question were approximately €3,591,500.

Sources of revenues: There is variation in the sources of revenues for TTOs, although most receive minimal funds from their universities and are quite dependent on grants to perform their functions. In 2010, three of the TTOs received no funding from their institutions, and seven others received 25% or less of their revenues from their institutions. One TTO received 95% of its budget, another received 90%, and two TTOs received approximately 60% of their budgets from their institutions. All TTOs except one obtained grant revenues in 2010. Seven TTOs received more than 60% of their total revenues from grants, five additional TTOs received more than 20% of their total revenues from grants, and two received less than 10%. Some TTOs also received revenues in 2010 from internal technical services and fees. Other TTOs received revenues from external services and fees, including two that derived at least 50% of their total revenues from those sources. On average in 2010, the TTOs received their revenues from sources as shown below, which include grants, home institutions, external services/fees, internal services/fees, and license/option agreements (see figure 5.2).

Services provided: Despite the diversity among TTOs in their budget expenditures and revenue sources, there is considerable similarity in what services are being provided. All TTOs:

- Negotiate or arrange licenses
- Raise awareness/disseminate information on intellectual property rights and entrepreneurship

Most (all but one TTO) also:

- Manage material transfer or confidentiality agreements
- Scout for new intellectual property and new technology

A majority of the TTOs:

- Assess the patentability of inventions
- Apply for patents
- Create or support start-up companies based on their institution's inventions
- Provide training to faculty, researchers, or students
- Prepare grant proposals
- Coordinate with business angel networks
- Negotiate government-sponsored research contracts/grants.

2.2. Intellectual Property and Commercialization

Scope of patenting: In 2010, all but two of the 17 TTOs performed at least 90% of the patent applications through their offices. (The other two TTOs reported handling no patent applications.)

Royalties: Fifteen TTOs provided information about royalties, and 14 reported that royalties are split between their institutions and the inventors in varying proportions.² In eight of the institutions, royalties are split 50%-50%. In three other institutions, the university receives 45% and the inventors receive 55%. In the other three institutions, the proportions

² One university retains 100% of the royalties. Last year, two universities retained all royalties.

Figure 5.1 TTO Employee Duties

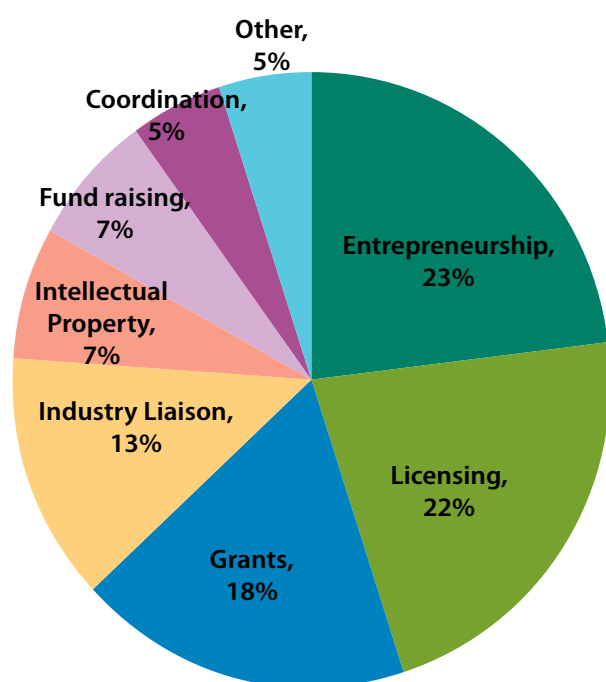
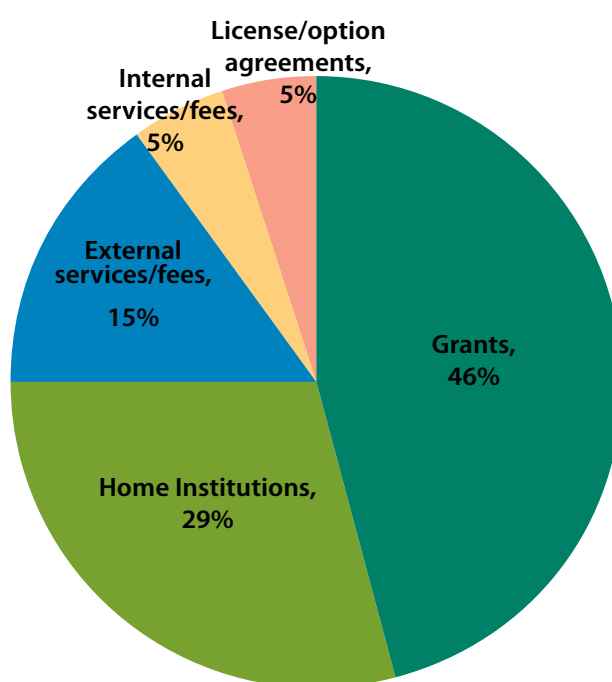


Figure 5.2 TTO Revenue Sources



were 90%, 40%, and 30% for the institutions, with the remainder for the inventors.

Invention disclosures: Compared to last year, there was no change in the number of invention disclosures reported by the TTOs in 2010. (see figure 5.3)

Patent applications (priority filings): The trend is less clear on patent applications as shown below. While the trend in provisional filings is clearly upward, in the other four categories there are no clear trends.

Patent Applications (Priority Filings)

	2007	2008	2009	2010
Provisional Filings	4	23	66	80
Portuguese	71	88	76	78
PCT	29	30	74	43
EPO	12	13	12	4
USPTO	11	17	5	11

Patents Granted: The trends has been upward or stable over time for the three categories.

Patents Granted

	2007	2008	2009	2010
Portuguese	27	35	48	45
EPO	2	6	4	6
USPTO	2	2	5	3

Active patents: In 2010, the number of active patents, by type, for all reporting TTOs is shown figure 5.3. For those TTOs reporting both this year and last year, there were major increases over the past year in the number of Portuguese patents (28% increase), PCT (80% increase), EPO (19% increase), and a 17% decrease in USPTO.³

Licenses, option agreements, and assignments: The large majority of the licenses, agreements, and assignments have been executed with Portuguese partners as shown below. That number continues to expand strongly in recent years.

Licenses, Option Agreements & Assignments

	2007	2008	2009	2010
Portuguese partners	24	32	28	56
EU Partners	4	5	5	7
US Partners	5	3	5	4
Int'l Partners	1	2	1	1

Amount of license income: The total amount of license income increased dramatically in the past year

³ Note that the increase in Portuguese patents may be considerably higher as one institution reported between 100 - 150 patents, rather than a precise number.

(see figure 5.3). While aggregate license income represented approximately 10% of aggregate TTO expenditures in 2007, and only 4% in 2009, in 2010 aggregate license income represented approximately 17% of aggregate TTO expenditures.⁴

Research and development agreements: The TTOs reported a dramatic decrease in the number of executed agreements in 2010, down 28% from the prior year, although only slightly below the two prior years (see figure 5.3).

Spin off & start-up companies: Data from the TTOs show that an increasing number of companies are being established.⁵ The total number of new companies and the total number of active spin off and start-up companies is shown in figure 5.4.⁶

Besides the increases in new companies and total companies, two different TTOs reported their institutions had each taken an equity position in one newly established company.

3. Characteristics and trends of Academic Spin Offs (ASOs) associated to UTEN partners⁷

3.1. Methodology

In 2010-2011 we identified 280 Academic Spin Offs (ASO) associated to UTEN's Portuguese partners.⁸ Out of the 280 firms, 185 constituted our target population.⁹ A part of the target population (20 firms) was unreachable (presumably these

⁴ Four different TTOs reported license income of at least €100,000 in 2010 so the dramatic increase was not due to a single transaction or single TTO.

⁵ Note that these spin off and start-up companies are not attributed specifically to UTEN involvement.

⁶ The precise number is unknown because in the first survey TTOs were provided an answer option of 25+. In the latest survey, TTOs were provided an answer option of 100+ and two TTOs selected that option. A more detailed enumeration and specific examples are provided in the next section of this report.

⁷ In a first phase we contacted 164 ASOs ('target' population) out of 280 ASOs associated to UTEN Portuguese partners. The ASOs of Avepark, Spinpark, IPN, Gabinete de Empreendedorismo da Universidade Nova de Lisboa, Taguspark, and Sinespólo were contacted in a later phase and will be included in a forthcoming report. Responses were received from 72 ASOs as of late September 2011. The two researchers with primary responsibility for the survey were Aurora Teixeira (University of Porto) and Marlene Grande (UTEN). We wish to thank all of the firms for their valuable cooperation and effort in providing the requested information.

⁸ This identification was undertaken mainly through direct search in the web sites of UTEN Portuguese members.

⁹ Due to time constraints, we opted to contact only those firms whose UTEN partners were successfully approached in last year UTEN's report, leaving aside Avepark, Spinpark, IPN, Gabinete de Empreendedorismo da UNL, Taguspark and Sines Tecnópolo, which encompass 94 ASOs. These firms will be included in a forthcoming UTEN study.

Figure 5.3 TTO Statistics: Invention Disclosure, Active Patents, License Income, R & D Agreements

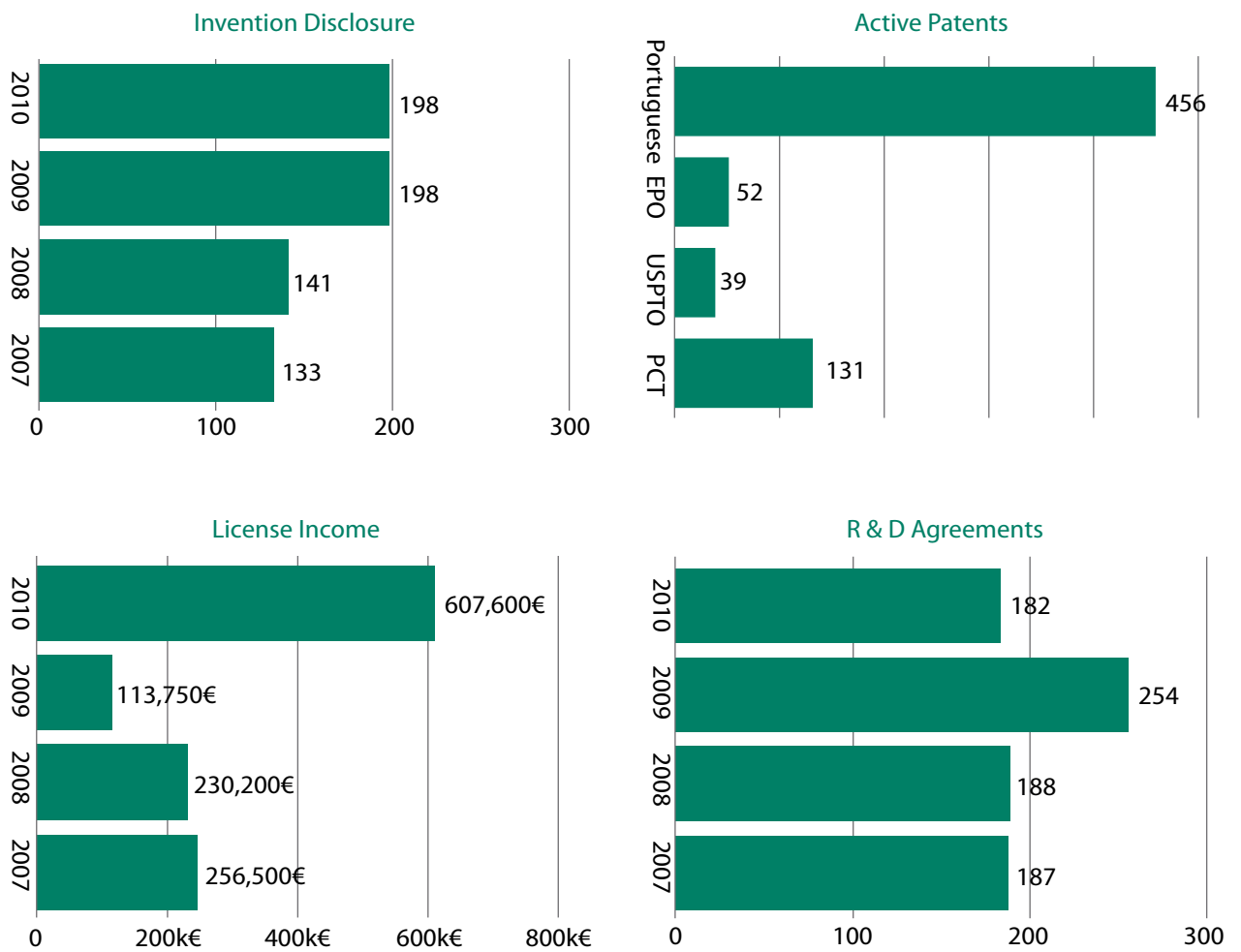
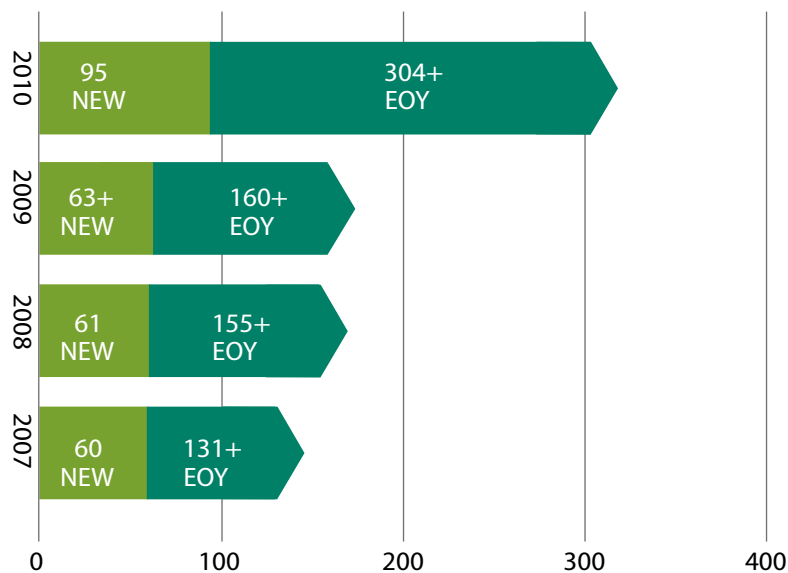


Figure 5.4 New Academic Spin Offs (ASOs) and Total ASOs at End of Year



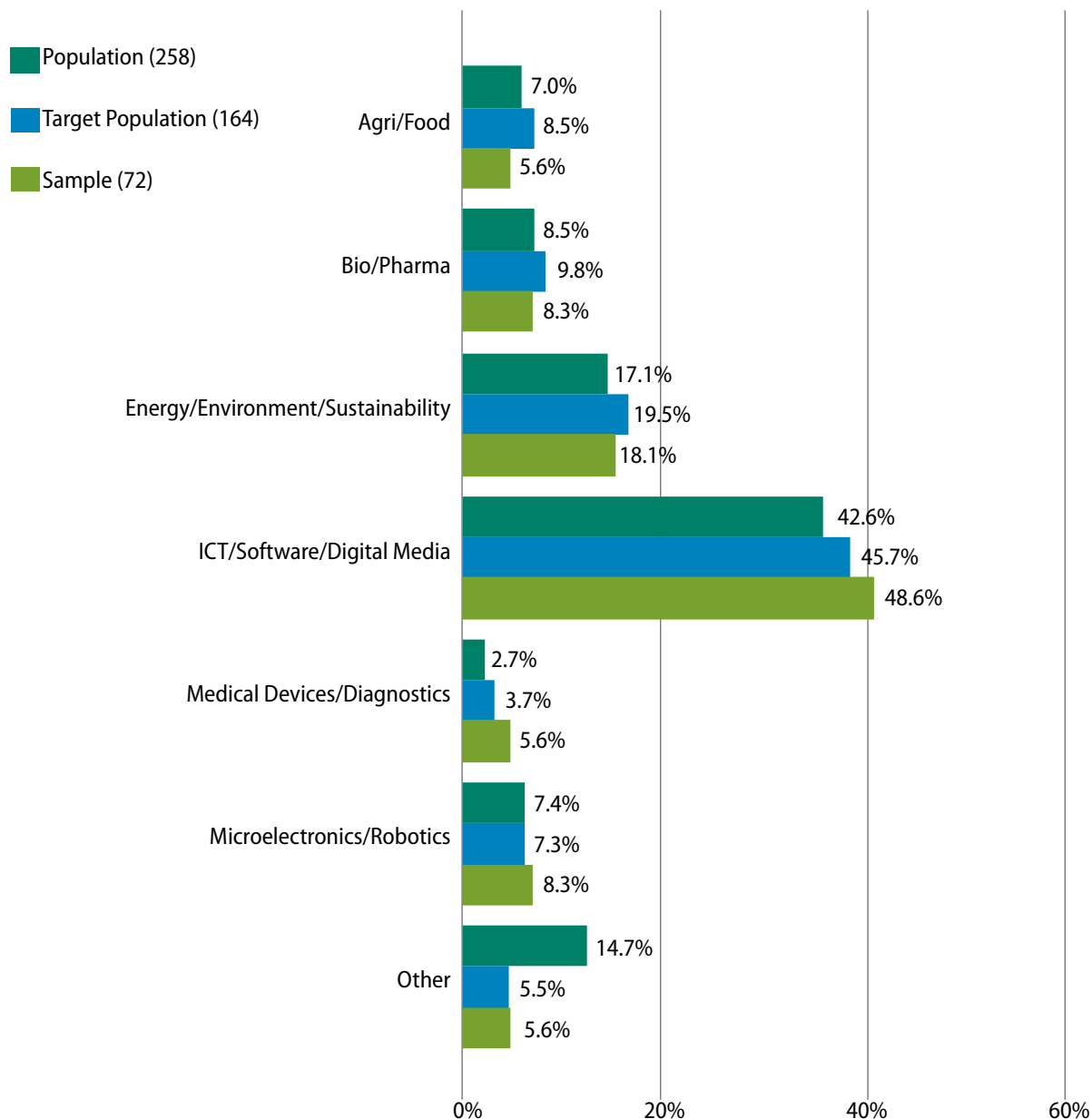
companies had ceased operations) and one left the associated entity facilities. Thus our effective target population included 164 firms. From these 164 targeted firms we managed to obtain 72 responses to a purposefully questionnaire (44% response rate).

The sample of 72 ASOs is fairly representative of the whole population in terms of sector, albeit with a slight over representativeness of the *ICT/software/Digital Media* sector, which represents almost 49% of the total sample (see figure 5.5). Regarding the associated TTO/UTEN partner and University (see table 5.1) the over representativeness of Universidade

do Porto (40% in the target population vs. 47% in the sample) and the under representativeness of Universidade da Beira Interior (14% in the target population vs. 7% in the sample) are clearly noticeable. The remaining entities present similar weights for the target population and the sample.

In terms of location (using as reference the territory unit NUTs II) we observe in figure 5.6 that the representativeness is reasonable although the Northern region emerges as slightly over represented (57.4% in the target population vs. 62.5% in the sample).

Figure 5.5 Distribution of Academic Spin Offs (ASOs) by Sector: Population, Target Population & Sample



Notes: The difference between the population and the 'target population' is explained by two points: 1) Similarly to last year's report, Avepark, Spinpark, IPN, Taguspark, and Sinespólo were not included in this first phase of inquiry; 2) Twenty ASOs were unreachable, presumably out of business. One ASO left the facilities of the associated UTEN partner.

Table 5.1 Representatives & Distribution of Academic Spin Offs (ASOs) by TTO and University

Associated University [target population n°; sample n°; response rate(%)]	UTEN partner associated to Technology Transfer	Population [1]	Target population [2]	Sample [3]	Effective Response rate. in % [3]/[2]	Weight (%) in the 'target population' [sample]
U. Trás-os-Montes e Alto Douro [1; 0;-]	OTIC-GAPI UTAD	1	0			
U. Minho [29; 11; 38%]	Avepark/ Spinpark	12				17.7 [15.3]
	TecMinho	30	29	11	37.9	
U. Porto [65; 34; 52%]	UPIN	3	3	3	100.0	39.6 [47.2]
	UPTEC	58	55	25	45.5	
	INESCPorto	7	7	6	85.7	
U. Aveiro [10; 5; 50%]	UA TEC	12	10	5	50.0	6.1 [6.9]
U. Beira Interior [23; 5; 22%]	UBI ACTIVA	4	3	0	0.0	14.0 [6.9]
	Parkurbis	24	20	5	25.0	
U. Coimbra [4; 3; 75%]	OTIC-UC	5	4	3	75.0	2.4 [4.2]
	IPN	23				
	Gab. de Empreendedorismo	21				
ISCTE, U. Lisboa, U. Nova Lisboa, U. Técnica de Lisboa [16; 7; 44%]	IMM	2	2	1	50.0	9.8 [9.7]
	INDEG	4	4	2	50.0	
	OTIC-UTL	1	1	0	0.0	
	Inovisa	5	5	2	40.0	
	TT@IST	4	4	2	50.0	
	Taguspark	34				
U. Algarve/ U. Évora [15; 6; 40%]	CRIA	21	12	6	50.0	9.1 [8.3]
	Uévora	3	3		0.0	
	Sines Tecnopólo	4				
U. Madeira [2; 1; 50%]	Gapi Madeira	1	1	1	100.0	1.2 [1.4]
	TECMU Madeira	1	1	0	0.0	
All		280	164	72	43.9	100 [100]

Notes: The difference between the population and the 'target population' is explained by two points: 1) Avepark, Spinpark, IPN, Gabinete de Empreendedorismo da Universidade Nova de Lisboa, Taguspark, and Sinespólo were not included in the first phase of inquiry but will be included in a forthcoming report by UTEN; 2) Twenty ASO were unreachable, presumably out of business. One ASO left the facilities of the associated UTEN partner.

Figure 5.6 Distribution of Academic Spin Offs (ASOs) by Sector: Population, Target Population & Sample

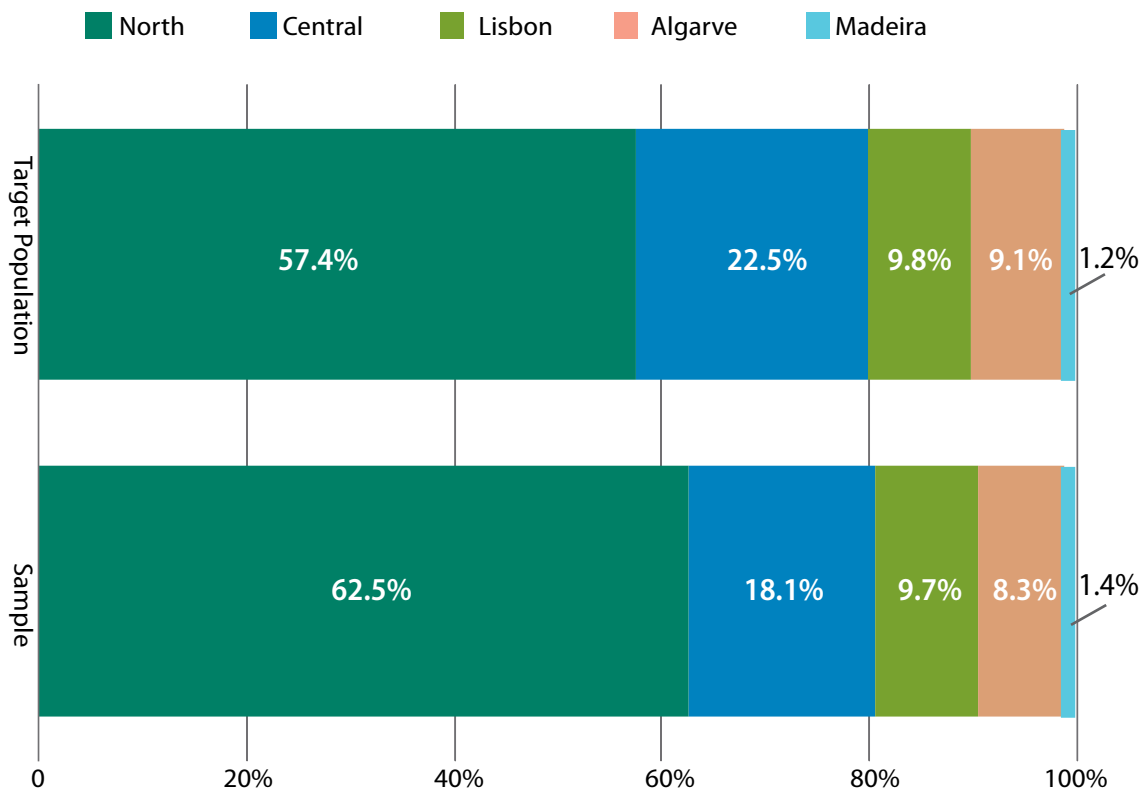
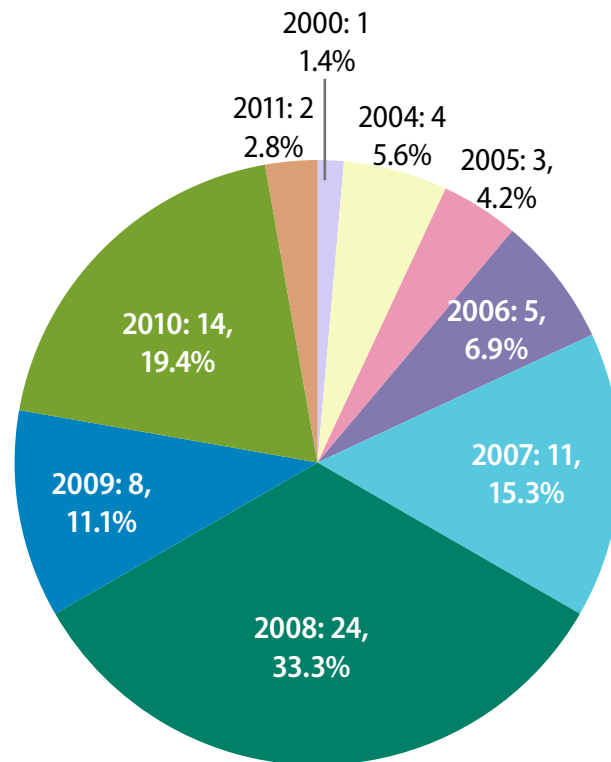


Figure 5.7 ASO Creation by Year: Number of Companies, % of Total



Source for all figures: Data gathered by direct inquiry, April-August 2011 (number of respondents: 72)

3.2. Main descriptive results

The bulk (almost 70%) of respondent ASOs have, at most, five years in business, being created in 2008 or later. The oldest ASO in our sample, from *ICT/Software/Digital Media* sector, is eleven years old. In the other extreme stands two firms which were created in 2011, from *Microelectronics/Robotics* and *Bio/Pharma* sectors (see figure 5.7).

As expected, the main source of firm's emergence has been the initiative of individuals linked to academia (researchers, students, faculty staff/professors). Indeed, around 80% of the ASOs surveyed started upon the initiative of academia related people. Of those which emerged from other firms, investors and

professionals, the vast majority (72%) belong to the *ICT/Software/Digital Media* sector (see figure 5.8).

In terms of the capital required to constitute a business, most of the firms (63%) started the business with the then required legal minimum amount (five thousand euros).¹⁰ *Microelectronics/Robotics* and *Medical devices/Diagnostics* firms are the ones with the highest initial capital, respectively 113k€ and 92 k€.

It is interesting to note that on the whole, the capital of the firms increased (Figure 5.9) while it also became

¹⁰ In December 2010, a Law Decree abolished the compulsory lower limit of 5 thousand € for constituting a firm in Portugal.

Figure 5.8 Source of ASO Emergence, % of Total

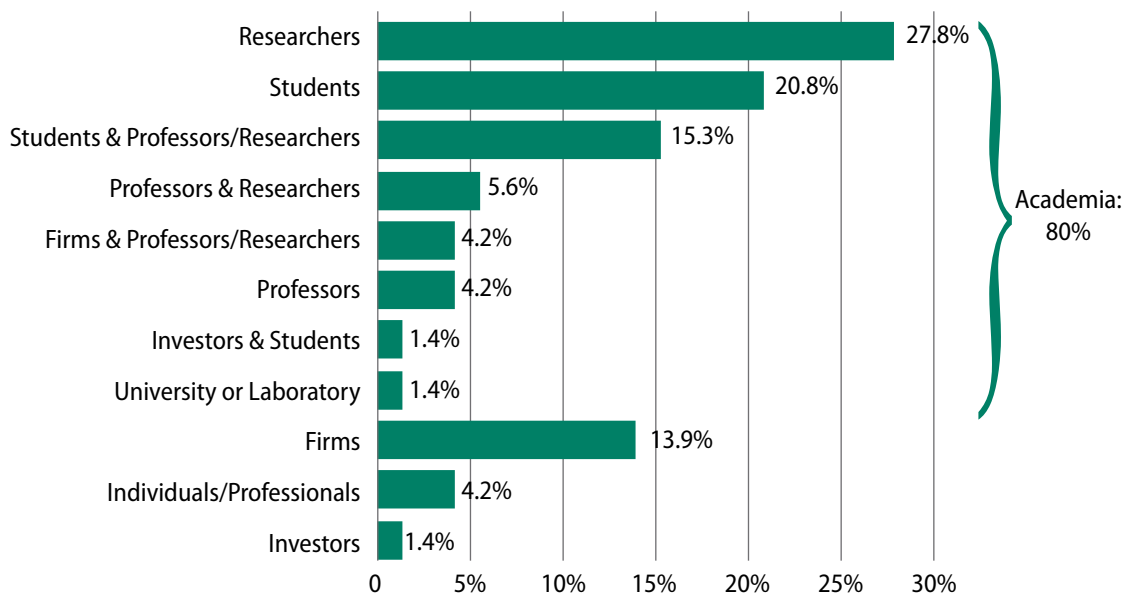


Figure 5.9 ASO Capital (Thousand €): Beginning and 18 Months after Creation

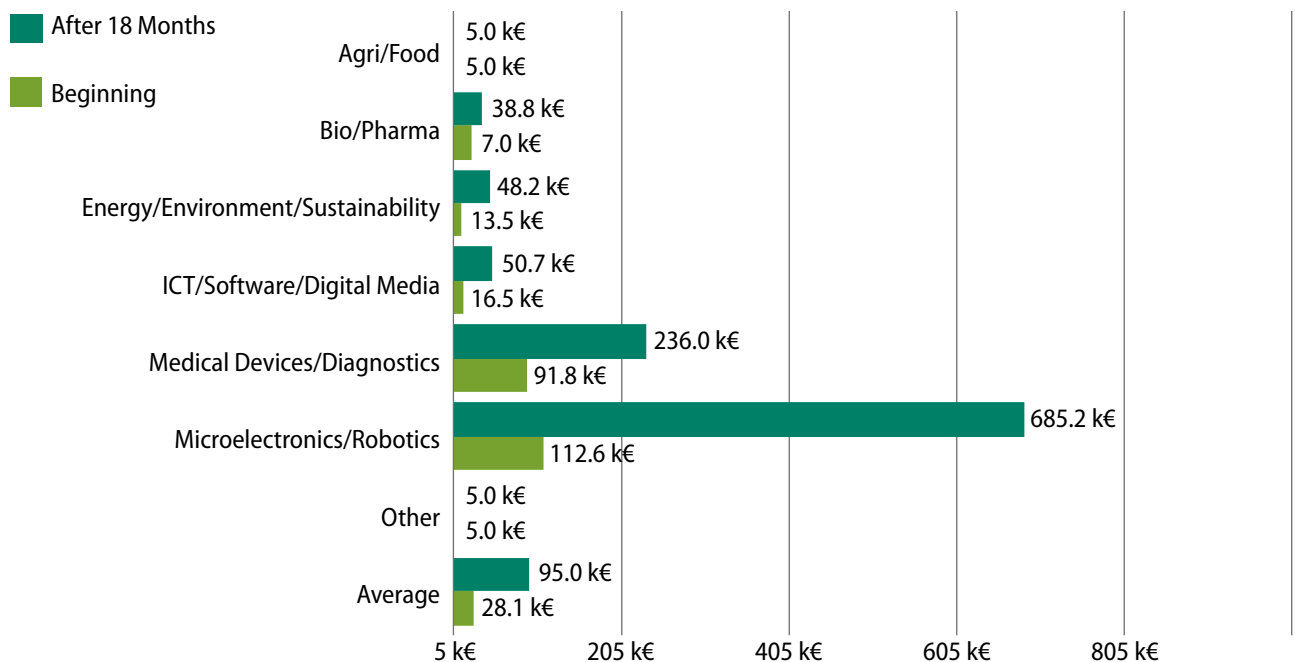
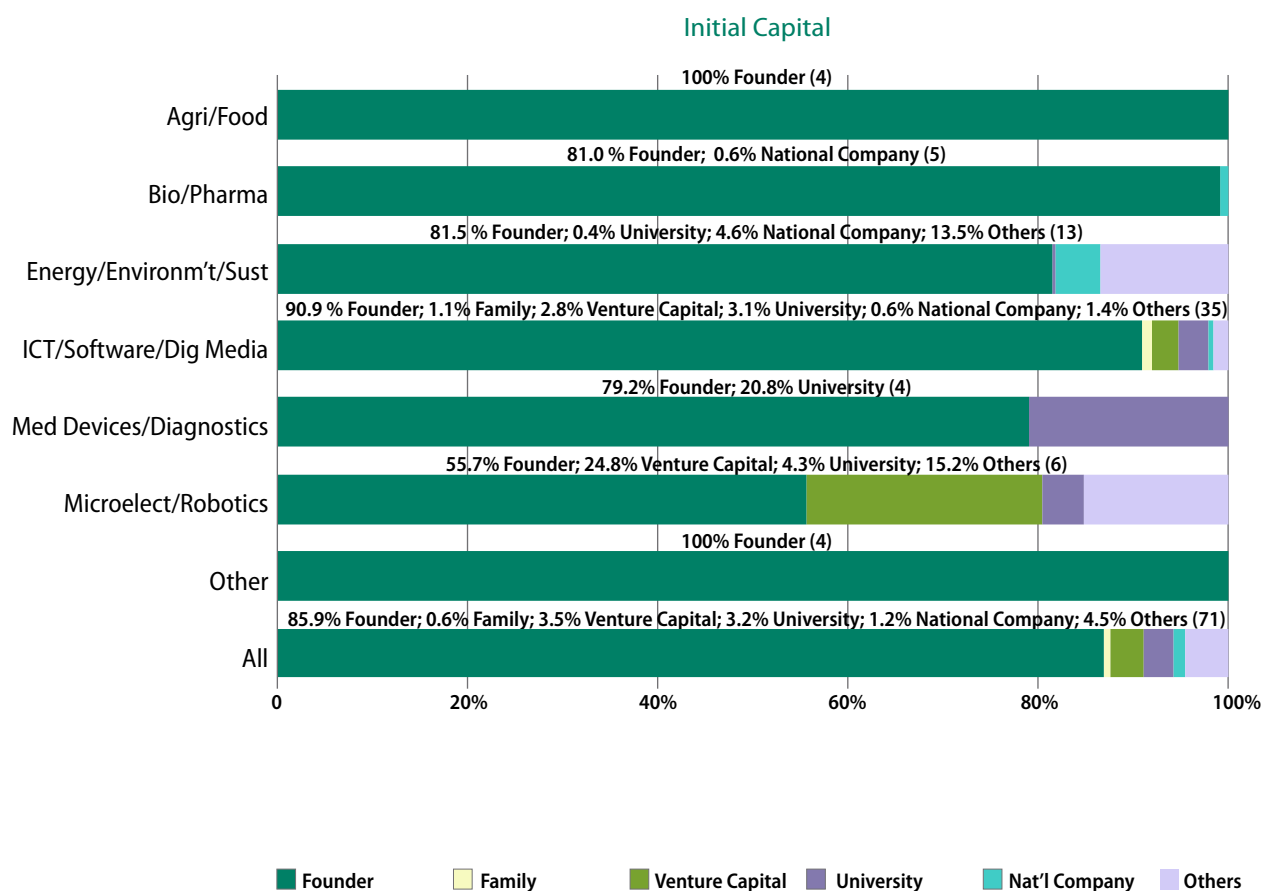
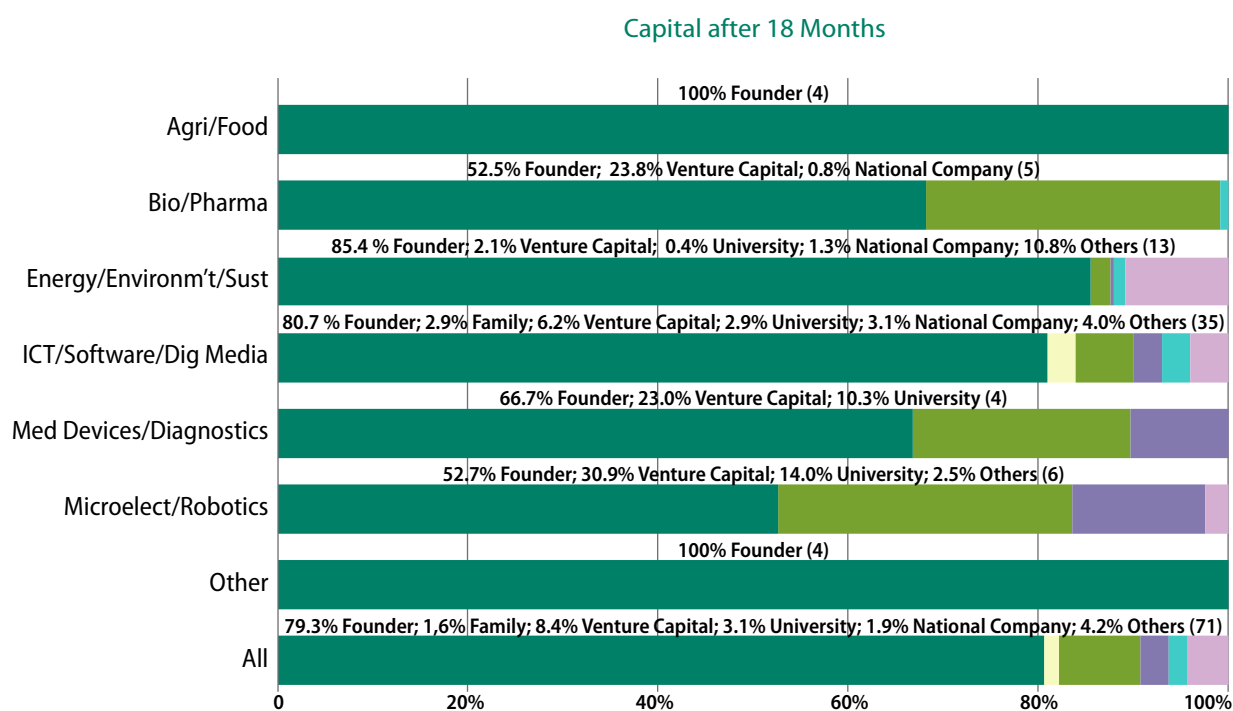


Figure 5.10 Distribution of ASO Social Capital: Beginning and 18 Months after Creation



Note: Foreign Company ownership was indicated as zero by all respondents for both initial and capital after 18 months.



Source for all figures: Data gathered by direct inquiry, April-August 2011 (number of respondents: 72)

more diversified (Figure 5.10) with the share of other partners, namely venture capitalists increasing. This is particularly noticeable in *Microelectronics/Robotics*, *Medical devices/diagnostics* and *Bio/Pharma*. The sharp increase in firms' capital indicates the (increasing) commitment the initial and new owners have on the growth prospects of these firms.

The majority of the ASOs (almost 80%) has marketable products and/or services. Those that are still in a pre-marketable phase (idea, proof of concept or prototype) are in general young (created after 2008). However, three firms (from *Bio/Pharma*, *Agri-Food*, and *ICT/Software/Digital Media*), that started their business in 2007 or earlier, are still in the proof of concept or prototype phases (see figure 5.11).

About 70% of the respondents ASOs target worldwide/global market in terms of internationalization. Only 23 firms (32%) commercialize (or aim at commercializing) their products/services in large markets supplied by other larger, more experienced firms ('mainstream' markets). The remaining firms focus on niche or temporary niche markets, that is, small-sized markets based on application to a specific or reduced group of customers. (see figure 5.12).

By 2010, around 90% of the ASOs claimed to have earned some money selling their products/services. Excluding the two ASOs that started business in 2011 (and therefore did not present sales) there were five firms without sales.¹¹

On average, each of the ASOs sold, in 2010, 226 thousand euros of products/services, presenting, from its start to 2010 an average annual growth rate of 145% (current prices). In the last three years (2008-2010), the average growth rate reached 127% per year (current prices).

In terms of employment, and for the same period, an average ASO employed eight people and in each year from its start (2008-2010) grew, on average, 37.5% (37.8%).¹²

Sales and employment figures varied considerably between sectors, with *Medical devices/Diagnostics* being the largest employer, with 17 people, followed by *Microelectronics/Robotics* (11 people) and *ICT/Software/Digital Media* (9 people).

¹¹ It is important to note that 11 ASOs although having sales did not provide the corresponding figures. Thus, for 2010 we have 61 ASOs with values for sales/turnover.

¹² The employment figures include the owners.

Figure 5.11 Phase Product/Service Development (Number, % Total)

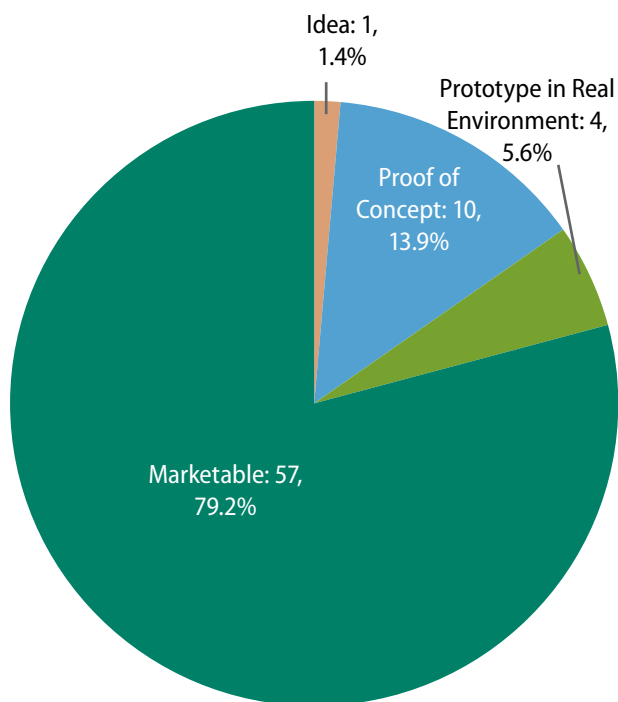
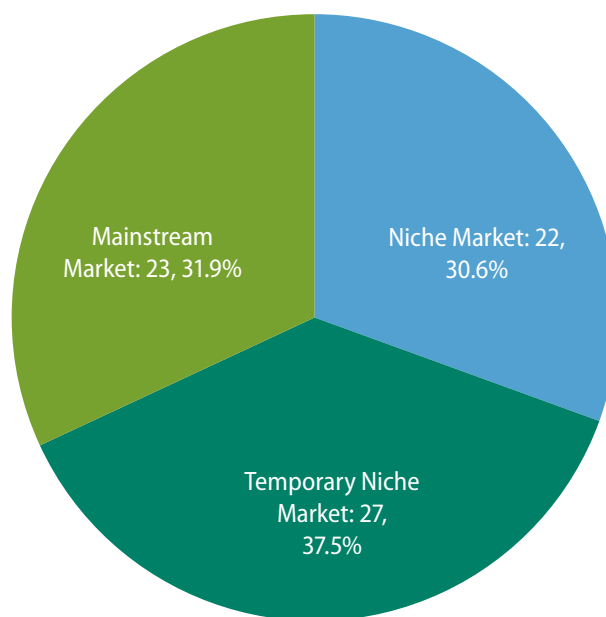


Figure 5.12 Target Markets (Number, % Total)



sectors present the largest turnover figures with, respectively, 368 and 315 thousand euros (see figure 5.13). *ICT/Software/Digital Media* and *Energy/Environment/Sustainability* are the sectors that generate the highest average income/sales per employee, respectively 32 and 27 thousand euros per year, per employee.

Performing a similar analysis by region (NUTs II), we observe (see figure 5.14) that ASOs located in the Lisbon and North regions tend, on average, to employ a larger number of people (around 10), which contrasts with those located in Algarve and Central regions that might be considered micro firms (number of employees below 5 people).

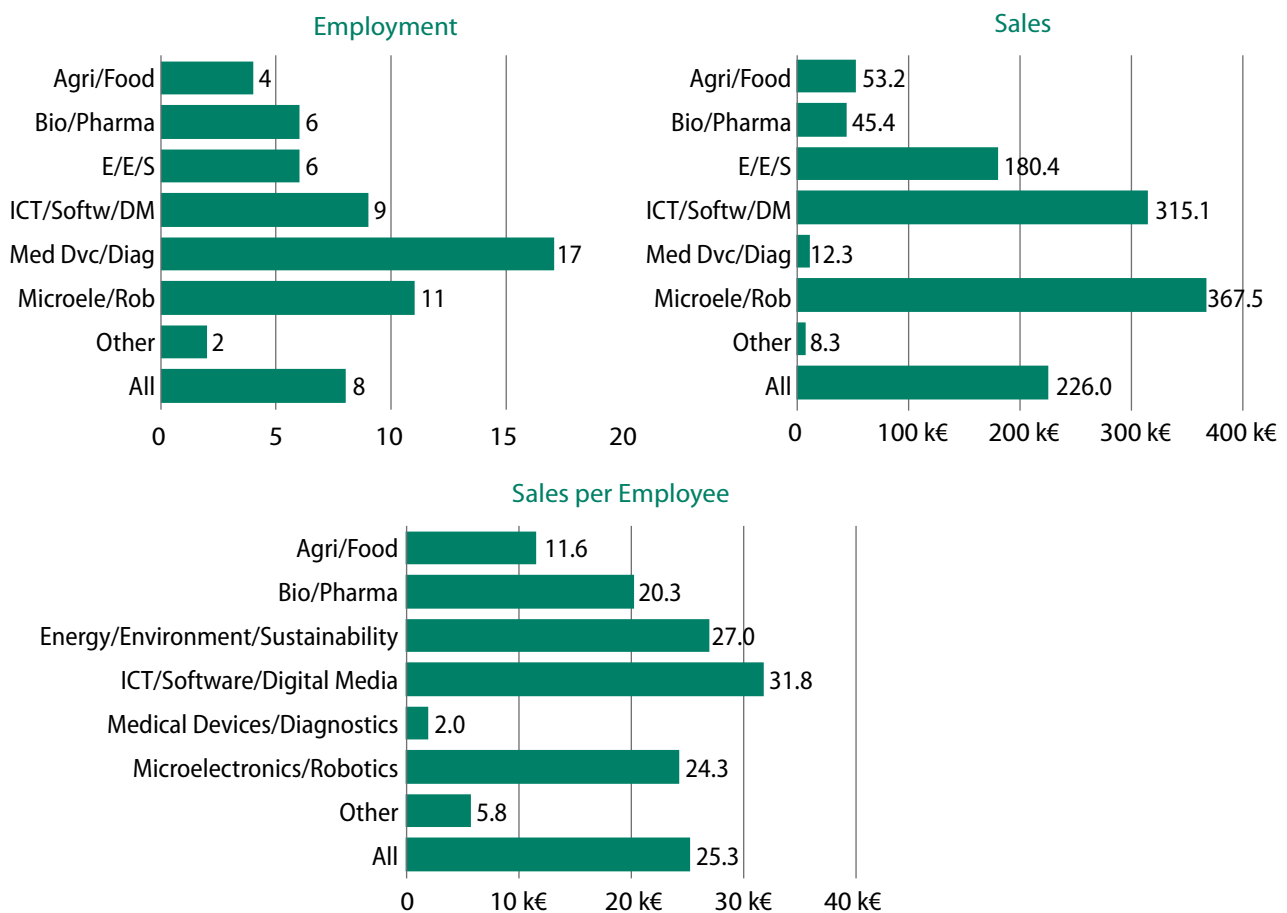
In terms of turnover, Madeira stands as a truly outlier as its only firm, from the *ICT/Software/Digital Media* sector, which is in business since 2004, had in 2010 almost one million euros of turnover, justifying its top position in terms of sales per employee (136 thousand €, far from the average 25 thousand €).

In dynamic terms, considering effective (from the start and in the period 2008-2010) and expected growth, the sales effective dynamics and prospects are impressive (see figure 5.15).

Considering the whole sample, ASOs have grown at an average rate of 145% from its start (until 2010), and 127% in the three year period 2008-2010. Despite the sluggish macroeconomic prospects for the Portuguese economy, ASOs are quite optimistic regarding sales expected increase, estimating that turnover will grow by about 651% per year in the next three years (2011-2013). In particular, ASOs from *Microelectronics/Robotics* revealed a truly 'explosive' growth and expect to continue to grow in the next 3 years at a still high rate (315%/year). *ICT/Software/Digital Media* sector is the one with the brightest growth prospects.

One might infer from these figures that albeit in absolute terms the macroeconomic relevance of ASOs is quite reduced, in dynamic terms, and

Figure 5.13 Employment (Number) and Turnover (Thousand €), by Sector in 2010



Source for all figures: Data gathered by direct inquiry, April-August 2011 (number of respondents: 72)

Figure 5.14 Employment (Number) and Turnover (Thousand €), by Region in 2010

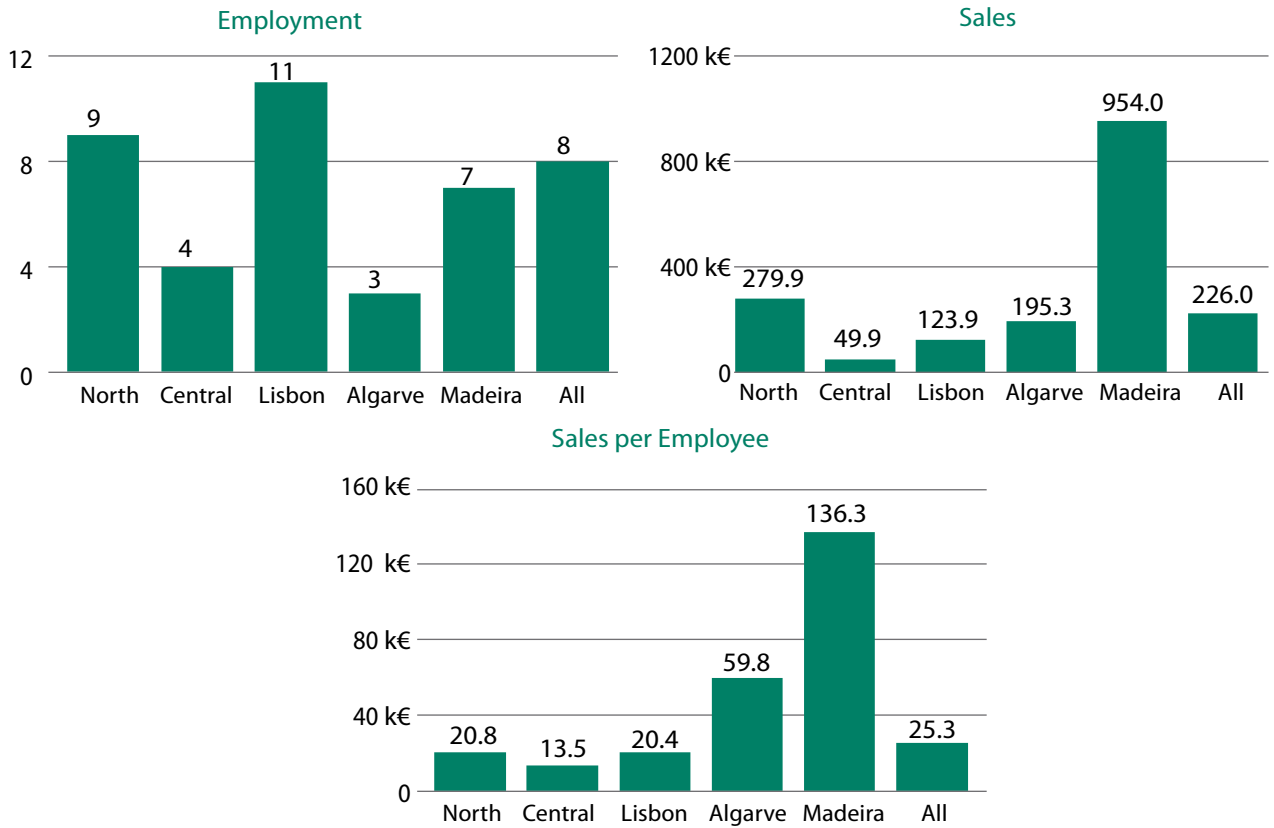
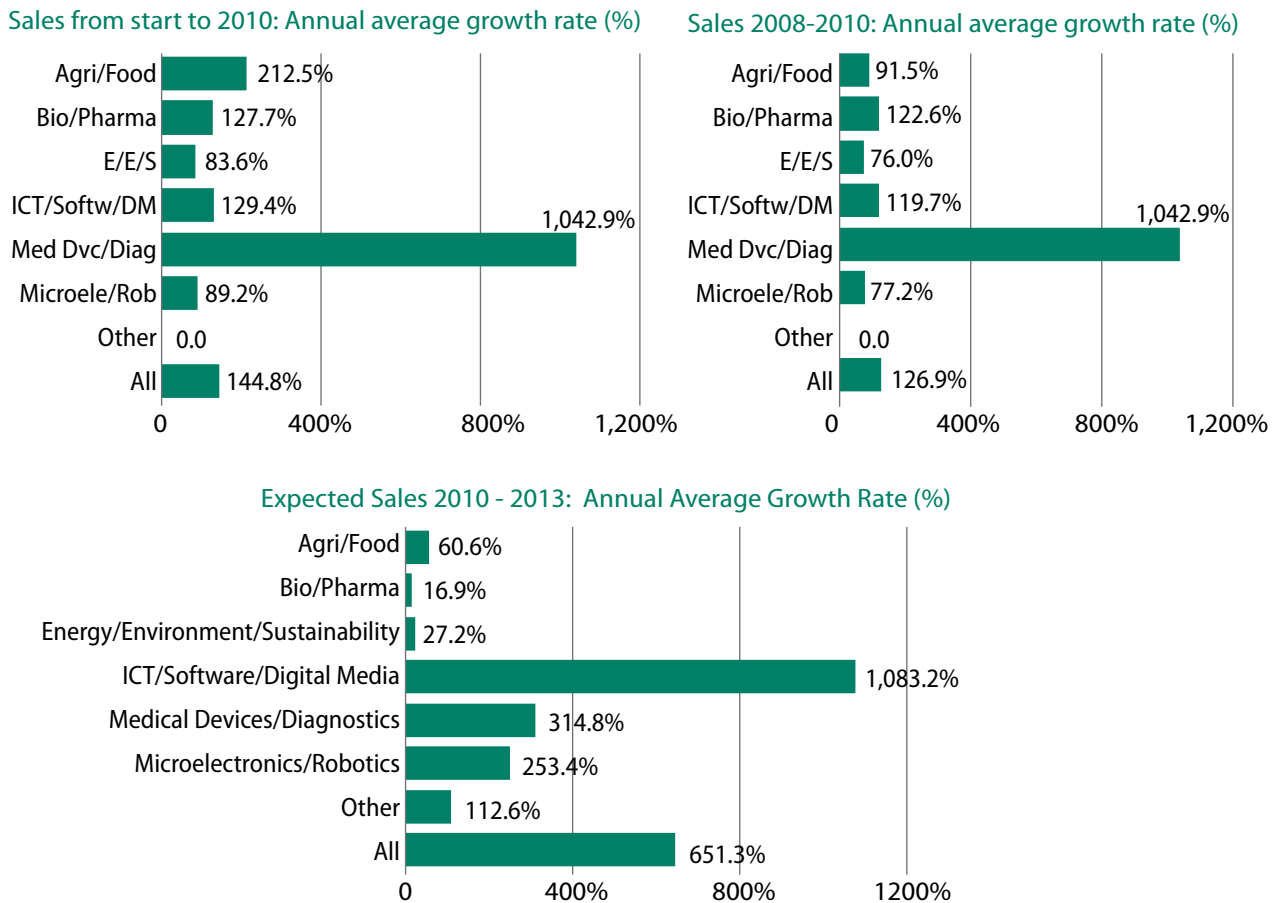


Figure 5.15 Dynamics of Sales (Annual Average Growth, %) by Sector



Note: In part, the very high growth rates are explained by the fact that the starting turnover for some firms is near zero.

adopting a medium to long term perspective, these firms might very well be the solution Portugal needs for leverage its economic growth.

In terms of employment, the growth rates are significantly lower than those from sales. On the whole, firms grew at about 38% per year in the recent past and expect to grow at about 30% per year, on average. To illustrate, an average respondent ASO which employs 8 workers will, in three years time, more than double its employment figure. This means that ASOs might constitute in the medium to long term as an important absorber of (highly educated) labor (see figure 5.16).

Having as reference the year 2011, we observe that a reasonable number of ASOs (27, representing 37% of total) exports their products/services and 33 (46%) expects to start exporting in a nearby future. In terms of more complex forms of internationalization (direct investment through subsidiaries) it is expected that in a nearby future about half of the ASOs use this entry mode as internationalization strategy (see figure 5.17).

It is interesting to assess how long it takes for an ASO to internationalize after being in business and

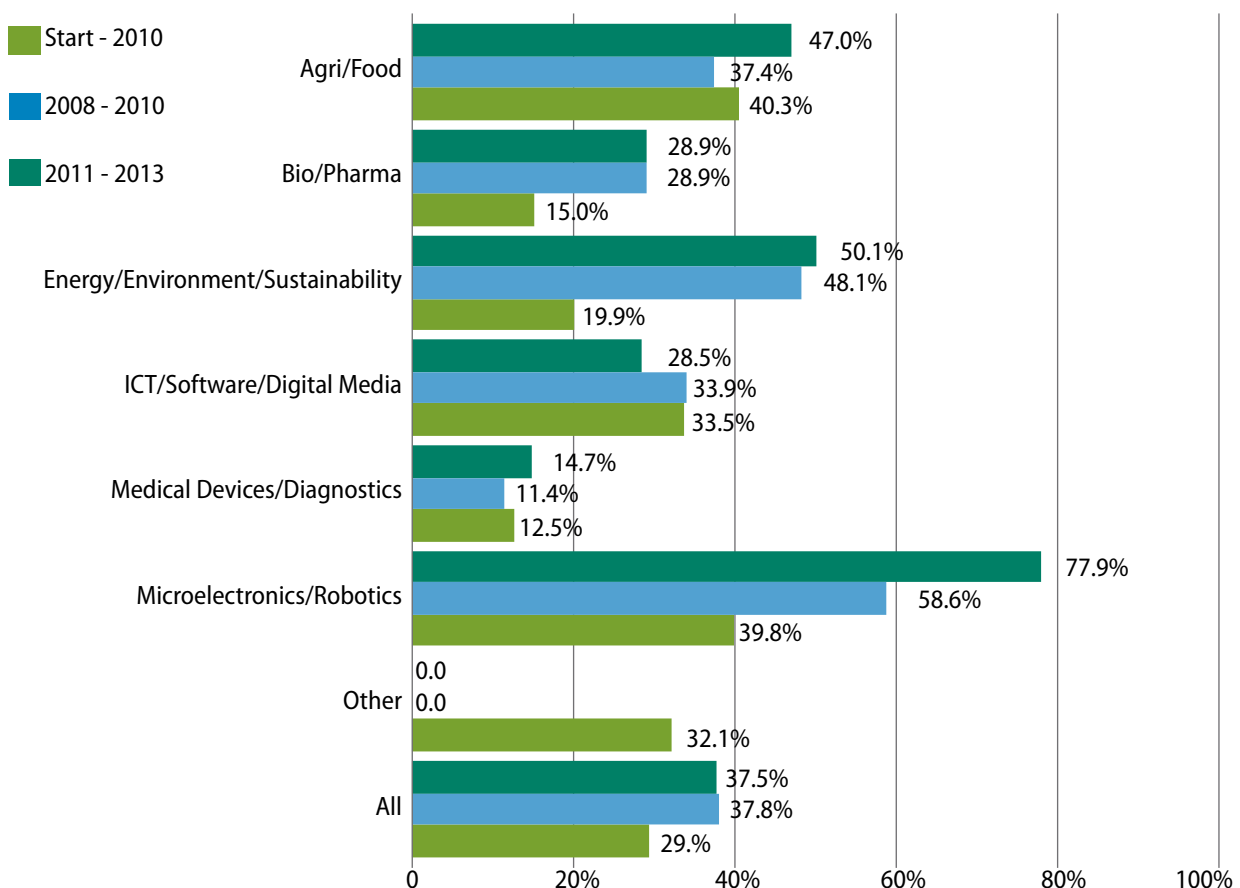
start selling. Because this might be sector specific we perform such an analysis taking into account the sector to which the ASOs belong (see figure 5.18).

On average, ASOs start selling after being in business for one year. However, this lag is quite differentiated between sectors with most of the firms in *Energy/Environment/Sustainability* and *Other* (e.g., consultancy) sector selling in the same year they create the firm, whereas firms from *Bio/Pharma* and *Medical Devices/Diagnostics* start selling only after three and two years respectively of having created the business.

Having generated sales, the fastest ASOs to enter foreign markets are those from *Medical Devices/Diagnostics* which need about one year (after the first sales) to export and four years to establish a foreign subsidiary. For the whole sample, three to four years is the time required on average for an ASO to start exporting and about nine years to establish a foreign subsidiary.

Given the nature of firms created to exploit technological knowledge that originated within a university, one would expect that ASOs would be highly R&D intensive firms. That, however, is a

Figure 5.16 Dynamics of Employment (Annual Average Growth Rates, %) by Sector



Source for all figures: Data gathered by direct inquiry, April-August 2011 (number of respondents: 72)

Figure 5.17 ASO Internationalization Commitment in 2011

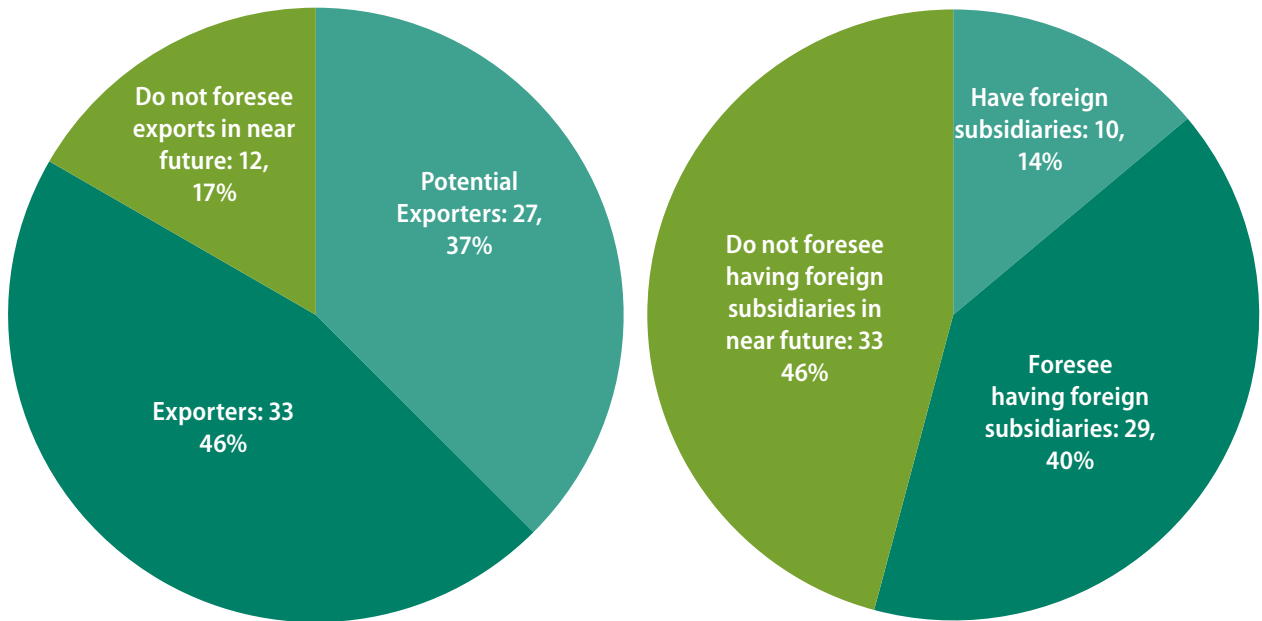
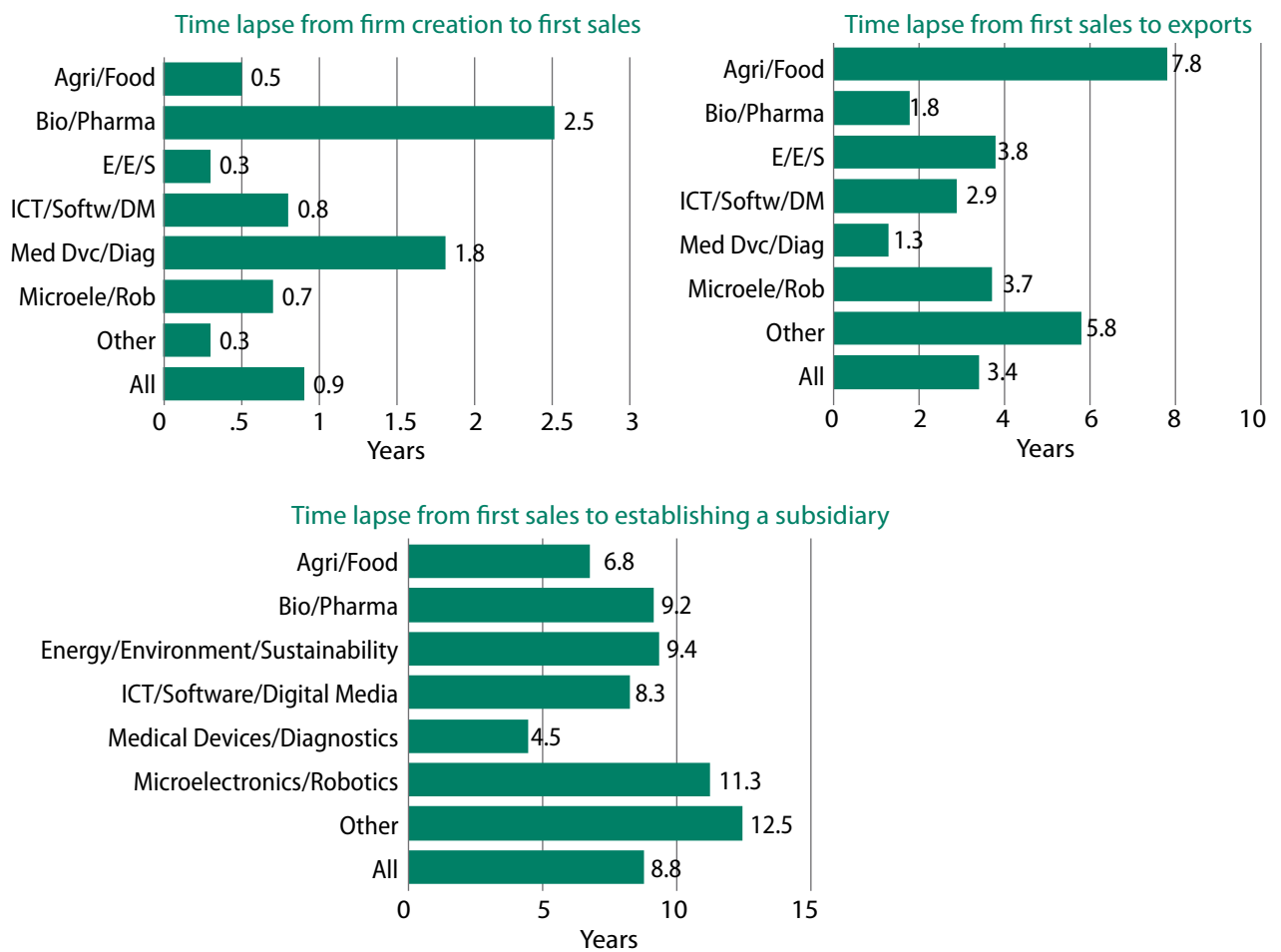


Figure 5.18 Time Lapse to Internationalization, by Sector



Note: In order to take into account the information regarding those firms that do not foresee exportation or establishing a subsidiary in the nearby future we attribute in those cases a time lag of 10/15 years.

misleading perception. Indeed, as documented in figure 5.19, only 58% of the respondent ASOs are R&D performers and 11 firms (20% of the total) have an R&D intensity (i.e., ratio of R&D to sales) between 3% and 30%. In contrast, in *Bio/Pharma* and *Medical Devices/Diagnostics* all ASOs are R&D performers and in *Microelectronics/Robotics* 80% of the firms undertook such activities (see figure 5.20). Excluding *Medical Devices/Diagnostics* where all respondent ASOs possess R&D/sales ratios above 100%, meaning that they are still in a pre-marketable phase, in the remaining sectors in general the bulk of the firms (about 80%) present R&D intensity below 75%.

Almost 70% of the ASOs surveyed have benefited in the course of their activity from the support of incubator facilities, and around 40% said they have

benefited (in isolation or jointly with TTO and incubators) from science park infrastructures. TTOs have also been a support mechanism, with 13% of the ASOs stating they received such support (see figure 5.20).

The most important support mechanisms associated to the scientific and technological system include *Access to qualified labor (students)* and *Access to formal and informal business networks*, with almost 60% of the ASOs identifying these mechanisms as important or very important for their activity (see figure 5.21). *Contact with a creative environment* and *Access to knowledge infrastructure and specialized competences* are truly relevant for almost half of the firms inquired. In contrast, firms failed to attribute great importance to *S&T Participation in the spin offs social capital* and *Support to recruiting external resources*.

Figure 5.19 R & D Intensity (Ratio R & D to Sales, %) in 2010 by Sector

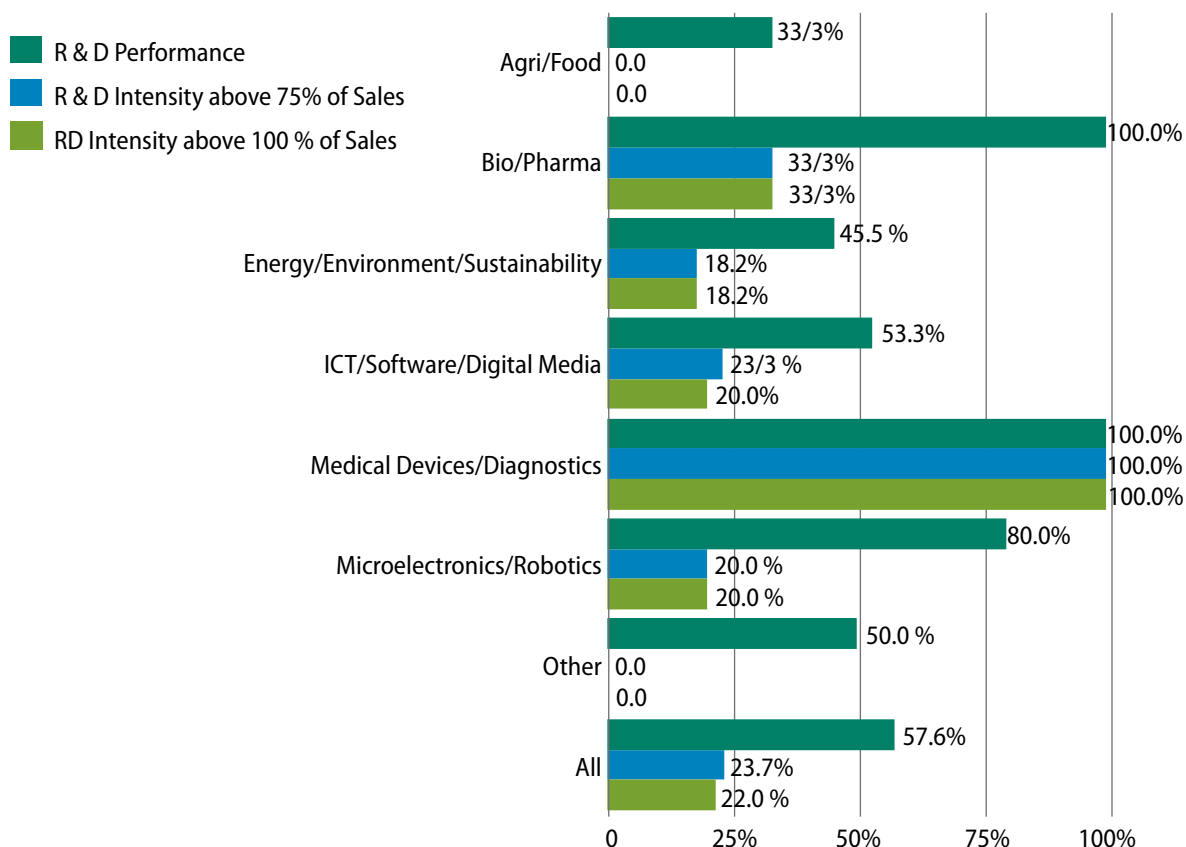
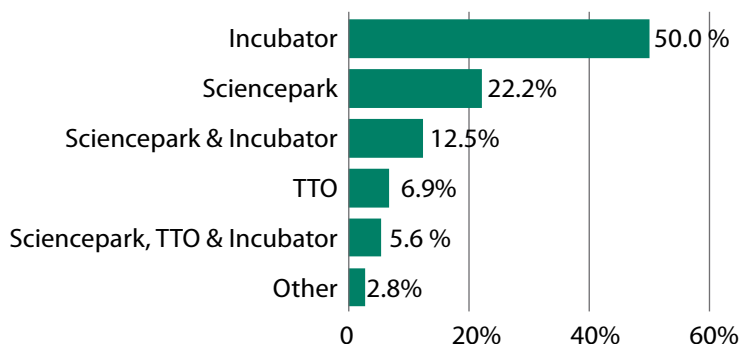


Figure 5.20 Support Mechanisms that Have Benefitted ASOs (% of Total)



Source for all figures: Data gathered by direct inquiry, April-August 2011 (number of respondents: 72)

Figure 5.21 Importance of Support Mechanism Associated to the Scientific and Technological System

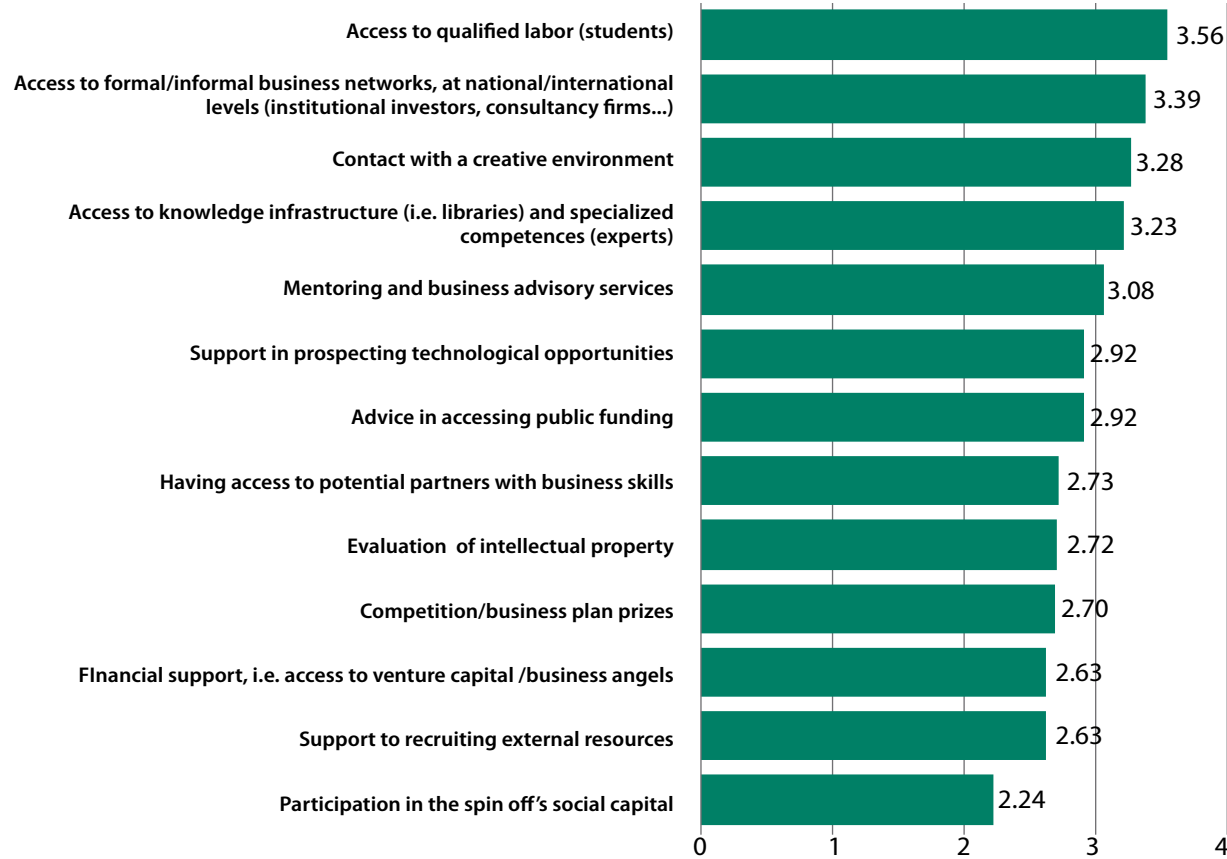
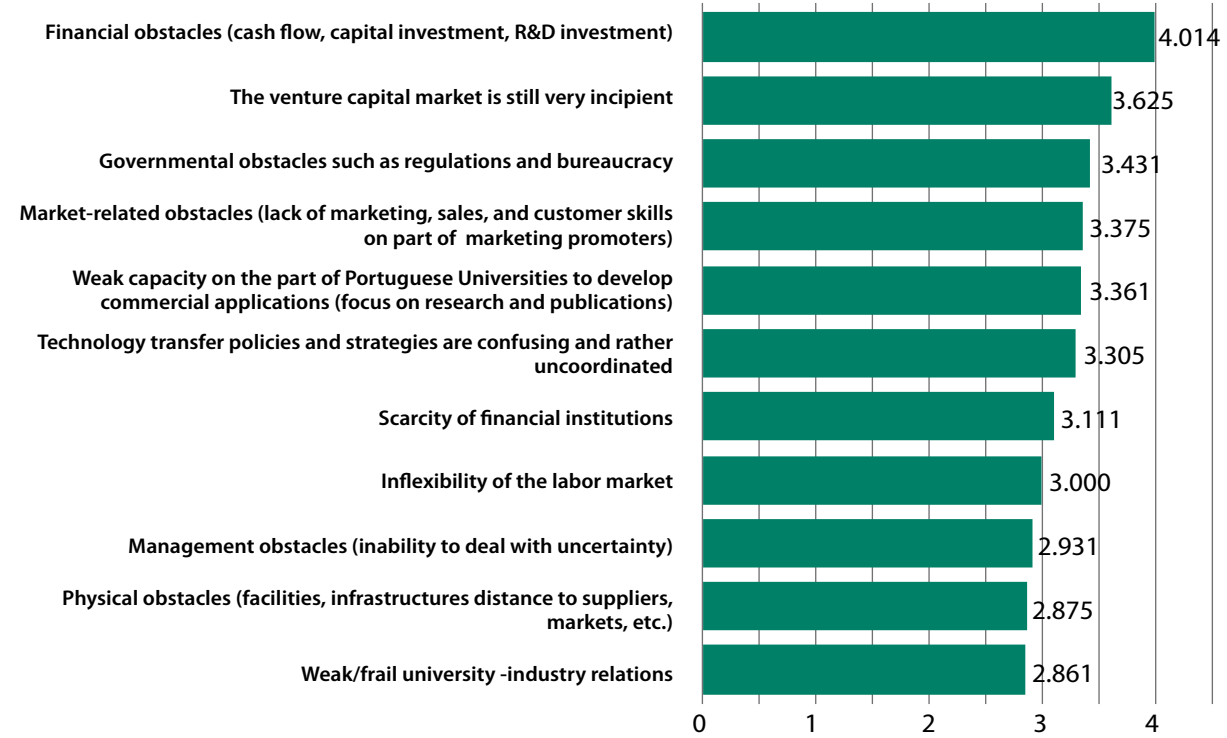


Figure 5.22 Main Obstacles to Creating and Developing Your Business



The most critical obstacles for business according to respondents (see figure 5.22) are mainly external to the firm, encompassing *Financial obstacles (cash flow, capital investment, R&D investment financial obstacles)* and *Government regulations & bureaucracy*. Indeed, more than three quarters of ASOs identify *financials* as important obstacles. Other obstacles that affect around half of the respondents are related to the *Weak capacity on the part of Portuguese universities to develop commercial applications* and *Policies/strategies regarding technology transfer that are perceived as confusing and uncoordinated*. Although about one third of ASOs claimed that *Facilities, infrastructures and distance to suppliers, markets*, as well as *Weak university-industry relations*, stand as a key problem, these are the least considered obstacles.

For the 17 ASOs classified as ‘incumbent stars’ and ‘great expectations’ (see table 5.2), that is, the top ranked ASOs in terms of (effective and expected) sales dynamics and employment, as well as internationalization and innovativeness features, the most important supporting mechanisms include, similarly to the generality of the ASOs, *Access to skilled labor (students)* and *Access to informal business networks on national and international basis*. Likewise, top ranked ASOs share the same view as the remaining ASOs regarding the obstacles, with the *Embryonic venture capital market* and *Financial obstacles (cash flow; capital investment; R&D investment)* being considered the most relevant obstacles.

4. Some final remarks

Based on the data gathered and the analysis performed, some main points regarding the characteristics and trends of Portuguese TTOs and ASOs deserve to be highlighted.

1. TTOs - the ‘greatness of small things’

- The majority of Portuguese TTOs are recent (established in the second half of 2000s) and small (employing 5 people and with a budget of 225 thousand euros, on average terms)
- TTOs output in terms of patents and licenses registered in recent period a noteworthy dynamics. Indeed, for the period 2007-2010, the annual average growth rate of TTOs activities related to intellectual property and commercialization expanded strongly
 - » Patents applications: 19.4% per year
 - » Patents granted: 19.6% per year
 - » Executed licenses/agreements/assignments: 26.0% per year
 - » License income: 33.3% per year.

2. ASOs - strong macroeconomic importance in dynamic terms

- Sales and employment dynamics are remarkable reaching in the relevant period of analysis 145% and 37.5% per year, respectively

- Given the employment dynamics, in the medium and long term, ASOs constitute an important absorber of (highly educated) labor
- Despite the sluggish macroeconomic prospects for the Portuguese economy, ASOs are quite optimistic regarding sales expected increase – about 651% per year in the next three years (2011-2013)

3. Increased and diversified capital

- ASOs’ capital increased six fold 18 months after creation
- The share of other partners, beside owners, namely venture capitalists, increased significantly
- Increasing commitment and confidence of ASOs’ partners in firms’ growth prospects

4. Reasonable internationalization involvement

- The vast majority of the ASOs have marketable products and/or services, targeting worldwide/global markets
- A reasonable percentage of ASOs (37%) exports their products/services and 46% expects to start exporting in a nearby future
- About half of the ASOs expect in a near future to establish subsidiaries abroad
- On average, the time required for an ASO to start exporting is 3-4 years
- On average, the time required for an ASO to establish a foreign subsidiary is 9 years

5. Disparate innovation commitment profiles

- About 40% of ASOs do not perform R&D activities
- All or practically all firms from *Medical devices/diagnostics, Bio/Pharma, and Microelectronics/Robotics* perform R&D activities and present very high R&D intensities

6. Main supporting infrastructures/instruments (in isolation or combined)

- Incubators (70%)
- Science parks (40%)
- TTOs (13%)

7. Main supporting mechanisms

- Access to qualified labor (students)
- Access to formal and informal business networks

8. Most critical obstacles for ASOs business

- Financial (cash flow, capital investment, R&D investment financial obstacles)
- Incipient venture capital system.
- Governmental regulations and bureaucracy

Table 5.2 Top Ranked Academic Spin Offs (ASO) 2011

ASO	Sector	UTEN partner	Brief description
INCUBENT STARS	Bilobite Engenharia	UPTec	The mission of Bilobite is based on the principle that a KW saved energy costs less than 1 kW of energy produced by alternative sources. The company proposes a significant invoice reduction of electricity entities. Makes use of an approach "pay as spare." Its markets are very diverse: mining, wood pellets; ceramics; metal-mechanical, injection molding all that involves fragmentation and milling, pharmaceuticals.
	Tomorrow Options	UPTec*	Tomorrow Options develops and produces electronic devices to satisfy a niche market as a global strategy for B2B. At this time the company has concentrate all efforts in the area of medical devices. The first device developed is WalkinSense a medical device that is noninvasive, portable, wireless and easy to use for clinical monitoring of activity and trends plantar pressure, allowing a complete characterization of mobility patterns of its bearer.
	Next to You	INESC Porto	Next to You pursues a logic of generalization of concept of community or user groups in the network, Next to You develops, markets and manages network products and systems corporate shares (cost and benefits) of access data, voice and multimedia over IP networks in residential and business.
	Smartwatt	INESC Porto	One of the few companies in Europe to feature list ESCO - Energy Service Company, the name given to companies operating in the energy market through provision of services with a significant positive impact on energy consumption patterns of customers.
	Science4you	INDEG	Science4You is dedicated to two distinct business areas: production and development of scientific toys; commercialization: summer university; birthday parties; mobile laboratory; holiday camps; science workshops.
	Inovmapping	OTIC-UC	Inovmapping is an ICT company providing GeoWeb solutions. Its services include 3D modeling for Google Earth, virtual tours in Google Earth; territorial promotion, tourism and heritage in geographic platforms; Google Places , GeoWeb SEO .
	WITSoftware [exports: 2002; subsidiary 2007]	UPTec	WITSoftware company develops advanced solutions and services for mobile telecommunications. The Company was founded in 2001 and currently it has headquarters in Coimbra, two development centers in Porto and Leiria, an office in Lisbon and a branch in San Jose (California, US) for business development.
	Simbiente [exports: 2008; subsidiary 2009]	TecMinho**	Dedicated to research activities, development, innovation and services in the areas of environmental engineering and biotechnology. The differentiation strategy set by the SIMBIENTE is its positioning as the interface between research and the market by betting on new approaches to conventional projects and by exploring new markets through the development of projects / innovative products.
	Tomorrow Options [exports: 2010; subsidiary 2009]	UPTec*	Dedicated to developing and producing electronic devices to satisfy a niche market as a global strategy for B2B. At this time the company has concentrate all efforts in the area of medical devices. The first device developed is WalkinSense a medical device that is noninvasive, portable, wireless and easy to use for clinical monitoring of activity and trends plantar pressure, allowing a complete characterization of mobility patterns of its bearer.
	Sales dynamics ¹		
Employment ²			
Internationalization ³			

Table 5.2 Top Ranked Academic Spin Offs (ASO) 2011 (cont'd)

INCUBENT STARS	Innovativeness	Medical Devices/ Diagnostics	TT@IST	Petsys presents an innovative technology of Positron Emission Tomography (PET) applied to early diagnosis of breast cancer. The aim is to launch on the world market through a new diagnostic aid.
		ICT/ Software/ Digital Media	UPTec	WITSsoftware company develops advanced solutions and services for mobile telecommunications. The Company was founded in 2001 and currently it has Headquarters in Coimbra, two development Centers in Oporto and Leiria, an Office in Lisbon and a branch in San Jose (California, US) for business development.
		Microelectronics/ Robotics	INESC Porto	Fibersensing is currently considered one of the 10 most competitive companies in the area of structural monitoring systems based on optical fiber technology. Among its major customers are Airbus, Siemens, Petrobras, European Space Agency and REN.
		ICT/ Software/ Digital Media	INESC Porto	Tecla Colorida is a spin off of FEUP and INESC Porto specialized on development of web 2.0 platforms and solutions for educational purposes. Specialties: Web 2.0, Social Software, e-Learning, Educational Software for Kids.
		ICT/ Software/ Digital Media	UPTec	Auditmark aims to introduce innovations in the market of online marketing to enable the analysis of advertising online through the validation of web traffic servers. It presents a set of effective solutions that help advertisers and companies as well as it provides innovate web security solutions. The Auditmark technologies allow a trade analysis, and provide detailed information resulting from creating technological tools that allow a large and rigorous analysis of the data collected.
		Microelectronics/ Robotics	UAtec	Korange focuses on the development of autonomous robotic systems (without need for human intervention). In the beginning, the bet will be in the development of robot lawn mowers.
		ICT/ Software/ Digital Media	UPTec	OSTV is a nonprofit organization aimed at: promoting a wide media coverage of events cultural; encouraging the production of sustainable projects; artists scheduled mainly through small monetary incentives; supporting collaboration between disciplines; developing the production of innovative content crowd sourced; and helping to build skills in editing video, the format of today's most powerful media.
		ICT/ Software/ Digital Media	UAtec	RN2S offers consultancy in telecommunications such as project networks; telecommunications, indoor and outdoor location, GPS / GSM GPS / satellite, RFID tags and RF amplifiers.
		ICT/ Software/ Digital Media	UPTec	Adclick combines expertise in the technology, retail, commercial and engineering and search areas providing innovative solutions in the areas of collection and distribution of information over the Internet and in advertising online.
GREAT EXPECTATIONS	Sales Dynamics ⁵			
	Employment Dynamics			

Notes:

1. Effective annual growth rate of sales in the period 2008 - 2010 ; 2. Effective annual average growth rate of employment in the period 2008 - 2010. 3. The most experienced ASO in exporting and establishing a foreign subsidiary; 4. The highest marks of combined figures for 2010 of R&D expenditures and R&D intensity; 5. Expected annual average growth rate of sales in the period 2010 - 2013; 6. Expected annual average growth rate of employment in the period 2010-2013; *These firms were also associated to UPIN and INESC Porto; ** This firm is also associated to Avepark and Spinpark.

The exploratory analysis performed here suggests that in recent years Portuguese TTOs' distinct activities related to intellectual property and commercialization have had an important role in stimulating entrepreneurship and the country's innovative economic performance. Moreover, the analysis sustains the view that academic spin offs are a potentially useful means to boost economic development and wealth creation through their impact on employment, income generation and internationalization prospects. Finance is a catalyst of this wealth creation, yet access to capital (namely venture capital) seems to be a major impediment faced by Portuguese ASOs.

References

- [1] Heitor, M. and M. Bravo (2010). "Portugal at the crossroads of change, facing the shock of the new: People, knowledge and ideas fostering the social fabric to facilitate the concentration of knowledge integrated," *Technological Forecasting and Social Change*, Vol. 77, Issue 2, pp. 218-247
- [2] Rothaermel, F. T., S. D. Agung, & L. Jiang (2007). "University entrepreneurship: a taxonomy of the literature," *Industrial and Corporate Change*, Vol. 16 (4), pp. 691-791.
- [3] Shane, S. (2004). *Academic Entrepreneurship: University Spin offs and Wealth Creation*, Edward Elgar Publishing.
- [4] Lockett, A., D. Siegel, D., M. Wright & M. Ensley (2005). "The creation of spin off firms at public research institutions: managerial and policy implications," *Research Policy* Vol. 34, pp. 981-993.
- [5] Wennberga, K., J. Wiklund & M. Wright (2011). "The effectiveness of university knowledge spillovers: Performance differences between university spin offs and corporate spin offs," *Research Policy*, Vol. 40, pp. 1128-1143.
- [6] Lazzarretti, L. and E. Tavoletti, (2005). "Higher education excellence and local economic development: the case of the Entrepreneurial University of Twente," *European Planning Studies*, Vol. 13, n. 3, pp. 475-493.
- [7] Steffensen, M., E. M. Rogers & K. Speakman (1999). "Spin offs from research centers at a research university," *Journal of Business Venturing* Vol. 15, pp. 93-111.
- [8] Fini, R., R. Grimaldi, S. Santoni & M. Sobrero (2011). "Complements or substitutes? The role of universities and local context supporting the creation of academic spin offs," *Research Policy*, Vol. 40, pp. 1113-1127.
- [9] Gibson, D. V. and H. Naquin (2011). "Investing in innovation to enable global competitiveness: The case of Portugal," *Technological Forecasting and Social Change*, Vol. 78, Issue 8, pp. 1299-1309.

5.3 Technology Transfer Offices in Universities: Emerging Challenges

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1. Introduction

1.1 Background

Despite the importance of public research institutions' (primarily universities) as sources of technological knowledge to enterprises, the advent

of Technology Transfer Offices (TTOs) within Universities is a recent phenomenon, specifically in Portugal. The professionalization of technology transfer activity, the complexity inherent to the possession of intellectual property rights (IPR) by universities (von Ledebur, 2008) and countries' legal and institutional changes (when employee inventions patent rights are owned by the organization) have been pushing universities towards patent portfolio management, to secure enterprise patent licensing as a new potential source of revenue.

Within this context, the University Technology Enterprise Network (UTEN), a network of professional Technology Transfer Offices (TTOs) focused on the commercialization and internationalization of Portuguese Science and Technology (S&T), has been conducting an investigation of Portuguese TTOs at the national level, through a survey addressing various variables and indicators that are central to shed new light on the outputs and processes of technology transfer activity in Portugal.

While acknowledging the great diversity of concurrent technology transfer processes and heterogeneous approaches (Bozeman, 2000), the present article reviews the relevant literature in the field and aims at providing robust scientific support to the analysis and discussion of the main results from the *Second Annual UTEN Network Survey of Technology Transfer Offices*.

Since TTOs may follow a diversified set of technology transfer mechanisms, in several institutions across diverse countries, with different strategies and organizational structures (Conti et al., 2007), it is our conviction that a systematic assessment of empirical evidence and scientific literature on University-Industry Technology Transference (UITT) is of paramount importance for academics, practitioners and policy makers.

1.2 Methodological concerns

In order to perform this review, different online databases were investigated, since not all cover the same journals; namely: *Science Direct and Web of Knowledge*; 13 *Research Papers in Economics* (RePEc) for research classified by *Journal of Economic Literature* (JEL) codes O31 (Innovation and Invention: Processes and Incentives), O32 (Management of Technological Innovation and R&D), O33 (Technological Change: Choices and Consequences; Diffusion Processes) and O34 (Intellectual Property Rights). We also performed an intensive collection of articles published on *The Journal of Technology Transfer and Technovation*, as these are considered important publications in

13 Main keywords used to screen articles were: technology transfer office*, industry liaison office*, technology licensing universit *, universit* licensing, universit* spin off, universit* start*, universit* patent*, academ* patent, universit* commercialization. Asterisk stands for search all word or word fragment combinations. For instance, universit* finds university and its plural, universities.

this specific field of knowledge. Each source was manually searched through the abstracts to pre-screen the relevant articles. Afterwards, the references of each relevant paper were reviewed, in order to identify further published material that was not listed in first place, or was not available within the searched databases.

From the initial pool of more than 700 papers, we extracted 528 relevant ones that specifically addressed TTOs. Those focusing primarily on the TTO phenomenon were categorized into a “primary” group of literature, accounting for a total of 93 papers. A “secondary” group of literature comprises papers that despite not focusing focus exclusively on TTOs, present relevant findings regarding the wider phenomena of technology transfer, providing new insight at the definitional and conceptualization levels. Figure 5.23 shows the evolution on the number of papers fitting the two categories since 1980. The chart depicts an increasing scientific output on the topic of “university technology transference,” as well as a similar increase on “primary” literature, specifically addressing TTOs.

1.3 State-of-the-art

In order to perform an initial overview of the literature, tables 5.3 and 5.4 show aggregated descriptive frequencies for the two categories of papers under analysis, as well the more frequent keywords. In order to perform a simple view of literature evolution, data cover two different periods (1980-1995 and 1996-2011), different geographical locations from where the studies originate and the percent distribution of studies according with the research methodology applied.

Geographical locations were grouped into *United States/Canada*, *Europe*, *Emerging Countries* (BRIC, Mexico and East Asia), *Developing Countries* and *Others*. The methodologies were grouped into either *Empirical* versus *Conceptual* studies. Empirical studies were broken down into *Qualitative* versus *Quantitative* research approach.

The data reveal an evolution from the period 1980-1995 to 1996-2011, where one can observe an increase in the proportion of literature produced outside United States/Canada, with a substantial growth in Europe, while trying to follow the US example (Conti and Gaulé, 2009).

The following sections of the present article will provide a structured overview of university TTO phenomena, based on the reviewed papers and, for each one, attempt to articulate the related research topics with its most relevant contributions and findings among “primary” and “secondary” literature, discussing different perspectives and proposing areas for further research. The “primary” group of papers will be used to support the role played by TTOs and relevant criteria for evaluating TTOs activity.

2. University Technology Transfer: Overview

2.1 Evolution of University Technology Transfer

Bozeman (2000) provides us an elucidative definition of the technology transfer concept, as the movement of know-how, technical knowledge, or technology from one organization to another. The same author stresses the difficulty to perform a canonical definition regarding differences between research fields and the fact it should be distinguished from the knowledge transfer process, although some scholars defend the interchangeability of both fields (Gopalakrishnan and Santoro, 2004).

It is widely accepted that universities are a major source of knowledge, but also of technology, as result of their discoveries originating from research projects. The UITT phenomena played a major role in the world economy, at least, since the nineteenth century; from when universities have been considered a major source of knowledge to industry (Niosi, 2006). However, systematic scientific study of universities as major suppliers of technology for industry is a recent phenomenon, arising about 30 years ago (Niosi, 2006). This interest arose when universities began to practice technology commercialization in the United States as a result of the Bayh Dole Act (1980) and the 1986 Federal Technology Transfer Act, which transferred the right to own and license inventions from federally funded research to the universities (Herrero and Angel, 2009). After the Bayh Dole Act there was a dramatic growth of patenting and licensing of publicly funded research by American research universities (Sampat, 2006).

Also, starting in the 1980s – despite some critics of “borrowing” policy instruments from other economies in very different institutional contexts (Mowery and Sampat 2005) – several similar policy initiatives took place in most European countries (Malva et al., 2010). These public policy measures were based on the assumption that European universities and scientists did not undertake enough IPR-mediated technology transfer, especially when compared to their US counterparts.

The British government was the first to emulate the US initiatives in 1985 (Malva et al., 2010). Fujisue (1998) analyses the implementation of the similar law changes in Japan. Malva et al. (2010) explore the effects of the Innovation Act introduced by the French government in 1999, finding an increase in the number of patents in French academic institutions, as a result of a higher propensity to claim IPRs over their employees’ inventions. These law changes are still being performed among countries, as a strategic reorientation to increase universities’ and academics’ incentives for patenting. For example, the principle of professor’s privilege (research results were considered property of the respective academic inventors) was abolished in several European

Figure 5.23 Literature Evolution: Primary and Secondary

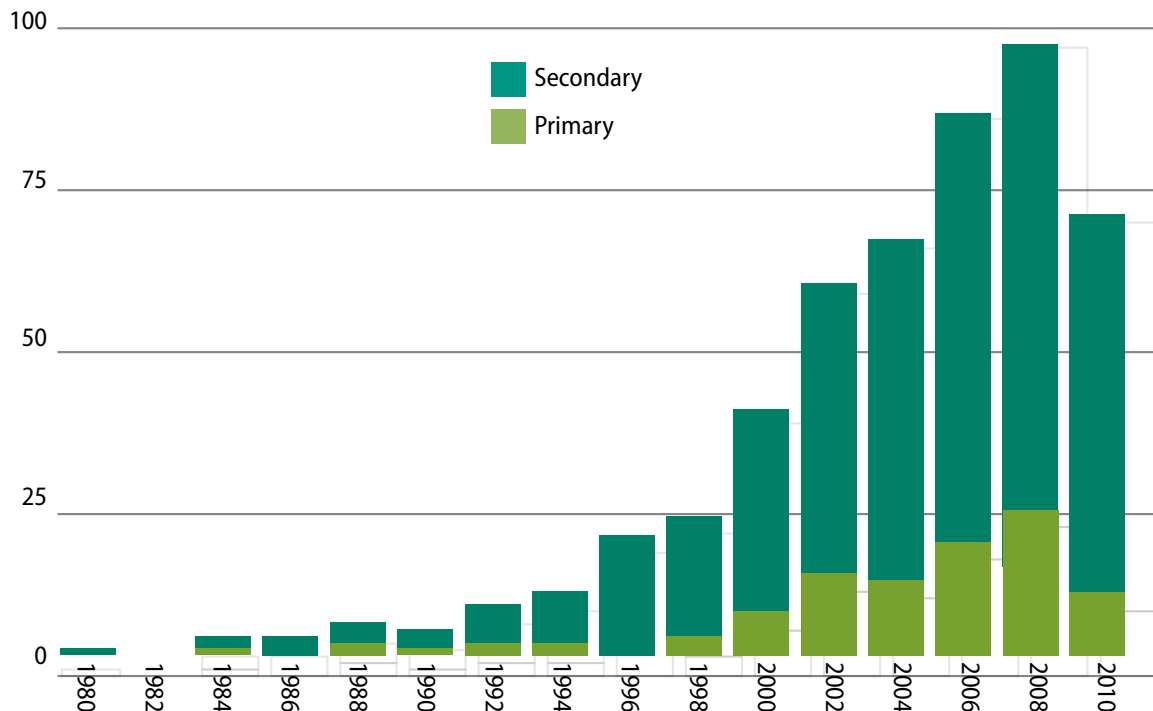


Table 5.3 Journals' distribution: Primary, Secondary Literature Taxonomy

Journals	Primary Literature	Secondary Literature
Journals	93	393
Journal of Technology Transfer	26	107
Technovation	4	42
Research Policy	8	62
Others	81	184
Most Frequent Keywords		
TTOs	14	0
University(ies)	10	26
Entrepreneurship	5	19
Academic Entrepreneurship	2	14
Bayh-Dole Act	0	12
Innovations	4	28
Licensing	3	11
Patents	3	19
Science Parks	2	10

countries: i.e., Germany (between 2000 and 2002), Austria, Denmark (Malva et al., 2010) and, more recently, in Finland (2007) (Tahvanainen, 2009). Other countries are undertaking similar technology transfer institutional changes, aiming to stimulate more competitive economies, i.e. Saudi Arabia (Alshumaimri et al., 2010). Conversely, Italy has established a different strategy, by introducing, in 2001, the professor's privilege (Balderi, 2010).

Table 5.4 Journals' distribution: Geographic Location, Methodical Approach

	1980-1995	1996-2011
Geographical Studies Focus	34	458
Europe	0	202
USA/Canada	25	185
Emerging Countries	1	15
Developing Countries	0	3
Others	0	47
Studies Methodology in "primary" group of papers		
Empirical	62.5%	62%
Conceptual	37.5%	38%
Quantitative	0%	80%
Qualitative	100%	20%

These events are widely reported in literature as being the main cause of growth regarding university-industry interactions (Bozeman, 2000; Malva et al., 2010). However, there is some debate on whether the law, per se, has the capability to stimulate the cooperation between public research and enterprises (Laperche and Uzunidis, 2010). Some authors argue that the law can be considered as both an effect and a cause of the increase in university patenting, grounded on a continuously increasing participation of US universities in the national patenting system since 1963 (Leydesdorff and Meyer, 2009). Geuna and Nesta (2006)

support this argument with their conclusions from an analysis of the European academic patenting system. First, the broadly defined research area of biotechnology and pharmaceuticals tends to be an area of extremely high university patenting activity across countries. Second, historical developments in Italy and Germany seem to support the view that university patenting is not a new phenomenon. Taken together, these two findings suggest that the rapid rise of academic patenting in the closing quarter of the twentieth century was driven more by the growing technological opportunities available in the biomedical sciences field (and eventually also in ICT) and the feasibility of pursuing those opportunities in university laboratories, rather than driven by policy changes affecting the universities' rights to own patents arising from publicly funded research. Notwithstanding, a more rapid growth is verified across the spectrum of different technologies after the US law changes (Kortum, 1999).

Although the proclaimed effects of the Bayh-Dole Act on university patenting in the United States have encouraged other governments to introduce similar legislation, Leydesdorff and Meyer (2009) discussed the end of the Bayh-Dole effect in the US, supported by a relative decline of university patenting since 2000, both domestically and internationally. According to the authors this was as a result of an "institutional learning" effect by universities, as they are becoming aware that university patenting is expensive and not always as rewarding as outsource patenting (Leydesdorff and Meyer, 2009).

2.2 University Technology Transfer

2.2.1 University Technology Transference Actors

Jensen et al. (2003) identified three major actors concerning technology transfer: faculty, administration, and TTOs. Although administration is not always explicitly defined in the literature – or is limited to the funding public or private institutions (Anderson et al., 2007) – in general, research on technology transfer focuses on these central actors.

Faculty: According to Jensen et al. (2003) many directors believe that substantially less than half of the inventions with commercial potential are disclosed to their office. Faculty may not disclose for a variety of reasons ranging from not being able to realize an invention has commercial potential to not wanting to take time away from their research. Paradoxically, according to the same author, directors also believe that many of the inventions disclosed to them are of questionable value. Jensen et al. (2003) suggest then that the nature of inventions disclosed in US universities is related to faculty quality, and found empirically that universities with higher quality faculty have a higher proportion of disclosures licensed in the proof of concept stage, as do universities with higher fractions of inventions from medicine and nursing or from engineering.

Also, the faculty role of involvement goes far beyond technology disclosure to the TTO. This involvement includes the identification of potential licensees and assistance in the further development of a licensed technology (Thursby and Thursby, 2003).

Central administration: The primary purpose of a technology transfer program is for the university to assist its researchers to disseminate research results for the public good. Phan (2004) concludes that technology transfer should be considered from a strategic perspective, where the central administration need to address skill deficiencies in TTOs, reward systems and faculty training to the university established program. The definition of *program objectives* and *methods* both extend largely from the central administration – where the option to create a TTO, incubator, or to participate in a science park, are not simple decisions, but are decisions that need to be considered within a global context, where multiple successful strategies may be followed. Tuunainen (2005) explores the way conflicts may emerge in faculty, originating from a lack of definition of boundaries between the social role of university knowledge and the business orientation stimulus that central administration must address.

Technology transfer offices: Jensen et al. (2003) examine the interplay of the three major university actors, modeling the TTO as an agent of both the faculty and the administration. They found that the TTOs reporting licensing objectives are influenced by their views of faculty and administration, which supports the assumption that the TTO is a dual agent. Ambos et al. (2008) show evidence that universities are able to manage the tensions between academic and commercial demands through, for example, their creation of "dual structures" as TTOs. Creation of TTOs is often related to the management of university patent portfolio; however Balderi (2010) discusses the Italian example, where after the introduction of professor privilege legislation in 2001, universities organized internal ad hoc offices in order to offer professors and researchers those services which were supposedly necessary for the valorization of their results. Very often researchers found TTOs' services increasingly efficient and convenient and therefore relied upon them for the protection and transfer of their inventions.

2.2.2 Specific Technology Transfer Mechanisms

Goktepe (2005) – based in previous literature on University Industry Technology Transfer (UITT) mechanisms – proposed a classification consisting in two main dimensions: *Specific* and *Generic* technology transfer mechanisms. Specific technology transfer mechanisms are those that are directly aimed at industrializing university knowledge and that, generally, produce direct revenue from a specific invention.

Licensing: Licensing is based on the transfer of university research results in the form of patents. Patents are one of the various ways to protect a technology, and the most effective towards universities' objectives. Inventors usually patent to protect their findings, before revealing them to their peers. With the ownership of patents changing to universities, in most countries, licensing starts to be the most frequent mechanisms to transfer technology in order to obtain revenues from an inventions' commercialization. Commercializing university inventions is not trivial because these inventions are often far from being readily marketable and information asymmetries exist between inventors and potential licensees (Buenstorf and Geissler, 2009).

Spin offs: Start-ups can benefit from university knowledge, education and the mobility of university staff. This is often a option when inventions are in a early stage of development, and need further market development to be commercially attractive or inventors are willing to use an invention to engage in their own venture (Wennberg et al., 2010). Thanks to their learning from long periods of education and advanced work experience, academics possess substantial human capital and often have access to advanced technologies and innovations, which could provide them with unique qualities for starting and operating new ventures with the potential of creating substantial growth and economic value. Spin offs are not only well seen by universities, that usually take part with equity, and/or maintain royalties on the technology, but also from politicians, as one of the key drivers of economic change and growth, despite, in many cases, of a limited success (Bathelt et al., 2010). University support to spin offs goes further than technology transfer. University support for spin offs often extends to the development of business incubators and assistance in seeking start-up funds.

2.2.3 Generic Technology Transfer Mechanisms

Universities produce applied and/or basic research. Basic research often limits the creation of a product or a technology ready for industry assimilation. However, this level of research often results in disruptive innovations, and firms are aware of this fact and are willing to establish links between their R&D staff and faculty members. Thursby and Thursby (2003) found that the more basic research conducted, the more likely the firm is to use sponsored research when a license is not signed. However, the closer the contacts of the firm's R&D staff with university personnel, the less likely the firm is to use sponsored research; therefore, the interest in this process is also a method for establishing relationships with faculty inventors. *Generic* technology transfer mechanisms have a great importance in the final objective of knowledge diffusion and economic growth. The role of university TTOs can be expanded to the

development of relationships between university and industry, improving the integration of communication, opportunities, and identifying potential weaknesses.

Goktepe (2005) proposed a classification for the generic UITT mechanisms – those that do not necessarily have direct impact on the industrial and commercial activities. These are more generic mechanisms where both industry and university, in collaboration, can develop new knowledge and technology. They were then classified as:

- Technology transfer and co-development via formal research contracts
 - » R&D agreements
 - » R&D consortia
 - » Co-funding of research
 - » Co-supervision of PhD and MSc. Theses
 - » Collaboration in national competence centers
- Technology transfer via mobility/exchange of people
 - » Employment of graduates
 - » Faculty consultancy
 - » University sabbaticals
 - » Industry scientist working at universities
 - » Individual collaboration
- Technology transfer via casual occasional/or contributory means
 - » Conference, seminars, workshops
 - » Scientific publications
 - » Popular lectures
 - » University fairs
 - » Open university days
 - » Joint-labs
 - » Continuing education for industry (sandwich programs).

Generic Mechanisms are important, as they fill the gap motivated from asymmetric information, allowing for the demonstration of technology between parts without a vendor bias, as a result of mutual human resources involvement in an informal level, as seen in many case studies in literature (Chang, 1995; Edwards, 1994; Kwiram et al., 1995). Science parks promote a link, through generic mechanisms, between academic expertise and industrial success in specific fields, revealing the role of proximity in this type of mechanism (Guy, 1996; Mathieu, 2011).

Mathieu (2011) made a summary of the mechanisms used in scientific fields, reporting different behaviors; for example, Biotechnology and Pharmaceutical fields are more based on scientific publications, spin offs, patents, informal interactions and collaborative research, lacking the use of human resources transfer (which is the main mechanism in Social, Economic and Political Sciences) and research services (more common in the Engineering field).

2.2.4 Performance of University Innovation in Companies

European firms lack the absorptive capacity to identify and exploit academic inventions that are further away from market applications (Czarnitzki et al., 2009a). Great differences exist between academic and small firms' personnel regarding perception of problems, time required to solve problems and appropriateness of cost factors (Dean, 1981). Larger companies are more willing to engage in technology transfer programs, as a result of a superior budget available for R&D. These firms benefit not only from the resulting technology, but also from increasing global competition as a result of a qualification and diversification of their work force. A research consortium is also an important challenge, with impact in the long term; but while crossing departmental and college boundaries with an interdisciplinary perspective can be a major benefit, it can also create administrative complexities which can lead to project delays and must be resolved (Chang, 1995; Kwiram et al., 1995).

2.2.5 Performance of Technology Transfer in Universities

Performance of technology transfer in universities is not comparable to that in industry. Academic patents protect more basic inventions than corporate patents. Academic patents cover rather basic inventions with a low immediate commercial value not threatening current returns of potential plaintiffs. The effect is weaker for academic patents in collaboration with the business sector, which suggests that those patents are evaluated as more applied by owners of potentially rival technologies (Czarnitzki et al., 2009b). The effects on universities' scientific production accounts for a significant field of the reviewed "secondary" literature that tries to establish a correlation between the patenting activity and the appeal of university top-level researchers to engage in technology transfer with industry. Findings show active steps to preserve the academic role identity (Jain et al., 2009) and that the more active in publishing and inventing belong to the group of authors-inventors (Wang and Guan, 2011).

2.2.6 Countries' Performance

The literature reports different success rates between the United States and other countries, mainly in Europe. For Mowery and Sampat (2005) critiques on the policy diffusion are supported by an empirical assessment of the US higher education system, particularly because of the unusual scale and structure of this institution. Recent studies have shown that European policymakers' assumptions may derive from lack of attention to the differences on the two continents' university systems (Malva et al., 2010), as well as placing too much faith in available statistics on the number of patents owned by universities (Geuna and Nesta, 2006). Despite an

evident delay, many European countries are growing quite fast towards higher levels of performance (Balderi, 2010).

2.2.7 Influence Factors

When Leydesdorff and Meyer (2009) mentioned the end of the Bayh-Dole Act effect in US universities patenting, they suggested a structural reason: Universities are becoming increasingly ranked in terms of their knowledge output, which neglects financial benefits of UITT, instigating institutions to engage in more international collaborations and co-authorships than university-industry relations. Lai (2011) identify variables affecting the willingness to engage in UITT on the side of the transferor (university), transferee (industry) and the intermediary institute, and the conclusions of this empirical study point out that, for university (transferor), *incentives* and *capabilities* have the same degree of importance in influencing the willingness to engage in UITT, while the most important role is played by the *degree of technology commercialization and distribution of license fees*, and *the degree of partnership* is the least important variable studied. The industry (transferee) results imply that *the match between technology provided by universities and companies' requirements* are important to the acceptance of a UITT, but *the company employee's experience and performance* in this process are the most important key issues in industry. From the point of the process intermediary, *the constant technological support* is less important than *resources*, while *the technology evaluation ability* and *mechanism of transfer* are the most crucial; however, *resources* and *intermediary transfer process* have significant statistical relationship with the willingness to engage in UITT. Kim (2011) findings suggest that the growth of the technology transfer of the studied universities were primarily due to the increasing frequencies of commercial outputs.

3 Technology Transfer in University TTOs Assessment

The study of the UITT process in the literature focuses often in TTOs and similar university structures. In the United States, with the Bayh-Dole Act, the number of TTOs in universities has grown from 25 to more than 200, in 2003 (Jensen et al., 2003). The assessment of these structures, and the process previously presented can address multiple factors of success influence and make use of some specific and direct or more indirect metrics, in the shape of externalities in the economy and society.

TTOs performance must be primarily put in terms of profit, since the main role is the commercialization of technologies, from which, profits stay partially in the TTO, supporting their activities. Geuna and Nesta (2006) discuss the fact that for UK universities, and for US institutions, for which even more abundant statistical evidence exists, that most university TTOs do not generate positive net incomes. Results

from a OECD PRO IP survey show that very few organizations earn appreciable amounts of money and the majority receive little or no income from their IPR holdings. In fact, on the sample composed of OECD member countries surveyed, between 10% and 60% of the reporting organizations that had an active TTO derived no gross income whatsoever from IP (Geuna and Nesta, 2006). Other assessment methods allow one to obtain more conclusive results. Gumbi (2010) presents different existing methods and its strengths and weaknesses, and suggest various indicators for measuring TTOs performance, which will be explored on the following sub-section of this article.

3.1 Standard Academic Technology Transference Metrics

Both start-ups and licensees can be measured quantitatively such as number of university patents licensed to industry or number of start-up companies established as a result of technology transfer (Goktepe, 2005). Standard metrics are often linked to the IPR management, as it is often the main role of TTOs (Gumbi, 2010).

Patents: Patents are the baseline output measure of the process, as it provides the guarantee of legal rights to inventors for the commercial use of their inventions (Kim, 2011). The use of patent counting metrics in UITT assessment is addressed in some papers. University-invented patents, defined as those patents that are owned by the university, tend to lead to a bias evaluation since early IPR laws gave ownership to the university inventor and, in many situations, universities decide to not patent the technology, allowing the university inventor to proceed independently (Geuna and Nesta, 2006). The same author supports that a correct definition of university-invented patents should include those patents that have a member of university faculty among the inventors whether or not the university is the patent assigner.

Licenses: TTOs licensing activities outputs are used as the main measure of TTOs productivity, usually represented by the number of licenses and the license revenue (Conti and Gaulé, 2009). In institutions where disclosure procedures are not well defined or internalized in the academic culture, patents are often filed only after a license is negotiated between university and the industry counterpart (Conti and Gaulé, 2009).

Spin off: Spin offs are used when technology is in embryonic state, and hazard is not attractive to a license with significant revenues, or with the potential to start a new firm. More common revenues from spin offs are associated with equity in the new firms, but the success rate of these ventures is very low, so in a correct assessment of university performance, the number of spin offs should be complemented with the success of the venture, and revenues brought to the university, since not all patents are suitable

for a spin off creation and traditional licenses can be a more profitable and low risk solution for the university (Bray and Lee, 2000).

Publications: While the number of articles published is not part of TTOs responsibilities, it is an important output measure used to rank academic institutions and constitutes the main measure of university scientific production and quality. Even though it does not represent direct revenue to the university, it is a type of knowledge transfer, and attracts the attention from industry to the academy, promoting an increase of technology transfer.

University and industry collaboration could also be mapped using a bibliometric examination of publications that are co-authored by researchers in the private sector with university scientists (Abramo et al., 2009). Another publication measure used in literature is the patent citation, comprehending prior technology of other patents and patent references, reported as a measure of patent quality and innovation performance (Gumbi, 2010).

3.2 Technology Transference Externalities Metrics

Generic UITT mechanism outcomes cannot be easily measured quantitatively, namely, at the level of training, subsystems of R&D and technology development/improvement (Goktepe, 2005). It is difficult to generalize, identify, and measure these mechanisms in terms of technology transfer. Siegel (2004) reported that TTO staff and university scientists frequently report that outputs are not the only ones used in standard metrics, invention disclosures, licenses, patents, start-up companies and royalties, but also informal transfer of know-how, sponsored research agreements, new opportunities for students, and product and economic development, that cannot be easily measured as a direct and quantitative output of UITT.

Sorensen and Chambers (2007) suggest that a TTO should be evaluated by how well it avails access to knowledge from the economy, rather than only measure money, neglecting the non-profit mission, or only economic impact.

3.3 Technology Transfer Policies, Models and Indexes

A major issue in evaluating UITT is the time lag of the results and investment, since the producing outputs may be due to consuming inputs in previous periods of the studies, so methodology should address time lags (Kim, 2011). The analyses of policy approaches regarding technology transfer and the efficiency between different countries allow identifying the role of innovation policies in performance (Oliveira and Teixeira, 2009).

TTOs are in many cases required to generate income from license in order to cover their operating budgets, working as an incentive to maximize the income they generate simply to stay in business,

rather than promotion of technology transfer, although when performance incentives exist, the majority focus on broader non-financial measures of performance (Abrams et al., 2009).

Data envelopment analysis (DEA) is one of the techniques often used to identify the relative efficiency of a decision making unit, in a more accurate way than a simple count measure of the outputs, enabling universities that are lagging behind in technology transfer to compare their productivity with leading universities, by measuring in observable groups of the best practices (Anderson et al., 2007; Kim, 2011). Chapple et al. (2004) Cluster analysis is common among literature survey analysis, setting homogeneous groups of institutions, as used in Portuguese TTOs by Mira Godinho and Cartaxo (2011), with the assumption that the diverse nature of institutions determined different behaviors.

Literature reports also suggested different indexes to evaluate university performance and allow comparable measure from different contexts. For instance, ENTRE-U measures the entrepreneurial orientation of university departments (William Todorovic et al., 2011). Azagra-Caro (2008) has built an indicator to compare EU and US patents. Arundel and Bordoy (2008) focus on the development of comparable indicators of UITT, suggesting simple tweaks of common surveys and an evaluation of more than the standard formal metrics.

3.4 Internal Technology Innovation Protection Policies

In order to promote the protection of innovation by researchers, universities routinely share revenues with the inventors and their departments. Literature studies on the effect of these policies show a greater patenting activity and inventor engagement in the UITT process (Baldini, 2010; Jensen and Thursby, 2001; Link and Siegel, 2005). Baldini (2010) also identified a positive impact in patenting activity originating from the organizational environment with the use of prompt administrative procedures, the availability of a TTO, and commitment to invention exploitation. Del Bairro-Castro and García Quevedo (2009) conclude that the principal factor determining the number of patents is the amount of R&D funding, with faculty inventors often renouncing their royalties in benefit of their research projects, aiming mostly to enhance their prestige and reputation (Baldini et al., 2007).

After an initial increase of university patents, due to law changes, recent literature showed a decrease in patenting activity due to more experienced technology evaluation (Leydesdorff and Meyer, 2009). TTOs staff/budgets shortages often motivate an increase in the number of inventions not processed or patents not marketed, which motivate a more rigorous inventions' potential evaluation (Owen-Smith and Powell, 2001; Swamidass and Vulasa, 2008).

3.5 Commercialization of University Intellectual Property Policies

While benefitting from public policy incentives towards innovation, institutions need to invest in their technology transfer operations in order to bridge research outputs to society's needs (Abrams et al., 2009). As seen, intellectual property transfer is, in general, only fulfilled with transference between the inventor and firm. Bekkers and Freitas (2008) found that channels' importance to actors in this process did not depend on the industrial activities of firms, but were better explained by the disciplinary origin, the characteristics of the underlying knowledge, the characteristics of researchers involved in producing and using this knowledge (individual characteristics), and the environment in which knowledge is produced and used (institutional characteristics).

One can conclude that TTOs should have specific approaches for each type of technology, but they could only identify the internal characteristics, rather than adapting to all external target firms. A large part of the literature addresses the problem of asymmetric information where, even after technology transference, the firm is unable to commercialize the products because the lack of capability to fully understand and adapt it to their processes. Agarwal (2006) studied license agreements associated with inventions from MIT, and showed that strategies that involve engaging the inventor favorably influence the likelihood and degree of commercialization success.

Therefore, besides the role of TTOs generally finished in the license agreement contract, previous and ensuing contact from licensees with the inventors are key factors to the success of the relationship, and can occur through several mechanisms (Geuna and Muscio, 2009; Goktepe, 2005). Pries and Guild (2011) found evidence that greater patent or other legal protection for technology was related to a greater occurrence of transferring limited rights to existing firms, while those with a greater commercial uncertainty are more likely to lead to a creation of a new firm, of a full transfer to an existing one. University license contracts are more complex than fixed fees and royalties, examined by most literature. Since most are embryonic inventions, contracts are based many times in risk sharing, leading often to milestones, annual payments, and consultancy that are not always studied as a form of patent commercialization measure (Dechenaux et al., 2009). The type of contract should also take into account the patent shelving intentions, or risk of the licensee, which could result in a lower income if not correctly addressed with bigger upfront fees or milestones along the contract duration (Dechenaux et al., 2009). The use of exclusivity agreements is more usual in new-to-the-market innovations, with potential disruptive value (van den Berghe and Guild, 2007).

3.6 Influence of Structure and Human Resources

Ambos et al. (2008) results show that the breadth of support and the experience of the TTOs are not significant predictors of commercial outcomes, although the study of existence of such boundary structure confirms the importance related in literature. Kim (2011) found that despite a growth of public and private investment in university research, corresponding productivity improvements have not occurred. The growths in UITT were due to the use of efficient technology transfer activities, into which stage many universities moved after the IPR law changes. In Lai (2011), results show that TTOs should focus on improving their own abilities in technology evaluation and on the construction of an organized UITT channel, since it contributes to a better performance and smoother technology transference. Internal environment (structure, procedures, priorities, research objectives, and university culture) are supported by policies but have to be adapted to internalize the real objectives of technology transfer beyond them (Oliveira and Teixeira, 2009). Staff experience and skills is also an identified influence factor of TTO performance, for private companies' needs may be better understood, and a PhD in science can facilitate academic communications (Conti and Gaulé, 2009).

References

- Abramo, G., C.A. D'Angelo, F. Di Costa, & M. Solazzi (2009). "University-industry collaboration in Italy: A bibliometric examination," *Technovation*, 29(6-7):498-507.
- Abrams, I., G. Leung, & A. J. Stevens (2009). "How are U. S. technology transfer offices tasked & motivated: Is it all about the money?" *Research Management Review*, 17(1):1-34.
- Agrawal, A. K. (2006). "Engaging the inventor: exploring licensing strategies for university inventions & the role of latent knowledge," *Strategic Management Journal*, 27(1):63-79.
- Alshumaimri, A., T. Aldridge, & D. B. Audretsch (2010). "The university technology transfer revolution in Saudi Arabia," *The Journal of Technology Transfer*, 35(6):585-596.
- Ambos, T., K. Makela, J. Birkinshaw, & P. D'Este, (2008). "When does university research get commercialized? Creating ambidexterity in research institutions," *Journal of Management Studies*, 45(8):1424-1447.
- Anderson, T., T. Daim, & F. Lavoie (2007). "Measuring the efficiency of university technology transfer," *Technovation*, 27(5):306-318.
- Arundel, A. & C. Bordoy (2008). Developing internationally comparable indicators for the commercialization of publicly-funded research, UNU-MERIT Working Paper 2008-075.
- Azagra-Caro, J.M. (2008). "Patents owned by public research centres: EU vs. US, universities vs. public research organisations." In 3rd Annual Conference of the EPIP Association, pages 1-26, Bern, Switzerland.
- Balderi, C. (2010). "The valorisation of results from public research: about ttos' performance & spin offs growth." Phd thesis, Scuola Superiore Sant Anna.
- Baldini, N. (2010). "Do royalties really foster university patenting activity? An answer from Italy," *Technovation*, 30(2):109-116.
- Baldini, N., R. Grimaldi & M. Sobrero (2007). "To patent or not to patent? A survey of Italian inventors on motivations, incentives, & obstacles to university patenting," *Scientometrics*, 70(2):333-354.
- Bathelt, H., D. F. Kogler, & A. K. Munro (2010). "A knowledge-based typology of university spin offs in the context of regional economic development," *Technovation*, 30(9-10):519-532.
- Bekkers, R. & I.M.B. Freitas (2008). "Analysing knowledge transfer channels between universities & industry: To what degree do sectors also matter?" *Research Policy*, 37(10):1837-1853.
- Bozeman, B. (2000). "Technology transfer & public policy: a review of research & theory," *Research Policy*, 29(45):627-655.
- Bray, M. J. & J. N. Lee (2000). "From technology transfer: licensing fees vs. equity positions," *Journal of Business Venturing*, 15(5-6):385-392.
- Buenstorf, G. & M. Geissler (2009). "Not invented here: Technology licensing, knowledge transfer & innovation based on public research." Papers on economics & evolution, Max Planck Institute of Economics, Evolutionary Economics Group.
- Chang, D. (1995). "Technology transfer & academic education with a focus on diversity," *The Journal of Technology Transfer*, pp. 88.
- Chapple, W., A. Lockett, D. S. Siegel, & M. Wright (2004). "Assessing the relative performance of university technology transfer offices in the U.K.: Parametric and non-parametric evidence," *Research Policy* 34(3): 369-384.
- Conti, A. & P. Gaulé (2009). "Is the US outperforming Europe in university technology licensing? A new perspective on the European paradox," *Research Policy*, Elsevier, vol. 40(1), pages 123-135, February.
- Conti, A., P. Gaulé, P. & D. Foray (2007). "Academic licensing: A European study."
- Czarnitzki, D., K. Hussinger, & C. Schneider (2009a). "The nexus between science and industry: evidence from faculty inventions," ZEW Discussion Papers 09-028, ZEW - Zentrum für Europäische Wirtschaftsforschung / Center for European Economic Research.
- Czarnitzki, D., K. Hussinger, & C. Schneider (2009b). "Why challenge the ivory tower? New evidence on the basicness of academic patents." *Kyklos* 62(4), 488-499.
- Dean, C. (1981). "A study of university/small business interaction for technology transfer," *Technovation*, 1(2):109-123.
- Dechenaux, E., M. C. Thursby, & J. G. Thursby (2009). "Shirking, sharing risk & shelving: The role of university license contracts," *International Journal of Industrial Organization*, 27(1):80-91.
- del Bairo-Castro, T. & J. García Quevedo (2009). "The determinants of university patenting: Do incentives matter?" Working Papers 2009/13, Institut d'Economia de Barcelona (IEB).
- Goktepe, D. (2005). "Investigation of
- Edwards, R. L. (1994). "The industrial revitalization forum program: Successful industry/university cooperation," *The Journal of Technology Transfer*, 19(2):43-46.
- Fujisue, K. (1998). "Promotion of academia-industry cooperation in Japan: Establishing the 'law of promoting technology transfer from university to industry' in Japan," *Technovation*, 18(6-7):371-381.
- Geuna, A. & A. Muscio (2009). "The governance of university knowledge transfer: A critical review of the literature," *Minerva*, 47(1): 93-114.
- Geuna, A. & L. J. Nesta (2006). "University patenting & its effects on academic research: The emerging European evidence," *Research Policy*, 35(6):790-807.
- Goktepe, D. (2005). "Investigation of university industry technology transfer case: A conceptual & methodological approach." Unit for Industrial Dynamics Project at University Lund (2005).

- Godinho, M. and R. Cartaxo (2011). "University patenting, licensing and technology transfer: how organizational context and available resources determine performance."
- Gopalakrishnan, S. & M. Santoro (2004). "Distinguishing between knowledge transfer & technology transfer activities: The role of key organizational factors," *IEEE Transactions on Engineering Management*, 51(1):57-69.
- Gumbi, S. (2010). "A review of performance standards to monitor, evaluate & assess the impact of technology transfer offices," *South African Journal of Science*, 106(7/8):1-9.
- Guy, I. (1996). New ventures on an ancient campus. *Technovation*, 16(6):269-270.
- Herrero, F. V. & P. O. Angel (2009). "The economic analysis of University Technology Transfer Offices: a theoretical review & empirical implications."
- Jain, S., George, G., & M. Maltarich (2009). "Academics or entrepreneurs? Investigating role identity modification of university scientists involved in commercialization activity," *Research Policy*, 38(6):922-935.
- Jensen, R. A., J. G. Thursby & M. C. Thursby (2003). "Disclosure & licensing of university inventions: 'The best we can do with the s**t we get to work with,'" *International Journal of Industrial Organization*, 21(9):1271-1300.
- Jensen, R. A. and M. C. Thursby (2001). "Proofs and prototypes for sale: The licensing of university inventions," *American Economic Review*, 91(1):240-259.
- Kim, Y. (2011). "The ivory tower approach to entrepreneurial linkage: productivity changes in university technology transfer," *The Journal of Technology Transfer*.
- Kortum, S. (1999). "What is behind the recent surge in patenting?" *Research Policy*, 28(1):1-22.
- Kwiram, A. L., M. Koch, J. E. Paden & B. M. Halldorson (1995). "University-industry consortium agreements Center for Process Analytical Chemistry: A case study," *The Journal of Technology Transfer*, 20(3-4):45-55.
- Lai, W.-H. (2011). "Willingness-to-engage in technology transfer in industry and university collaborations," *Journal of Business Research*, Volume 64, Issue 11, November 2011, Pages 1218-1223.
- Laperche, B. and D. Uzunidis (2010). "La valorisation de la recherche publique en France et la question de l'université" (The commercialization of public research in France and the issue of the university.)
- Leydesdorff, L. and M. Meyer (2009). "The decline of university patenting and the end of the Bayh-Dole effect," *Scientometrics*, 83(2):355-362.
- Link, A. N. and D. S. Siegel (2005). "Generating science-based growth: an econometric analysis of the impact of organizational incentives on university-industry technology transfer," *The European Journal of Finance*, 11(3):169-181.
- Malva, A. D., F. Lissoni, & M. P. Llerena (2010). "Institutional Change and Academic Patenting: French Universities and the Innovation Act of the 1999."
- Mathieu, A. (2011). "University-Industry interactions and knowledge transfer mechanisms: a critical survey."
- Mowery, D. C. and B. Sampat (2005). "The Bayh-Dole Act of 1980 and university-industry technology transfer: a model for other OECD governments?" *Essays in Honor of Edwin Mansfield*, 30(1-2):115-127.
- Niosi, J. (2006). "Introduction to the symposium: Universities as a source of commercial technology," *The Journal of Technology Transfer*, 31(4):399-402.
- Oliveira, M. d. D. B. M. and A. A. C. Teixeira (2009). "Policy approaches regarding technology transfer: Portugal and Switzerland compared." FEP Working Papers 334, Universidade do Porto, Faculdade de Economia do Porto.
- Owen-Smith, J. and W. W. Powel (2001). "To patent or not: Faculty decisions and institutional success at technology transfer," *The Journal of Technology Transfer*, 26(1):99-114.
- Phan, P. H. (2004). "Analyzing the effectiveness of university technology transfer: Implications for entrepreneurship education." Rensselaer Working Papers in Economics 0426, Rensselaer Polytechnic Institute, Department of Economics.
- Pries, F. and P. D. Guild (2011). "Commercializing inventions resulting from university research: Analyzing the impact of technology characteristics on subsequent business models," *Technovation*, 31(4):151-160.
- Sampat, B. N. (2006). "Patenting and US academic research in the 20th century: The world before and after Bayh-Dole," *Research Policy*, 35(6):772-789.
- Siegel, D. S. (2004). "Toward a model of the effective transfer of scientific knowledge from academicians to practitioners: qualitative evidence from the commercialization of university technologies," *Journal of Engineering and Technology Management*, 21(1-2):115-142.
- Sorensen, J. A. T. and D. Chambers (2007). "Evaluating academic technology transfer performance by how well access to knowledge is facilitated: Defining an access metric," *The Journal of Technology Transfer*, 33(5):534-547.
- Swamidass, P. M. and V. Vulasa (2008). "Why university inventions rarely produce income? Bottlenecks in university technology transfer," *The Journal of Technology Transfer*, 34(4):343-363.
- Tahvanainen, A.-J. (2009). "Finnish University Technology Transfer in a Whirl of Changes."
- Thursby, J. G. and M. C. Thursby (2003). "Are Faculty Critical? Their Role in University-Industry Licensing," NBER Working Paper No. 9991, Issued in September 2003
- Todorovic, Z. W., R. B. McNaughton & P. D. Guild (2011). "ENTRE-U: An entrepreneurial orientation scale for universities," *Technovation*, 31(2-3):128-137.
- Tuunainen, J. (2005). "Contesting a Hybrid Firm at a Traditional University," *Social Studies of Science*, 35(2):173-210.
- van den Berghe, L. and P. D. Guild (2007). "The strategic value of new university technology and its impact on exclusivity of licensing transactions: An empirical study," *The Journal of Technology Transfer*, 33(1):91-103.
- von Ledebur, S. 2008. "Technology transfer offices and university patenting - a review," Jena Economic Research Papers 2008-033, Friedrich-Schiller-University Jena, Max-Planck-Institute of Economics.
- Wang, G. and J. Guan (2011). "Measuring science and technology interactions using patent citations and author-inventor links: an exploration analysis from Chinese nanotechnology," *Journal of Nanoparticle Research*.
- Wennberg, K., J. Wiklund, & M. Wright (2010). "The effectiveness of university knowledge spill-overs: performance differences between university spin offs and corporate spin offs," *Technical report*, The Ratio Institute.



6. Institutionalization of a Knowledge Network

“The participation of UAlg members in the UTEN program was absolutely a major step within this institution. UTEN activities and programs allowed all staff to “work together in the same direction” – the promotion and the commercialization of University of Algarve results. The staff is now able to identify technologies with potential and identify new markets for commercializing technologies. The UTEN program was the structural step to provide the University of Algarve with established and organized internal procedures, from the disclosure to the licensing or spin off creation.”

Sophia Vairinho
CRIA University of Algarve

6.1 UTEN Governance

UTEN is administered through a *Joint Operating Board* that is chaired by the President of FCT and includes INPI's President and UTEN Directors (Portugal and Austin). Robert Peterson, as Principal Investigator and Associate VP for Research, The University of Texas at Austin, oversees the program.

The management team is led by the Scientific Director, José Manuel Mendonça, President of Inesc Porto and full professor at the School of Engineering of University of Porto, who is assisted by Sonia Pinto and by the Program Manager, Maria José Francisco, as well as by Joana Ferreira, the Communications Coordinator. UTEN's current management team works closely with the managing boards of the international partnership programs both in Portugal and abroad (table 6.1). For the next phase of the UTEN initiative, the governance structure is being enlarged in order to continuously strengthen the UTEN network in terms of structure, organization, and leadership. This includes:

- Establishing routines for UTEN's organization and relations among partner institutions across Portugal

- Strengthening collaboration among the existing network of TTOs, the Council of Rectors (CRUP), and INPI and international partners
- Increasing collaboration with the CRUP.

The FCT will appoint the *Scientific Director*, and together they will hire an *Executive Director* to oversee daily operational activities. The *Executive Committee* (created in 2010, composed of leading TTOs from various Portuguese universities) will work with the Scientific and Executive Directors to execute the annual agenda. *The International Advisory Board* (also created in 2010, with global experts on technology transfer and commercialization) will introduce improvements, while a revised independent *External Review Committee* will monitor and critique UTEN program activities. Specifically:

- **Scientific Director: José Manuel Mendonça**, President of Inesc Porto, Portugal (appointed for 2011-2013) chairs the Executive Committee and coordinates relationships with FCT, CRUP and INPI. The Scientific Director will be appointed by the President of FCT every two years, after consultation with INPI and CRUP.

Table 6.1 International Partnership Programs

The University of Texas at Austin	Focal Points
Scientific Director, UT Austin-Portugal CoLab	António Câmara
Executive Director, UT Austin-Portugal CoLab	Pedro Madeira
Director, UT Austin-Portugal CoLab	David Gibson
IC ² Institute	Greg Pogue Cliff Zintgraff Heath Naquin Rosemary French Margaret Cotrofeld Diane Skubal
UT Austin Office of Technology Commercialization (OTC)	Max Green Ray Atilano
UT Austin Technology Incubator (ATI)	Isaac Barchas
Texas A&M OTC, College Station	Brett Cornwell
South Texas Technology Management Team (STTM)	Sean Thompson Christine Burke
Massachusetts Institute of Technology (MIT)	
Scientific Director MIT-Portugal	Paulo Ferrão
Executive Director MIT-Portugal	Miguel Carvalho
Director MIT	Dava Newman
Technology Licensing Office	Lita Nelson
Industrial Liaison Office	Tony Knopp
Carnegie Mellon University	
Scientific Director Carnegie Mellon-Portugal	João Barros
Executive Director Carnegie Mellon-Portugal	Carlos Freire
Director Carnegie Mellon University	José Fonesca da Moura
Assistant to the Director	Lori Spears
Center for Technology Transfer and Enterprise Creation	Tara Brandstad
Office of General Counsel	Mary Beth Shaw

- *Executive Director*: to be hired
- *General Assembly*: co-chaired by the President of FCT and the President of CRUP, with representatives from all of the Portuguese institutions in the network. The General Assembly will review past achievements, evaluate and approve planned activities, and discuss the network's major issues and future strategies. It will meet once or twice a year.
- *Executive Committee*: established with active members of the network that collaborate directly with the Scientific Director, in close contact with the Coordination Office at FCT, to implement UTEN's mission, strategy and planned activities. Committee members are appointed by the President of FCT on a yearly basis, after consultation with INPI and CRUP. It will meet quarterly, or more often as needed:
 - » *Chairperson*: Scientific Director, **José Manuel Mendonça**, President of Inesc Porto, Portugal
 - » **Marta Catarino**, TecMinho, University of Minho, Guimarães, Portugal
 - » **Maria Oliveira**, UPIN, University of Porto, Porto, Portugal
 - » **José Paulo Rainho**, UATEC, University of Aveiro, Aveiro, Portugal
 - » **Carlos Cerqueira**, IPN, University of Coimbra, Coimbra, Portugal
 - » **Nuno Silva**, ULInovar, University of Lisbon, Lisbon, Portugal
 - » **Gonçalo Amorim**, AUDAX, ISCTE-IUL, Lisbon, Portugal
 - » **Emir Sirage**, Foundation for Science and Technology (FCT), Lisbon, Portugal
 - » **Sofia Vairinho**, CRIA, University of Algarve, Faro, Portugal.
- *Coordination Office & Secretariat*: chaired by the Scientific Director and appointed by the President of FCT for two-year terms, after consultation with the Scientific Director; handles all administrative and organizational issues, as well as the Secretariat, communication strategy, and UTEN's website:
 - » *Events coordination*: **Sónia Pinto**, Inesc Porto, Portugal
 - » *Secretariat*: **Manuela Duarte**, Inesc Porto, Portugal
 - » *Communication*: **Joana Ferreira**, Inesc Porto, Portugal
- *International Advisory Board*: experts in the field of technology transfer and commercialization, who will provide guidance for UTEN development and the international promotion and "branding" of technology transfer and commercialization activities in Portugal. Board members will be appointed by the President of FCT for three-year terms after consultation with INPI and CRUP. It should meet at least once a year, at least by the time of the annual conference:
 - » *Chairperson*: **João Guerreiro**, Rector, University of Algarve, Faro, Portugal
 - » *Co-chairperson*: **Robert Peterson**, Principal Investigator and Associate VP for Research, The University of Texas at Austin
 - » **Jorge Gonçalves**, Vice Rector, University of Porto, Porto, Portugal
 - » **Vasco Teixeira**, Vice Rector, University of Minho, Portugal
 - » **Leonor Trindade**, President of the Board, Portuguese Industrial Property Institute (INPI), Lisbon, Portugal
 - » **Teresa Mendes**, Universidade de Coimbra, Instituto Pedro Nunes (IPN), Coimbra, Portugal
 - » **Luís Mira**, ISA, Technical University of Lisbon, Lisbon, Portugal
 - » **João Paulo Crespo**, New University of Lisbon
 - » **Peter Hiscocks**, University of Cambridge, Cambridge, UK
 - » **Laura Kilcrease**, Triton Ventures, Austin, TX, US
 - » **Brett Cornwell**, Texas A&M University, College Station, TX, US
 - » **Tara Branstad**, Associate Director, Center for Technology Transfer and Enterprise Creation (CTTEC), Carnegie Mellon University, Pittsburgh, PA, US
 - » **Charles Cooney**, Deshpander Center, MIT
 - » **Richard Friedman**, Senior Director, Stevens Institute for Innovation, University of Southern California.
- *External Review Committee*: independent body of international experts who monitor achievements of UTEN and provide an annual critical assessment. Committee members will serve five-year terms, as appointed by the President of FCT after consultation with INPI and CRUP. It will meet at least once a year:
 - » *Chairperson*: **Bob Hodgson**, Zernike Group, Cambridge, UK
 - » *To be appointed by FCT*
 - » *To be appointed by FCT*.

Funding

The main funding source of the UTEN, since its inception, comes from the Foundation for Science and Technology, FCT. It is possible that the national and international partners will also sponsor some initiatives in Portugal under their budgets.

6.2 Portuguese Partners

FCT: Fundação para a Ciência e a Tecnologia

The main sponsor of the University Technology Enterprise Network is the Fundação para a Ciência e a Tecnologia (FCT). FCT began operations in August 1997 following Junta Nacional de Investigação Científica e Tecnológica (JNICT). FCT's mission is to:

1. Continuously promote the advancement of scientific and technological knowledge in Portugal
2. Explore opportunities that become available in any scientific or technological domain to attain the highest international standards in the creation of knowledge

Table 6.2 University & Institutional Portuguese Partners

Institution	Technology Transfer Offices Involved	UTEN Focal Points
INESC Porto - Associate Laboratory	UITT (Innovation and Technology Transfer Unit)	José Manuel Mendonça Alexandra Xavier
University of Porto	UPIN (includes GAPI and OTIC-UP) UPTeC (Science & Technology Park)	José M. Santos Jorge Gonçalves Maria Oliveira Clara Gonçalves
Polytechnic Institute of Porto	ESTSP (Escola Superior de Tecnologia da Saúde do Porto) OTIC IPP (Oficina de Transferência de Tecnologia e Conhecimento)	Rosário Gamboa Luís Metello Rafael Pedrosa
University of Aveiro	UATEC (TTO - Technology Transfer Unit) GAPI_UA (Gabinete de Apoio à Promoção da Propriedade Industrial) GAPI grupUNAVE (Office for the Promotion of Industrial Property)	Manuel António Assunção Carlos de Pascoal Neto José Paulo Rainho Fernando Santos
University of Minho	TecMinho (TTO and GAPI) ICVS (Life and Health Sciences Research Institute) 3B's Research Group (Biomaterials, Biodegradables and Biometrics)	António M. Cunha José F. Mendes Marta Catarino Nuno Osório Nuno Neves Carlos Remísio
Avepark (S&T Park)		Avelino Pinto
Spinpark (Technology-based Incubator) University of Coimbra	OTIC UC (TTO - Technology Transfer Office)	Fernando Seabra Santos Henrique Santos Madeira Jorge Figueira
IPN (Institute Pedro Nunes)	VCI IPN LAS	Teresa Mendes Carlos Cerqueira António Cunha
University of Algarve	Algarve TransferTECH (TTO - Technology Transfer Office) GAPI UALG (Office for the Promotion of Industrial Property) CRIA (Centro Regional para a Inovação)	João P. Guerreiro Sofia Vairinho Natercia Pereira João Amaro
University of Trás-os-montes e Alto Douro	OTIC-UTAD (TTO and GAPI)	Armando M. Ferreira José Bulas Cruz
University of Beira Interior	ICI ID GAPPI (Gabinete de Apoio a Projectos e Investigação)	João António Queiroz Ana Paula Duarte Conceição Camisão Dina Pereira Pedro Serrão
University of Madeira	TECMU (OTIC-TeCMU - Oficina de Transferência de Tecnologia e Conhecimento)	José Castanheira da Costa Carlos Lencastre
Madeira Tecnopólo	GAPI (Office for the Promotion of Industrial Property)	Raul Caires Pedro Mota
University of Lisbon	UL INOVAR	António Sampaio da Nóvoa Maria Martins Loução Nuno Silva Ana Isabel Moreira
ISCTE IUL	AUDAX (Entrepreneurship and Family Businesses)	J. P. Esperança Gonçalo Amorim Rui Ferreira Ana Fonseca

IMM, Associate Laboratory (Instituto de Medicina Molecular) New University of Lisbon	FCT (Unidade de Promoção do Empreend. e Transf. de Tecnologia) Reitoria UNL (Gab. Empreendedorismo) ITQB UNL	Carmo Fonseca António Rendas Paulo Pinho Rita Gonçalves Fernando Santana Susana Barreiros Dina Chaves Bruno Reynolds
Technical University of Lisbon	Reitoria OTIC – UTL (Empreendedorismo Transferência de Tecnologia)	Fernando Ramôa Ribeiro Vitor Gonçalves Maria do Céu Crespo Eduarda Camilo
Instituto Superior Técnico (IST)	IN+ (Center for Innovation, Technology, and Policy Research) TT@IST (Office Technology Transfer)	António Cruz Serra Paulo Ferrão Rodolfo Condessa Luís Caldas Oliveira
CPIN BIC (Centro Promotor de Inovação e Negócios) Taguspark (Science & Technology Park) ISA	GAPI (Office for the Promotion of Industrial Property) INOVISA (Association for Innovation and Business Development, Higher Institute of Agronomy, ISA)	António Nunes Amaro Teixeira Carlos Noéme Luís Mira
IGC – Instituto Gulbenkian de Ciência		António Coutinho Margarida Prado David Cristina
University of Açores	INOVA (Institute of Technological Innovation of Açores)	Avelino de Meneses Jorge Medeiros Sancha Santos João Carlos Nunes
Portuguese Catholic University	ESB UCP (Escola Superior de Biotecnologia) TRANSMED (Valorization of Biomedical Knowledge and Technologies)	Manuel Braga da Cruz F. Xavier Malcata Eduardo Luís Cardoso
AIBAP – BIC Beira Atlântico PARKURBIS. Science & Technology Park of Covilhã		Victor Cardial Pedro Farromba Daniela Marta
University of Évora	DPI (Service of Science and Cooperation)	Carlos Alberto S. Braumann Manuel D'abreu Rui Gonçalves Pingo Claudia Belchiorinho
SinesTecnopolo		Roberto de Souza João Amaro
Biocant		Carlos Faro
Institutional Partners		
FCT (Portuguese Foundation for Science & Technology) INPI (Portuguese Institute of Industrial Property)		Vasco Varela Leonor Trindade Marco Diniz

3. Stimulate knowledge diffusion and contributions to improving education, health, the environment, quality of life, and well being of the general public.

FCT mainly accomplishes its mission through the competitive selection and funding of proposals, and also through cooperative agreements and other forms of support in partnership with universities and other public or private institutions in Portugal and abroad. The results of the activities of FCT come from the contributions of individuals, research groups, and institutions who have been awarded FCT financing. FCT promotes, finances, and evaluates science and technology institutions, programs, projects; establishes qualifications of human resources; promotes and supports infrastructure for scientific research and technological development, and promotes the diffusion of scientific and technological culture and knowledge (especially when relevant for educational purposes) in close collaboration with the agency Ciência Viva. FCT also stimulates the update, interconnection, and reinforcement and availability of science and technology information sources.

CRUP: Council of Rectors of Portuguese Universities

CRUP is composed of the rectors of the Portuguese Public Universities plus the Catholic University of Portugal. The competences of CRUP are to assure the coordination and representation of the universities that compose the conference, securing their autonomy; to cooperate in the definition of the national policy of education, science and culture; to give advice regarding legislative projects concerning public university education; budgetary questions concerning public university education; the creation, integration, modification or suspension of public university institutions; to contribute to the development of education, research and culture, and to the promotion of the functions of the universities and their agents; also to improve the relations with foreign institutions of similar character.

INPI: Instituto Nacional da Propriedade Industrial

The Portuguese Institute of Industrial Property (INPI) is a public institution operating under the aegis of the Portuguese Ministry of Justice. INPI's mission is to ensure the protection and promotion of Industrial Property Rights on both a national and international level. It is INPI's aim to provide support to IP System end users, by implementing strategies which will enable them to effectively explore their intangible assets.

University and Institutional Partners across Portugal

Since its beginning, UTEN has moved from theory to reality. Table 6.2 lists organizations including TTOs that have joined in this effort. Following are brief descriptions of some of these organizations.

This is the University Technology Enterprise Network.



UATEC

Technology Transfer Office, University of Aveiro
www.ua.pt/uatec

Universidade de Aveiro (UA), founded in 1973, is a Private Law Public Foundation, attended by 14,000 students, with 1,700 highly qualified professors. The university mission is to create knowledge and make it accessible to the community through teaching, research, and cooperation. UA's research and development creates innovative products and solutions, which contribute to the public good as they advance science and technology. National and international partnerships with companies and other organizations increase opportunities for collaborative research and provision of services.

Created in 2006, UATEC (Universidade de Aveiro's technology transfer office), helps meet these goals, particularly in creating partner opportunities. Under the supervision of the Vice Rector Cooperation University-Companies, Innovation and Technology Transfer, UATEC's mission is to support the university to be a national center of excellence in knowledge creation and dissemination. UATEC promotes UA technologies in the marketplace; manages intellectual property; identifies industry needs and supports R&D preparation and consultancy projects; and promotes entrepreneurship and supports technology-based company creation. Since 2006, UATEC has helped UA researchers achieve the following results:

- Intellectual Property (IP)
 - » 74 National patent applications filed
 - » 49 International patent applications filed
 - » 100 Trademark applications filed
- IP Valuation:
 - » 11 technologies licensed to companies
- Company creation:
 - » 8 Spin-outs created
 - » 26 Start-ups created
 - » 10 Companies in which UA has a stake.



CRIA

Universidade do Algarve

www.cria.pt

CRIA consists of five functional areas under the supervision of the Executive Coordinator and the Rector. The functional areas of CRIA are opened and transversal and the members involved in one area also participate in the activities of other areas.

1) *Entrepreneurship*: promotes the transformation of knowledge-based ideas generated within the university and also coming from knowledge-based firms in the Algarve that are economically viable and can generate qualified employment.

2) *Knowledge and technology transfer*: promotes dialogue between university and industry, the development of consortium projects, the creation of collaborative platforms with relevant regional sectors, and the promotion of scientific research with transfer potential for stakeholders inside and outside UAlg. At this international level are the inputs from UAlg's participation at the UTEN Network, which provides a real contact with foreign companies and high quality training to a specific group of skilled people inside CRIA.

3) *Technological infrastructures*: is responsible for the promotion of technology centers and incubation areas for new entrepreneurs.

4) *Industrial property*: provides business support through its unit for Industrial Property Promotion (UIPP/GAPI) by providing information, monitoring and clearing of all procedures related to trademarks (brands, logos, etc.) and providing the follow-up of patent registration and licensing procedures.

5) *Studies and projects*: all the activities in these referred areas have been complemented by participation in research, consultancy and European projects.

AUDAX

ISCTE Lisbon University Institute

<http://audax.iscte.pt>

AUDAX is the Entrepreneurship and Family Owned Business Center of Lisbon University Institute and offers:

1. Specialized training courses on entrepreneurship, start-up and family business management

2. Development and support to research projects regarding entrepreneurship and family business; promote conferences and publications related to entrepreneurship

3. Promotes investment vehicles to support early stage businesses originated in universities

4. Provides consultancy services in areas such as corporate finance, marketing, strategy, human resources, technology, innovation, production and lean management.

Audax has an appropriately designed and flexible structure for the promotion of technology transfer activities. The existence of technical (human resources) and sound financial sustainability enables Audax TTO to be a prime choice for would-be entrepreneurs and technologists. Audax technical resources include a broad range of skills and backgrounds comprising a multi-disciplinary team of PhD's, MBA's and Engineers with a proven track record in industry.



ENOVA

Universidade Nova Lisboa

www.unl.pt/enova/enova

The UNL Entrepreneurship Department's mission is to develop the entrepreneurial ecosystem within the university by working in close relation with the following elements:

In order to achieve this objective, an Entrepreneurship Council was created with the participation of all the UNL schools, to take part in all the decisions concerning the entrepreneurship activities at UNL. This council works towards the involvement of all the members within the university and the existence of multidisciplinary work. The Entrepreneurship Pro-Rector establishes the link between the Entrepreneurship Council and the Rector Team, reinforcing the importance given to this area.

The Entrepreneurship Department, following the decisions made by the Entrepreneurship Council, develops work in entrepreneurship education and entrepreneurship activities.

TecMinho

University of Minho

www.tecminho.uminho.pt

TecMinho is the interface of University of Minho (UMinho) responsible for managing its intellectual property and supporting knowledge transfer through licensing, strategic partnerships with industry and the setting-up of knowledge-intensive spin offs. TecMinho has been active in this field for more than 20 years, with an extensive track record of patent portfolio management, technology licensing and a young and vibrant entrepreneurship community. As the knowledge transfer office of University of Minho, TecMinho's multidisciplinary team is particularly focused on:

- Encouraging and supporting researchers in effectively transferring their research results to the market
- Maximizing the valorization of the IP portfolio of UMinho
- Promoting and participating in national and transnational projects to develop innovative methodologies and strategies in innovation and technology transfer
- Offering solutions and consultancy services for companies' R&D, innovation and IP needs through an unique access point to UMinho's universe of knowledge
- Connecting entrepreneurs, technologies and market opportunities to develop new successful ventures.

TecMinho networks extensively with national, European and international partners to access global resources, knowledge and opportunities to support local ventures and commercially viable research results in fulfilling their market potential.

Supporting researchers on the exploitation of R&D results and companies on the definition of their technology needs, TecMinho promotes the establishment of successful strategic partnerships.



ICI

Technology Transfer Office, University of Beira Interior
www.ubi.pt/Entidade.aspx?id=ICI

The main activities of the ICI (Instituto Coordenador da Investigação, University of Beira Interior) are to:

- Promote and establish partnerships between UBI and firms, in terms of R&D projects, technology transfer and contracts
- Spur the creation of academic start-ups and spin offs, through the organization of ideas contests, common events with industry partners, VC's and BA's and support to business plans and proofs of concep
- Disclose inventions and help scientists to apply for patents
- Support and consult the economic valorization of academic patents.

UPTEC

University of Porto Science and Technology Park
<http://uptec.up.pt>

UPTEC works on the valorization of competences between the University of Porto and industry. It is organized in four main institutions – the Technological Center, the Biotechnology Center, the Creative Industries Center, and the Sea Center – integrating two kinds of structures, Incubators and Centers for Business Innovation.

At the incubators, entrepreneurs find support to transform their ideas into businesses, benefiting from a vast array of structures and specialized services developed to respond to the typical needs of start-up ventures, while focusing on the specific issues associated with each project.

At the Center for Business Innovation, national and international companies find ideal space and technological infrastructures to install their innovation activities. They also benefit from diverse synergies with the R&D+I departments and interface institutes of the University of Porto.

UPTEC thus offers a favorable environment to innovation and creation of profitable businesses, currently hosting 85 start-up and spin off companies and 12 private innovation centers associated with the University of Porto. UPTEC assumes itself hence as a privileged bridge between knowledge and the market, able to valorize the socioeconomic landscape of the region.



DITS

Universidade de Coimbra
www.uc.pt/gats

The University of Coimbra Technology Transfer Unit, (DITS Divisão de Inovação e Transferências do Saber) is a specialized service from the university's administration that develops its activities on knowledge transfer and promoting win-win collaborations between academia, society and companies. Pursuing its mission of "supporting the definition and promotion of the university's knowledge economy policy, as well as entrepreneurship, integrated in a regional innovation ecosystem, and contributing to its strategic development," the main activities of this unit are:

- Search, identify and disseminate development and innovation projects financial opportunities
- Manage the university's intellectual property portfolio
- Manage R&D and innovation partnerships and give support to spin off creation
- Identify and evaluate the commercial potential of R&D project results
- Stimulate and promote collaborations between academia and industry
- Inform about scholarships, courses, programs and research projects offers
- Support and manage current knowledge transfer partnerships
- Promote innovation and entrepreneurship.

INESC PORTO

Innovation and Technology Transfer Unit (UITT)
www2.inescporto.pt/uitt

The Innovation and Technology Transfer Unit (UITT) was created in 2007 to strengthen INESC Porto's mission to transfer R&D results directly to the society for economic and social value.

UITT develops knowledge valorization practices focusing on three main areas:

- Innovation management
- Promotion and support of entrepreneurial activities (including social entrepreneurship)
- Developing R&D activities in innovation management, technology transfer and entrepreneurship, innovation and internationalization for companies, innovation and corporate social responsibility.

UITT invests in research in entrepreneurship for technology-based companies with the aim of improving knowledge of how new technological enterprises are formed, grow, and survive.

UITT provides an incubation service (stages of idea development and proof of concept) for technology-based entrepreneurial projects at LET-in, which is the UITT's Laboratory of Technological Companies at INESC Porto. Many successful companies have already been incubated at UITT, including Xarevision, Tomorrow Options (with a branch office in the UK), AUDOLICI, NextToYou, and SmartWatt.

Technology commercialization, academic entrepreneurship, high-growth ventures and new venture creation in creative industries are also UITT's areas of expertise. Studying innovation, how it is organized, developed and commercialized, and studying the way in which companies create, capture and deliver value with technology. UITT understands how technology can be used to create and maintain a competitive advantage.



OTIC-TeCMU

Technology & Knowledge Transfer Office, U Madeira
<http://gpc.uma.pt>

Mission: Increment the interaction between scientific and technologic units and business activity, promoting processes for technology search, suitable to the needs of regional markets, thereby streamlining procedures for the promotion of technology based start-ups and spin outs, as well as initiatives to diffuse intellectual property.

Main objectives

1. Survey and technology identification within Madeira University
2. Detect environmental needs and business initiatives to be addressed through technological innovations at U Madeira
3. Contribute to the growth of partnerships and cooperation between UMA and business initiatives as it relates to the design, monitoring and / or development of joint R+D+T+I
4. Make the university more cognizant of regional business reality, in order to provide a better performance with the regional market, through the adequacy of training, as well as specialized training in a long life learning perspective
5. Protect and manage intellectual property (IP) resulting from the R&D, whether developed by UMA and/or in cooperation partnerships with laboratories or regional/national/international research centers
6. Promote and support the creation of innovative technology-based companies
7. Draft technology transfer contracts
8. Prepare confidentiality agreements
9. Establish protocol with the National Industrial Property Institute (INPI)
10. Support the commercialization of research results.

UPIN

Universidade de Porto Inovação
www.upin.up.pt

University of Porto (U.Porto) is the largest higher educational institution in Portugal. With 15 schools and 69 research units, it covers all science fields and generates knowledge across a wide span of educational disciplines.

The Knowledge and Technology Transfer Office at U. Porto supports the link between academic and private sectors in the fields of intellectual property (IPR), technology transfer (TT), entrepreneurship, spin off creation and international competitive R&D funding. UPIN works to obtain results which might have a significant impact in U.Porto's affirmation as an important institution in the socioeconomic development of the northern region of Portugal and the nation, stimulating the creation of new companies, new jobs, and enlarging the University international efforts. Since its creation UPIN has been able to:

- Raise awareness of U.Porto members to the importance of intellectual property protection, increasing the number of patents, trademarks and other IP rights registered in the name of U.Porto
- Introduce the thematic of entrepreneurship and provide training for students and researchers that wish to engage in the establishment of a spin off
- Increase the funding for R&D activities and the number of research collaborations between the university and industry.

UPIN is also engaged in national and international networks including GAPI (Portuguese Network of Industrial Property Promotion); TII (Technology Transfer and Innovation Association); ProTon Europe (European Knowledge Transfer Association), ASTP (The Association of European Science and Technology Transfer Professionals) and the University Technology Enterprise Network (UTEN), a joint initiative with The University of Texas at Austin (USA), the Portuguese Ministry of Science and Education, and participating TTOs in Portugal.



UTAD

University of Trás-os-Montes e Alto Douro
www.utad.pt

With 8,300 students, the University of Trás-os-Montes e Alto Douro's mission is teaching, research and extension. Research activities at UTAD are concentrated in 5 schools with 500 researchers.

The tech transfer office at UTAD is 6 years old with a large work done in intellectual property protection and technology transfer.

An advantage of UTAD's technology transfer office is the multidisciplinary background of its staff, including biology, engineering and economics resulting in a high value for the office.

The University of Trás-os-Montes e Alto Douro has a wide portfolio of patents, which include various areas, such as ambient and renewal energies, chemistry, agriculture, mechanics, and engineering.

The TTO has around €9M in projects in diverse areas such as engineering, food chemistry, environment, agriculture, animal husbandry, and wine.

INOVISA

Technical University of Lisbon
www.inovisa.pt

INOVISA (Association for Innovation and Business Development) is a private non-profit association promoting the valorization of knowledge and technology developed at the Institute of Agronomy (www.isa.utl.pt) and facilitating the relationship between university and the business sectors in the areas of agriculture, food, forestry, biotechnology and environment. In addition, INOVISA gathers skills for the development of start-ups and spin offs, creating an innovation and entrepreneurship culture in academia. In this context, INOVISA acts on two complementary levels of activities:

- Entrepreneurship and business development
- Innovation and technology transfer.

INOVISA is involved in several projects aiming at promoting university-enterprise partnerships:

- Rede INOVAR – The Portuguese Agro, Food and Forest Innovation Network
- RED-ITAA - a professional network for the agro and food sectors in Portugal, Spain and France
- Several activities of Cooperation for Development in Angola and Mozambique focused on innovation, technology transfer and entrepreneurship.

In March 2011, INOVISA launched an initiative called FOOD I&DT in the Alimentaryria & Horexpo 2011 exhibition, with the objective of promoting the most promising technologies in the food sector being developed at Portuguese universities. This initiative includes a strong component of networking to promote the valorization and commercialization of technologies to the business sector.

INOVISA is also a partner of OTIC/UTL (the TTO of the Technical University of Lisbon).



IMM Instituto de Medicina Molecular

University of Lisbon Medical School
www.imm.ul.pt

The Instituto de Medicina Molecular (IMM) is a research institute with the mission to foster basic, clinical and translational biomedical research – with the goal to better understand disease mechanisms, develop novel predictive tests, diagnostics and therapeutic approaches.

Created in 2004 and located on the campus of the University of Lisbon Medical School and the Santa Maria Hospital, IMM has acquired the special status of Associated Laboratory from the Portuguese Ministry of Science and Higher Education. IMM is a non-profit private research institute, supported mainly by national public funds, European Union funds, and private foundations.

IMM hosts 31 independent research groups (circa 350 researchers), whose interests fall within three major IMM research lines: molecular & developmental biology, immunology & infection, and neurosciences. Its physical proximity to both the hospital and the medical school creates opportunities to bridge “bedside” research and promote translational research. In addition, the institute hosts and collaborates with a number of start-up and biotechnology companies in areas of biomedical technologies and sophisticated health care delivery.

IN+

Instituto Superior Técnico
<http://in3.dem.ist.utl.pt/>

The multidisciplinary activities of IN+ (Center of Innovation, Technology & Policy Research) link basic and applied research to technology development that focuses on sustainability issues including environmental issues, management of energy resources, and economic development. Within this context, the center also undertakes interdisciplinary research involving technology policy, to promote sustainable and socially responsible industrial development.

The research component on management of technology and innovation policies has been implemented in close cooperation with advanced education, including the PhD program in “Entrepreneurship and Technical Change,” established in 2007 in close cooperation with the School of Economics of the Portuguese Catholic University and

Carnegie Mellon University. Education activities also include VECTORE (since 2001), an annual “informal” non-degree program that promotes the commercialization of science and technology and the launching of entrepreneurial ideas and projects VECTORE - Valorização Económica de Ciência e Tecnologia e Organização de Empresas. Previous related initiatives include the IMPACT Program in 1998-2000, “Innovation and Internationalization of Companies through the Application and Commercialization of Technology” which was the first international education program delivered in Portugal in the area of entrepreneurship. IN+ provides an online video connection to the Master of Science Technology Commercialization (MSTC) degree program at The University of Texas at Austin. Among other awards, in 2005 the center was named one of the “Top 50 global centers of research on Management of Technology,” by the Int’l Association for the Management of Technology, IAMOT.



OFICINA DE TRANSFERÊNCIA
DE TECNOLOGIA E DE CONHECIMENTO
UTL | Universidade Técnica de Lisboa



OTIC

TTO, Technical University of Lisbon
www.utl.pt/pagina.php?area=8055

UTL's mission and goal is to promote, develop and transfer scientific, technique and artistic knowledge in its specific intervention areas, with quality as a driver for modern thinking and adjusted to the dynamic needs of society. Pursuing this goal in 2006 UTL created its technology and knowledge transfer office - OTIC|UTL - responsible for supporting students, teachers and researchers.

OTIC|UTL has organized several courses and workshops in entrepreneurship and intellectual property protection, has patented technologies developed by our school's researchers, and has made some successful technology transfers. Parallel to these activities, OTIC|UTL also promotes contests in entrepreneurship to stimulate entrepreneurial activities among UTL researchers and students.

OTIC|UTL is a flourishing office primarily concerned with establishing a strong relationship with researchers in order to promote effective results in technology transfer and commercialization.

Polytechnic Institute of Porto

Center of Creative and Applied Knowledge
www.ipp.pt

Leading five distinct scientific areas and fully complying with the European Space for Higher Education and the Bologna Declaration, the Polytechnic Institute of Porto integrates more than fifty 1st and 2nd Cycle Degree Courses. Characterized by a teaching team of more than 1,300 highly skilled and trained scholars and researchers.

It aggregates seven distinct organic units, integrating more than 35 active research centers, with around 17,000 students, and more than 360 non-teaching collaborators.

Polytechnic Institute of Porto is a role model of success and ambition. Being rated in the first five places of the national access ranking list, the Polytechnic Institute of Porto was, in 2008, the national Polytechnic Institute that received the largest number of new students.



GAPI at Madeira Tecnopólo

Madeira Tecnopólo
<http://www.ceim.pt>

In recent years, GAPI Madeira has developed strategies for promoting applications for patent protection. These are supported by industrial property (IP) policies, marketing materials and activities, intellectual property policies, staff, and procedures dedicated to achieving that goal.

An overall strategy and marketing activities have been carried out - IP tool kit, IP brochures, workshops and seminars, website development, questionnaires, and structured interviews.

The approach to IP policy drafting and the different procedures for identification and selection of patentable inventions have been the GAPI's primary target.

GAPI Madeira is, at first, an interface – an organization that is in the boundary of another (typically, but not limited to, a university) or between two others (university and company). Thus, its mission must be aligned with that of both parties whom it is trying to bring together; specifically, not just the party that often controls the management of the technology – the university – but also the companies.

Taguspark, GAPI

Parque de Ciência e Tecnologia (includes GAPI)
www.taguspark.pt

Taguspark is designed for the investment of companies and entities creating social development, always supported by the dynamics of knowledge and technological and scientific innovation, where scientific discoveries and applications as well as the 21st century new models move towards a society rooted in well-being, health, and a sustainable environment for all mankind.

The three structuring pillars of the Science and Technology Park - universities, R&D institutions and companies – integrate a project where the management and administration of Tagusparque S.A. implements innovation incubators for companies devoted to the commercialization of scientific investigation results and distribution of new technical skills into the labor market.

Thus, Taguspark also creates conditions for the development of working skills, innovation, and investigation of both women and man working therein and of all tenants – assuming the role of a social and economic engine for the region.

The park's concept includes not only the buildings of companies or universities, the working station and inherent working instruments, but also the circumstances in which the producing activity is carried out: certified buildings, natural spaces with little impact on buildings, support for sports activities, catering, cultural and recreation services, transportation networks, and schools for children and teenagers.

Access to specialized human resources, specialized R&D services, and information technologies, telecommunications, electronics, multimedia and the internet in an innovative entrepreneurial environment are important advantages in a park that offers one of the most advanced telecommunications technologies in the country, which connects all buildings to three digital plants.



AvePark

Science and Technology Park
www.avepark.pt

Located between Braga and Guimarães, Avepark meets regional innovation concerns. Avepark was incorporated in May 2004 and includes the following entities: Guimarães City Hall, The University of Minho, the Association of Science and Technology Parks of Porto, the Minho Industrial Association, and the Guimarães Association of Commerce and Industry.

Avepark has four buildings: (1) The incubator of the University of Minho called Spinpark, (2) the building of the European Institute of Tissue Engineering and Regenerative Medicine, (3) the CRH building, and (4) the core building of Avepark. The Center for Business at Avepark has fourteen companies from technology sectors including biotechnology, information systems, technology, video surveillance, and smart textiles.

The Avepark Science and Technology Park's network includes business management; entrepreneurs and entrepreneurial support, researchers, and college students who operate in the spirit of constant development of new ideas and the implementation of new products and services. Avepark's model is based on shared risks and goals that lead to commercial success in the global market.

Avepark has an annual environment that enables businesses and institutions to operate in an informal and creative environment. Avepark also promotes events that attract different companies, institutions, and talent as well as the larger community by offering advantages in terms of networks and value-added support.

Parkurbis

Science and Technology Park of Covilhã
www.parkurbis.pt

Parkurbis, the Science and Technology Park of Covilhã promotes the development of new technology-based activities and fosters a dynamic exchange between the University of Beira Interior (UBI) and local business companies, thus helping the R&D supply meet the demands of Parkurbis-based businesses.

The park supports UBI research projects; works as an interface between UBI and Parkurbis-based companies; promotes activities in the sphere of technological research; provides support services to existing companies (including traditional ones) and start-up companies; supports integrated development in the region and the establishment of highly qualified professionals.

Parkurbis facilities comprise outstanding conditions for the formation, setting up, and development of technology-based companies. Parkurbis has established a number of protocols with financing institutions, namely venture capital societies and a contact network that includes banks and business angels with an interest in supporting projects and companies based at Parkurbis.

Besides this contact network, as the major shareholder of Parkurbis, Covilhã Municipality offers a package of incentives for setting up new companies in the region, and at Parkurbis in particular. Additionally, companies that choose to set up their businesses at Parkurbis will benefit from a five percent reduction in corporate income tax and from increases in financing obtained through applications to EU programs.

Sines Tecnopólo

UAlgarve, UEvora, Polytechnics Beja& Setubal
www.sinestecnopolo.org

Sines Tecnopólo is a new Portuguese Science Park, located in the South Region, in the city of Sines. Founded in 2007, it was formed by two public universities: the University of Algarve (www.ualg.pt) and the University of Evora (www.uevora.pt); two public tech faculties: Polytechnic of Beja (www.ipbeja.pt) and Polytechnic of Setubal (www.pis.pt), with the local authority support of the Sines City Council (www.sines.pt).

The project targets tech transfer, entrepreneurship promotion and advanced training oriented to industry needs. Its location provides strategic management orientation for opportunities in both ocean economy and energy technologies. It has pursued several European R&D programs, including:

- The MED EU program to pursue energy efficiency in buildings
- The Interreg-Sudoe to pursue development of road pavement materials
- The Equal Program to promote entrepreneurship

The park has achieved ISO 9001:2008 accreditation and also met the criteria of the European Business Network in Brussels to attain the seal of BIC: a European Community Business Center. Its training unit holds the DGERT accreditation provided by the Labor Ministry, a quality seal needed for training and education programs obtaining public financing.

CPIN-BIC

Centro Promotor de Inovação e Negócios
www.cpin.pt

CPIN is a Business Innovation Center certified by the European Union for innovation and business development. It is a non-profit, private association founded in 1992, with premises at Avenida Manuel da maia 36 c/v D. in Lisbon. It is one of seven Portuguese Business Innovation Centers and one of 163 EU BICs. The main goal is to provide integrated solutions to technology-based entrepreneurship through the adoption of new technologies and innovation for existing and new companies.

CPIN is also an active partner in internationalization, facilitating access to new markets through networking with counterparts in Europe.

CPIN provides services to technology-based entrepreneurs by supporting development of company projects (incubation support services), development of European projects to support company internationalization initiatives, and diffusion of entrepreneurship and technological innovation.

Technology transfer activities include technology brokerage with Portuguese and European companies, development of business planning tools, entrepreneurial skills assessments, and help with financing negotiations.

CPIN provides incubation support such as technology analysis and evaluation, technology management; entrepreneurship promotion; promotion of technology transfer processes; and partnerships with universities and R&D centers.



UL INOVAR

Universidade de Lisboa
www.ul.pt

UL Inovar is the Knowledge Transfer Office (KTO) of Universidade de Lisboa. Created in 2009, it is located at the main campus and operates within the Shared Services of UL (Serviços Partilhados - SPUL), as a part of the Research Support Cabinet (Gabinete de Apoio à Investigação). It is overseen by a Steering Committee, presided by a Vice Rector of the University and including representatives of its several Units.

UL Inovar mission is to “Add value to the research results and processes of UL, through the co-promotion and management of structured interactions between the academic community and the social and economic stakeholders.” It offers a number of services to the community of UL, including

- Liaising with industry and other entities
- Strategic management of Knowledge Transfer (KT) and Intellectual Property (IP) portfolios
- Negotiating IP rights on research results
- Assisting in the protection of IP
- Drafting or reviewing IP clauses in contracts
- Entrepreneurship support, business modeling and business plans
- Support to academic spin offs
- Training and awareness raising in entrepreneurship, KT and IP.

In its short time of existence UL Inovar as tripled the number of patent applications owned by UL, concluded three license deals and a number of other research development contracts with industry, organized several workshops and events, including a summer school on KT and two entrepreneurship courses (one together with Instituto Politécnico de Lisboa), and supported several spin off projects, including two teams that won national competitions on entrepreneurship.

DPI

U Évora
<http://www.uevora.pt>

The University of Évora is organized in schools: Arts, Sciences and Technology, Social Sciences and Health. The University offers 33 undergraduate and 41 postgraduate degrees.

Research and Development (R&D) is organized in several areas through a network of 14 research units all of them submitted to international evaluation and under the global coordination of Institute for Research and Advanced Education. The main goal is to aim all R&D efforts to look forward to direct appliance in the society contributing to its sustainability. For that, research activities are managed on a multi-disciplinary and inter-departmental basis or around specific programs and projects, in order to take advantage of the synergies and articulations between different areas.

The main R&D areas are: agronomy and biodiversity; geophysics, environment and landscaping; materials and surface science; economics and management; computer sciences and software interoperability; social and political sciences, history, history of art, science and cultures; applied mathematics; education; literature; and geriatric healthcare.

Among over 250 running R&D projects, most are developed within international and national partnerships, by financial programs like 7th Framework Program, Social European Fund and National Science Foundation as also private sponsorship.

Above the mentioned the University of Evora has two Chairs in excellence areas, biodiversity and renewable energy, sponsored by private enterprises.

6.3 Texas Partners

When the IC² Institute helped coordinate the launch of the UTEN program, in doing so, the Institute leveraged a number of partners from its robust “know-how” network in order to provide highly valuable training and networking opportunities that were broad-based, diverse, and most importantly, to gather representatives with many years of experience in technology transfer and commercialization specifics. The value of these partners to the UTEN program cannot be overstated. Descriptions follow.

IC² Institute: Innovation, Creativity, Capital
www.ic2.utexas.edu

The IC² Institute is a globally recognized “think and do” research center at The University of Texas at Austin. The Institute’s mission is to engage in cutting-edge research that contributes to the solving of unstructured problems related to market economies worldwide with a focus on accelerated technology-based growth. This mission is carried forward with experiments in the Institute’s research laboratories and within the context of the “real world” to facilitate knowledge transfer that impacts emerging, developing, and developed economies.

The IC² Institute has more than 30 years of experience in researching, working and partnering on S&T commercialization and regional development projects. A key resource of the Institute is the IC² Fellows Global Knowledge Network that includes over 160 active academics, scientists, managers, and public sector leaders from a broad range of institutional backgrounds and professional disciplines. IC² Global Fellows contribute their intellectual and practical expertise to Institute education and training programs, research activities, conferences and workshops, and mentoring. Several IC² initiatives and programs have established leading national and international reputations and these programs and activities have been part of the UTEN program working with Portuguese technology transfer managers and staff, technology entrepreneurs, and select civic, academic, and business leaders. Following are IC² Institute programs and Texas-based organizations which contribute to this important objective:

The Austin Technology Incubator (ATI)
www.ati.utexas.edu

Launched in 1989, the Austin Technology Incubator is an experiential laboratory for research, education, and advancement of technology-based entrepreneurship. ATI leverages business, government, and academic resources to provide strategic counsel, operational guidance, and infrastructure support to its member companies to accelerate their transition from early stage ventures to successful, globally competitive technology businesses. In 1993 ATI established incubator

programs for NASA at Ames Research Center in Sunnyvale, California and Johnson Space Center in Houston, Texas; and in 1995, for the National Oceanic and Atmospheric Administration (NOAA), and in Charleston, South Carolina. In 1994, ATI received the NBIA National Business Incubator of the Year Award and launched six incubators in Russia under a USAID Program. In 1996 ATI received the Justin Morrill Award from the US Technology Transfer Society and an ATI’ company (Evolutionary Technologies International/ETI) was named NBIA incubator graduate of the year.

ATI has trained and worked with incubator directors and managers and has hosted technology ventures with regional development leaders in Russia, Canada, Brazil, Japan, India, Korea, Mexico, Chile, Portugal, Australia, England, Poland, Germany, China, and Israel. With Portugal, for example, through collaboration with the Vector E IMPACT Program of the Technical University of Lisbon (IST), ATI played a key role in the United States incubation and launch of the well-known Portuguese start-up venture, Critical Software. Across its history ATI has worked with over 150 entrepreneur teams who collectively have raised over \$725 million dollars in investor capital while at ATI. Currently ATI focuses its incubation efforts in the following technology sectors: IT and wireless, bioscience, and clean energy.

Mexico’s Technology Business Accelerator (TechBA)
www.techba.com

TechBA Austin began operations in the Austin Technology Incubator in December 2005, with the objective of taking innovative Mexican-developed technology-based businesses to the US market. Teams of experts from IC² Institute work in coordination with TechBA’s management team to support the Mexican companies in US business development. Valuable lessons have been learned for the UTEN Program. For example, with the assistance of TechBA and IC² Institute, in November 2008 Merkatum Corporation received \$1 million from the Texas Emerging Technology Fund (ETF) to expedite the commercialization of its web-based biometric software systems in the US market. The ETF was created as a tool to develop and diversify the Texas economy by expediting innovation and commercialization of research. UTEN Austin works actively with select Portuguese companies to possibly benefit from the ETF.

UT Austin Office of Technology Commercializat’n (OTC)
www.otc.utexas.edu

UT Austin’s OTC bridges between the research community at The University of Texas at Austin and national and international commercialization partners with the objective of ensuring an efficient and effective transfer of intellectual property created at the university. The OTC serves three distinct groups: the research community at the university,

commercial partners, and society. UT Austin's OTC managers and staff are actively engaged in training and mentoring Portuguese TTOs as well as serving as institutional hosts for several month-long internship programs. UTEN and UT's OTC are also working to explore creative and innovative ways to partner with Portuguese TTOs such as cross-licensing university-based technologies and leveraging university-based research as well as exploring cross-national markets and licensing opportunities. UTEN has successfully linked Portuguese-based business plan competitions to Moot Corp and Idea2Product (I2P) competitions to facilitate multinational competitions and global market considerations.

The City of Austin

www.TexasWideOpenForBusiness.com

www.austin-chamber.org, www.cityofaustin.org

Austin, Texas is pleased to be a valued partner in the UTEN Portugal collaboration. Based on many national and international rankings, Austin is judged as one of the top United States cities in terms of entrepreneurship, economic growth, and quality of life and is often referred to internationally as the "Austin Model" in terms of results oriented academic-business-government collaboration leading to accelerated technology-based growth. In short, Austin is considered an ideal United States city partner for Portugal's University Technology Enterprise Network (UTEN).

Key to Austin's successful technology-based growth is the fact that the city and The University of Texas at Austin are able to attract and retain key US and international talent. This talent has been crucial to the establishment of globally competitive clusters in semiconductors, software and IT, computers and peripherals, and creative industries, as well as emerging clusters in biosciences, nanotechnology, digital media, clean energy and wireless technology.

Additional Texas Partners

UTEN Austin has engaged the support of key Texas universities, their TTOs, and entrepreneurial centers state-wide to partner with the UTEN Portugal program. The vast size and diversity of Texas educational and economic activities provides a broad range of partnering opportunities for Portuguese TTOs focused on different industry sectors, geographic realities, populations of different size and character, and regionally-based challenges and opportunities. Working with these Texas-based partners UTEN takes an open and collaborative approach with researchers, inventors, industry partners, and potential investors.

UTEN continually adapts to the realities of Portugal's collaborators to facilitate market-oriented and creative long term, mutually beneficial relationships. The results include enhanced marketing and networking opportunities; access to internship and

management training programs and recruitment; referrals to a broad range of financial resources including angel networking, venture capitalists, and assistance with small business grant applications.

Emergent Technologies, Inc., Austin, Texas

www.emergentechnologies.com/growing-biotech.html

Emergent Technologies works to create value using a unique technology innovation processes to transform scientific breakthroughs into technology platforms with multiple commercial applications. Emergent transforms research into revenue by means of an expert driven and disciplined selection criteria based primarily upon scientific thought leader sponsorship and a market driven product development processes.

Emergent's main focus is to unlock the commercial potential of a scientific breakthrough. In addition, Emergent's use of management and capital resources minimizes the economic risk typically associated with developing early stage technologies. The biotech sector is Emergent's main technology focus and current Emergent portfolio companies include AeonClad Biomedical, LLC; AeonClad Coatings, LLC; Appian Labs, LLC; Auxano Biomedical, LLC; Heparinex, LLC; Pure Protein, LLC; and Reveal Sciences, LLC.

OTC, University of Texas at Dallas

www.utdallas.edu

Housed in the heart of the Texas Telecom Corridor, the University of Texas at Dallas' Office of Technology Commercialization was created in April 2008 with a venture-experienced team and customer-oriented philosophy to move commercially viable inventions more effectively from lab to market. The OTC streamlined its invention disclosure and evaluation processes with UTD's Institute for Innovation and Entrepreneurship (IIE), which focuses on creating and incubating UTD-affiliated start-ups (<http://innovation.utdallas.edu>). The mission of the OTC is to effectively and efficiently facilitate the evaluation processes, protection, patenting, and transfer of commercially viable, UTD innovations for the economic, social, environmental and cultural benefit of citizens of the region, the state, and society in general.

OTC, Texas A&M University

<http://otc.tamu.edu/index.jsp>

The mission of the Office of Technology Commercialization at Texas A&M university is to encourage broad practical application of Texas A&M System research for public benefit; to encourage and assist those associated with the A&M System in the protection, licensing and commercialization of their discoveries; to ensure the equitable distribution of royalties and other monetary benefits resulting from the commercial application of intellectual property; and to see that



commercialization activities benefit the research, education and outreach missions of the System. Founded in 1992, The OTC manages more than 900 patents and 1,500 patent applications relating to a portfolio of some 2,600 inventions. According to the Association of Technology Managers Annual Survey, the OTC is eighth in the nation in the number of license agreements generating revenue.

The A&M System is one of the largest systems of higher education in the nation, with a statewide network of nine universities, seven state agencies and a comprehensive health science center. The A&M System educates more than 109,000 students and reaches 15 million people through service each year. With nearly 27,000 faculty and staff, the A&M System has a physical presence in 250 of the state's 254 counties and a programmatic presence in every Texas county. In 2008, externally funded research brought in almost \$676 million to the state's economy.

Office of Technology Commercialization, South Texas Technology Management (STTM), San Antonio

www.utsystem.edu/sttm/index.shtml

South Texas Technology Management (STTM) is a regional technology transfer office affiliated with the University of Texas Health Science Center at San Antonio, (UTHSCSA), and allied with the research departments of the University of Texas San Antonio (UTSA), the University of Texas Pan American (UTPA), and the University of Texas at Brownsville (UTB). STTM's mission is to provide comprehensive and integrated technology development services for affiliates using the most effective protection and commercialization strategies to stimulate and capitalize on each University's intellectual property portfolio, thereby achieving maximum economic and humanitarian value for the institutions, staff, and communities. STTM's office is organized and staffed to handle the multiple demands of a full-

service office dedicated to stimulating growth in the quality and size of the intellectual property portfolio.

Triton Ventures

www.tritonventures.com

Triton Ventures is a venture capital firm investing in spinout and start-up technology companies. Triton Ventures, LLC, is a venture capital fund investing in spin out and early stage technology companies. With more than 25 years of hands-on experience in commercializing technology, the company's founder, Laura Kilcrease has a deep understanding of how to "grow businesses around businesses" as well as how to deconstruct and reconstruct business models to achieve significant results. She provides ongoing counsel to portfolio companies regarding management teams, industry and financial marketplace issues, introduction of strategic and investment partners, and positioning the company for public offering, merger, or sale. She has served as director on the boards (including audit and compensation committees) of portfolio companies Applied Science Fiction, Charitygift, Exterprise, Hart Intercivic, and LNNi.

INCELL, San Antonio

www.incell.com

INCELL Corporation, LLC is a biopharmaceutical products manufacturer and contract services company with Innovative Life Science Solutions™ for its industry, government and research customers worldwide. Founded in 1993, INCELL is registered with FDA as a manufacturer of sterile liquid fill products and medical devices, and for process and use of human cells. INCELL's mission is to provide innovative life science solutions to patients and professionals personalized medicine, stem cell technologies, cancer technologies, non-needle vaccines, cryopreservation tools, novel manufacturing, and rapid inexpensive diagnostics with high quality products and services.

6.4 International Partnerships

● UT Austin | Portugal

The University of Texas at Austin
Austin, Texas, United States of America

Established by the Texas constitution in 1876, The University of Texas System consists of nine academic universities and six health institutions. The University of Texas at Austin, the flagship of the UT System, enrolls about 50,000 students, making it one of the largest universities in the world. UT Austin has 16 colleges and schools with 2,500 faculty and annual research funding of over \$500 million. Its mission and core purpose: To transform lives for the benefit of society through the core values of learning, discovery, freedom, leadership, individual opportunity and responsibility <http://www.utexas.edu>.

The UT Austin | Portugal International Collaboratory for Emerging Technologies (CoLab) was launched by the Portuguese Science and Technology Foundation (FCT) on March 22, 2007 as part of a national strategy to promote Portuguese scientific and technological capacity and to reinforce the status of Portugal's scientific institutions at an international level. The five-year collaboration is working to increase the excellence of Portuguese research and postgraduate studies in emerging state-of-the-art research and education with particular emphasis within and across academic programs in advanced digital media and mathematics. CoLab also supports The University Technology Enterprise Network (UTEN) that is the focus of this annual report. The intention is to strengthen collaborative research and advanced education in the short term as well as to institutionalize these collaborative programs so they are sustainable. For more information, visit www.utaustinportugal.org

● MIT | Portugal

Massachusetts Institute of Technology CoLab
Boston, Massachusetts, United States

The mission of MIT is to advance knowledge and educate students in science, technology, and other areas of scholarship that will best serve the nation and the world in the 21st century.

The Institute is committed to generating, disseminating, and preserving knowledge, and to working with others to bring this knowledge to bear on the world's great challenges. MIT is a world-class educational institution. Teaching and research, with relevance to the practical world as a guiding principle, continue to be its primary purpose. MIT is independent, coeducational, and privately endowed. Its five schools and one college encompass numerous academic departments, divisions, and degree-granting programs, as well as inter-disciplinary centers, laboratories, and programs of America whose work cuts across traditional departmental boundaries.

The MIT-Portugal Program is an international collaboration seeking to demonstrate that an investment in science, technology and higher education can have a positive, lasting impact on the economy by addressing key societal issues through quality education and research in the emerging field of engineering systems. The program has targeted bioengineering systems, engineering design and advanced manufacturing, sustainable energy systems, and transportation systems and as key areas for economic development and societal impact.

● Carnegie Mellon | Portugal

Carnegie Mellon CoLab
Pittsburgh, Pennsylvania, United States of America

Carnegie Mellon University is a global research university of more than 10,000 students, 70,000 alumni, and 4,000 faculty and staff. Recognized for its world-class arts and technology programs, collaboration across disciplines and innovative leadership in education, Carnegie Mellon is consistently a top-ranked university.

The Information and Communications Technologies Institute (ICTI) is a partnership between Carnegie Mellon and several universities and high-tech corporate research groups in Portugal, and Portugal's national science and technology foundation, the FCT (Fundação para a Ciência e a Tecnologia). ICTI offers students unique dual-degree masters and doctoral programs. Graduates are conferred degrees from Carnegie Mellon and the partner Portuguese institution. For more information, view our programs pages.

The intellectual focus and theme of the Carnegie Mellon|Portugal partnership is information and communication technologies, broken out into four broad areas:

1. Information processing and networking, which includes information networking, software engineering, information security, language technology, and critical infrastructure.
2. Sensing technologies & networking includes distributed inference, and risk assessment & management.
3. Technology, management & policy includes technical change & innovation, engineering and public policy for network and software industries.
4. Basic sciences including applied mathematics.

● Fraunhofer | Portugal

Fraunhofer-Gesellschaft
Munich, Germany

The Fraunhofer-Gesellschaft undertakes applied research of direct utility to private and public enterprise and of wide benefit to society. Customers include industry, the service sector, and public administration.

Fraunhofer-Gesellschaft encompasses more than 80 research units, including 57 Fraunhofer Institutes at 40 different locations in Germany. The majority of the 15,000 staff are scientists and engineers. The annual research budget totals 1.4 billion€. Of this sum, more than one billion euros is generated through contract research. Two-thirds of the research revenue is derived from contracts with industry and from publicly financed research projects. One-third is contributed by the German federal and Länder governments in the form of institutional funding.

Portugal (through the Portuguese Science and Technology Foundation and the Knowledge Society Agency), and the Fraunhofer-Gesellschaft established a long term collaboration focused on emerging technologies, exploring mutual interests in science and technology oriented towards social well-being, economic growth and quality of life.

Fraunhofer Portugal was created to drive the collaboration framework and to establish a new institute in Portugal—FhP AICOS the Research Center for Assistive Information and Communication Solutions. Additional focus areas identified include biotechnology, nanotechnology, advanced manufacturing and logistics. This collaboration will promote continuous and systematic cooperative actions between Fraunhofer Institutes, R&D institutions in Portugal, and customers.

“ UTEN has been a stimulating opportunity to foster knowledge transfer between universities and society and thus, an important contribution to build up, in Portugal, a stronger and more competitive knowledge-based economy.”

Jorge Gonçalves
Vice Rector
University of Porto

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