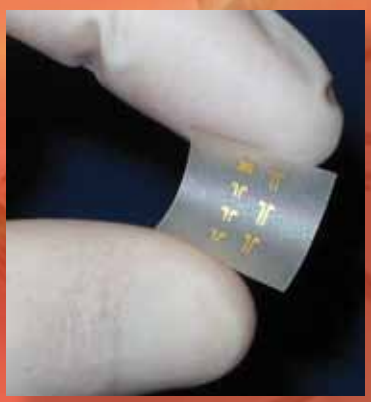
2009-2010 ANNUAL REPORT

UTEN Portugal

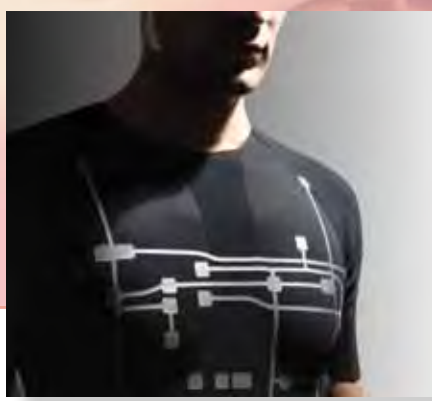
University Technology Enterprise Network

Advancing and Professionalizing Science and Technology Commercialization







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João Sentieiro

President of the

Portuguese Foundation

for Science

and Technology (FCT)

Innovation, and science-based innovation in particular, is one of the major drivers of the economy of modern societies. New knowledge resulting from science and technology research activities is the natural inducer of innovation. It is also true that to spur and catalyze that transfer, public policies have a fundamental role.

So, in order to foster knowledge-based innovation in Portugal we need not only to promote science and technology research activities, but also encourage the transfer of its results to produce innovation, adding economic value to the scientific quality of the research results.

We, as a country, need to profit from the opportunities that the results of research projects developed in our scientific institutions may represent in the market.

This is why FCT has been so interested and willing to encourage technology transfer activities. UTEN has been doing that in Portugal for some years now with the support of FCT. This report is a good description of the work done.

In the name of the Science and Technology Foundation (FCT), the promoting agency of the International Partnerships Programs where UTEN is being nurtured, I want to welcome this 2010 UTEN Annual Report and to express my appreciation to those in Portugal as well as in the U.S. who developed and participated in the UTEN activities and also those who worked so hard in preparing this report in time to be distributed at the second UTEN Annual Conference.

Networking *is an essential feature of successful organizations and in Portugal, a country known in the world for its sailors and traders, the development of international networks has always been linked with great periods in our history.*

Universities have been key players in this networking mainly based on scientific interchange of expertise and joint international projects. Enlarging university cooperation for the development of expertise in technology transfer and commercialization is a challenge that needs to be addressed with care and responsibility.

The UTEN program, started in 2007 by FCT within the scope of the international program with UT Austin (CoLab), with the support of INPI and other international collaborations, is now successfully launched and the present report clearly documents, amongst other achievements, the nationwide response of Portuguese universities to the challenge.

The professionalization of TTOs in most universities based on the promotion of expertise amongst their young staff, coming from very different backgrounds, has been a successful and extremely useful achievement of the UTEN program.

The next step calls for a joint effort from the universities and all the UTEN partners in order to create a national network of TTOs, sharing experiences and projects so that the acquired expertise, not just sailing and trading, can be applied to projects leading to the commercialization and internationalization of Portuguese science and technology.

António Rendas

President of the

Council of Rectors of the

Portuguese Universities (CRUP)

Rector of

New University of Lisbon (UNL)

Robert Peterson

Principal Investigator for the

UT Austin | Portugal CoLab with UTEN

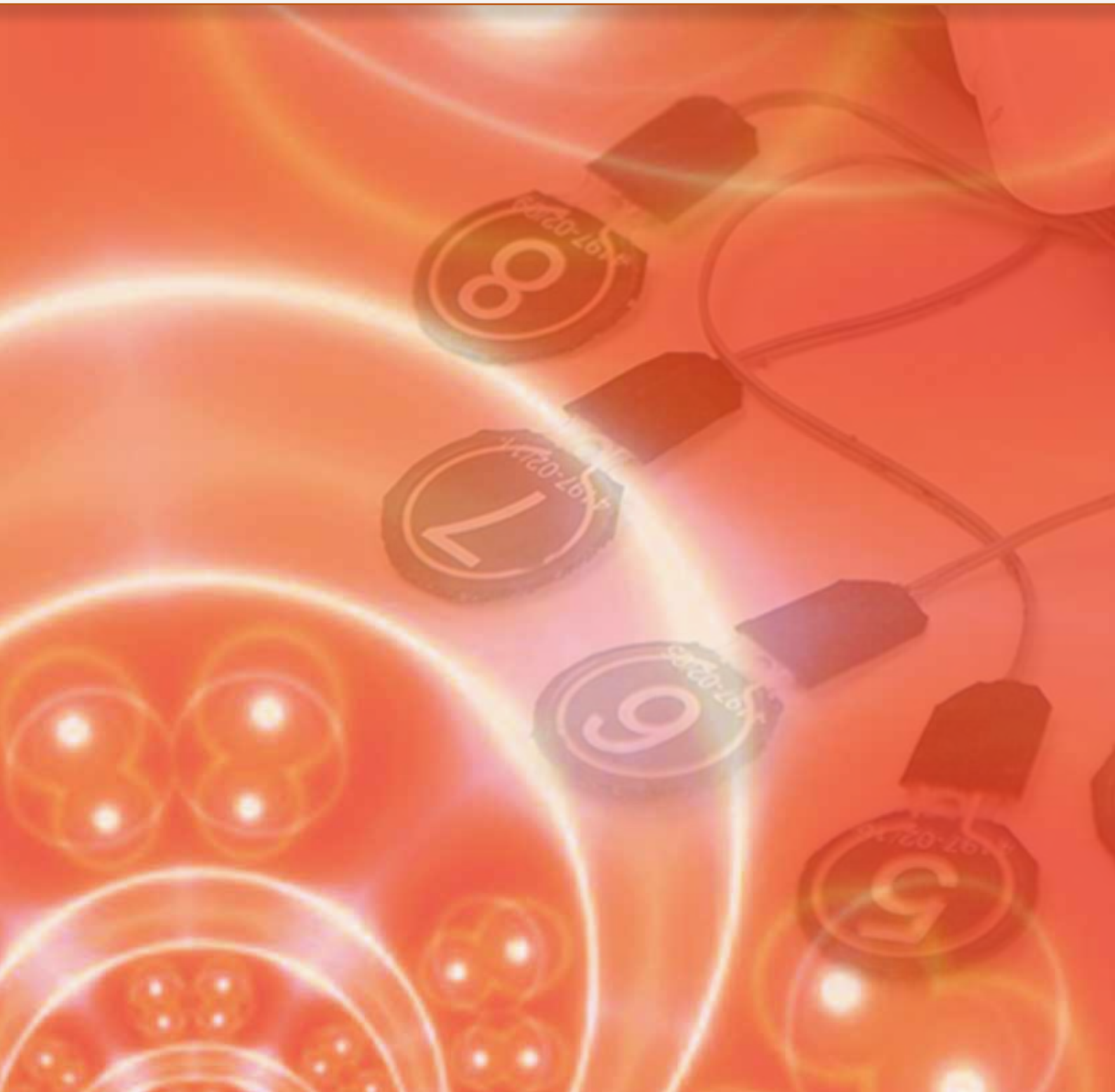
Associate Vice President for Research of

The University of Texas at Austin

Four years ago the Portuguese Science and Technology Foundation, select Portuguese universities, and The University of Texas at Austin initiated a collaboration that was both unique and exciting.

Indeed, in retrospect the collaboration can perhaps be considered a grand experiment bringing together researchers and practitioners from both sides of the Atlantic with the common goal of facilitating and accelerating the commercialization of intellectual property generated by the Portuguese academic community. Within this collaboration, UTEN has been focused on developing the capabilities and skill sets of technology transfer offices and managers in Portugal so as to more effectively and efficiently accomplish the commercialization goal.

This UTEN report, Advancing and Professionalizing S&T Commercialization, formally documents the progress that has been made in the fourth year of the collaboration. As such, it provides fascinating insights into what the collaboration has achieved as well as insights into what remains to be achieved. Consequently, the report should be viewed not only as a memorialization of past events and activities, but also as a prelude to future activities and events.



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1.

UTEN Vision, Mission & Strategy

"It is not hard for me to believe... that the UTEN program is changing the technology transfer landscape in Portugal forever."

Pedro Silva, TecMinho Technology Transfer Officer & UTEN International Intern

1.1 UTEN Vision and Mission

The University Technology Enterprise Network (UTEN) was launched in March 2007 by the Portuguese Science and Technology Foundation (FCT) with the support of INPI and in partnership with the IC² Institute, The University of Texas at Austin within the scope of The International Collaboratory for Emerging Technologies (CoLab). During the past four years, UTEN has also benefitted from developing close collaborations with Portugal's other international partners, including Cambridge University, Carnegie Mellon University, Massachusetts Institute of Technology, Harvard Medical School, and the Fraunhofer Institute, as well as other new participants.

While UTEN has evolved over the past four years, its mission has remained constant: to help build a professional, globally competitive, and sustainable technology transfer and commercialization network within Portugal. Programs and activities undertaken since 2007 have allowed UTEN to take full advantage of, and consolidate, the emerging network of Portuguese technology transfer offices (TTOs). Specialized training has accelerated the development of a professional Portuguese network of TTOs as well as the commercialization and internationalization of Portuguese science and technology (S&T).

During 2009-'10, UTEN focused on three main activities aimed at professionalizing and strengthening Portugal's TTO network, including building sustainable partnerships with key international institutions:

1. **Specialized training:** Training weeks and specialized international workshops have enhanced Portugal's understanding of S&T-based technology transfer (TT) and commercialization. The objective was to learn from international practice and case studies and to build on the experience of leading institutions worldwide.

2. **International internships & networking:** Value-added S&T transfer and commercialization training has been provided through international internships. Supported by the FCT and competitively offered to Portuguese technology transfer managers and staff, these internships include working and training engagements with UTEN's international partners.

3. **Observation and assessment:** UTEN has collected data, developed metrics, and conducted observation and assessment on key programs and activities. This information has been used to continually improve UTEN training and program delivery as well as to assess the impact of UTEN. This assessment information is presented on the UTEN Web site (www.utenportugal.org) and in the annual UTEN Portugal Reports (Volume 1: 2008-'09 and Volume 2: 2009-'10).

Through these action lines and activities, UTEN is working to help build sustainable, value-added partnerships and networks between UTEN Portugal and UTEN Austin, and with other key international partners. UTEN is also continually working to expand its network with new Portuguese entrants by providing training to an increasing number of TTOs—from Portuguese universities, polytechnic schools, research centers, and S&T parks—as well as reinforcing knowledge transfer with the existing UTEN partner institutions.

In year five of the CoLab program, UTEN looks forward to continuing to provide exceptional value-added training programs and activities as well as achieving successful internationally competitive technology commercialization results that will provide high-value jobs, wealth, and positive international recognition for Portugal.

1.2 Evolution of UTEN Strategy

Timeline of Activities and Programs

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, Texas
  - » South Texas Technology Management (STTM), San Antonio, Texas
  - » INCELL (biosciences), San Antonio, Texas

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 Administration (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)

- Seven 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; Regenerative Medicine and Novel Medical Therapies*

- 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 *UTEN Austin, Carnegie Mellon University, Cambridge Enterprise*
- Second UTEN National Conference, Lisbon
  - » Second UTEN Annual Report
  - » First TTO Survey
  - » First University Technology Business Spin-off Survey
  - » Portuguese case studies on internationalization
- Pilot in-situ training: TecMinho, UNL
- Pilot Soft-landing: University of Texas and Texas A&M Incubators
- 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.*

1.3 Strategy for Year 5

UTEN Year 5 will continue to focus on the establishment of a professional, internationally competitive, and sustainable technology transfer (TT) network within Portugal. The final goal is to improve the successful knowledge transfer and technology commercialization among the national scientific and technological system, helping transform the results of scientific research into new commercial products and maximize the social and economic benefits. UTEN will continue stimulating and supporting the creation and strengthening of a "Portuguese Association of Technology Transfer" to consolidate the network in a structure of a more stable nature. Year 5 actions will focus on capacity building through the learning of established and innovative TT practices and the application of international know-how and commercialization networks. Programs and activities that will be emphasized include:

- International internships
- Workshops, training weeks, and In-situ training
- TTOs leaders meetings
- Observation and assessment
- Annual conference and activities report.

International Internships. Year 5 internships will focus more on licensing and on-shoring of Portuguese technologies including achieving successful licensing deals and softlanding of Portuguese S&T spin-offs with:

- Connect-US, which will emphasize international TT training and U.S. networking of Portuguese TTOs
- Technology bundling, cross licensing, and other international partnering activities.

Training Weeks. Based on Portuguese TTO feedback, select training weeks in Year 5 will focus on industrial liaison programs and procedures to improve Portuguese university and industry research collaboration leading to S&T commercialization and on-shoring of Portuguese S&T in U.S. markets.

In-situ Training. In situation training will be customized to the particular needs of TTOs already identified from UTEN past activities. UTEN Portuguese TT managers and staff will be invited to participate as "experts" in this training and to transfer their know-how and experience.

International Workshops. The focus will continue to be the identification of important emerging technology sectors in Portugal with emphasis on increased industry involvement and Portuguese university organization and management of these events. An important UTEN goal is for the national workshops to continue the theme of technology transfer and commercialization with industry involvement.

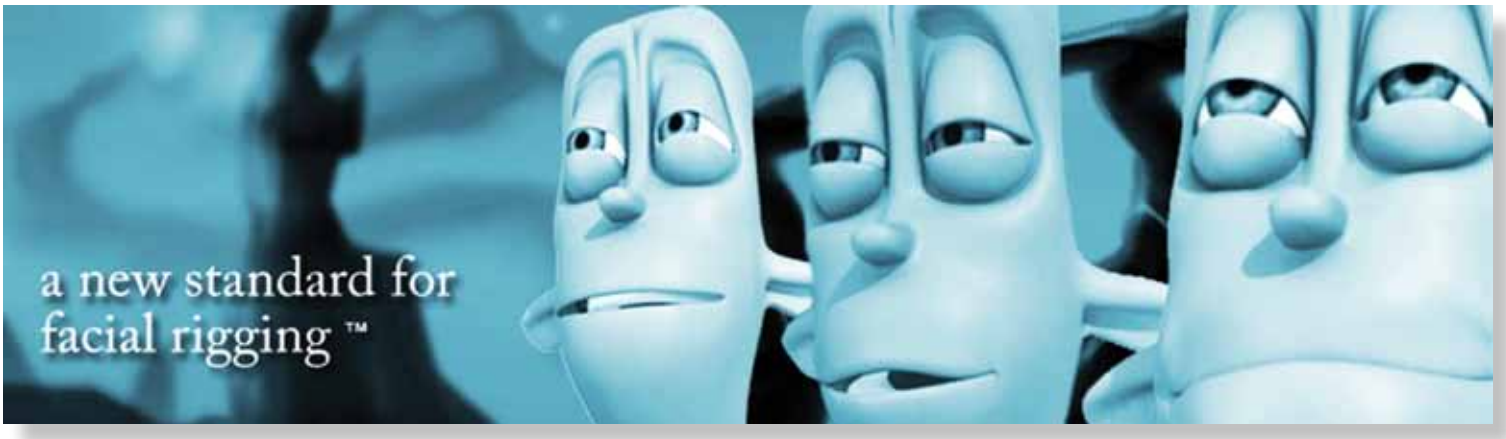
TTOs Leaders Meetings. This activity will allow roundtables with invited international experts to deepen work surrounding real cases, specified and discussed by Portuguese leaders in the area of TT and commercialization.

The internationalization of Portuguese TTOs has been a main focus of UTEN and Year 5 will include more activities to assist and mentor Portuguese TTOs in "taking the last mile" to realize key commercialization results whether licensing to international companies or establishing international Portuguese start-up ventures. Additionally—through the global networks of UTEN—multi-country TT partnering and commercialization, opportunities have already been initiated with business and academic partners. All UTEN programs and activities will work to enhance the stability and sustainability of successful TTO programs and activities. Key to this effort is the continued collection of metrics to evaluate and improve UTEN and Portuguese TTO offerings and the continued professionalization of Portuguese TT managers and staff.

1.4 At the Intersection of UTEN & CoLab

UTEN has worked to increase support for Portuguese researchers, entrepreneurs, and start-ups related to Advanced Digital Media, a central academic program of the International Collaboratory for Emerging Technologies (CoLab), www.utaustinportugal.org. In 2009, UTEN conducted a "Digital Media Sweep" of emerging Portuguese researchers and entrepreneurial activity. UTEN has also worked with Portuguese TTOs in identifying emerging university-based digital media companies. Some of these entrepreneurial start-ups are included in the UTEN database of Portuguese S&T.

In 2008, CoLab organized the first Creative Cities Conference in Lisbon. This conference inspired several Portuguese cities to develop their own "creative city" initiatives, including Cascais, Obidos, Paredes, Montemor-o-Velho, Porto, and Guimarães. In 2009, at the second Lisbon Conference on Creative Cities, former Austin Mayor Will Wynn gave a keynote presentation on "Austin as a Creative City." At the first annual CoLab Research Conference, held at the Gulbenkian Foundation, September 21-22, 2010, an afternoon session was devoted to Creative Cities. Also in 2010, UTEN and CoLab worked with the University of Porto, Catholic University, Porto, and ADDICT to organize the first annual Creative Industries Workshop for mid-sized cities, held in Porto, September 16-19, 2010.



At the intersection of UTEN and the UT Austin | Portugal Collaboratory programs, Verónica Costa Orvalho has developed facial animation technologies that are commercialized through her company Face In Motion (http://faceinmotion.com). This application of her technology automates the rigging process within the animation pipeline, enabling digital artists to create more lifelike characters in shorter times and at lower cost than with traditional techniques. One of UTEN's goals in the coming year is to pursue closer interaction with CoLab's academic programs to help catalyze technology transfer.

Another opportunity to link Advanced Digital Media's academic programs and UTEN is the digital media competition Prémio ZON. ZON awards include an internship in Austin funded through the FCT and coordinated by CoLab's Digital Media Internship Program. When winning Prémio ZON submissions are technology-based, UTEN is available to assist winners in using their internship time to explore technology commercialization. For example, Pedro Torres, a 2010 ZON award winner and Managing Director of FYI (http://fyi.pt), a Portuguese social media start-up company, visited Austin in July 2010 to better define his 2011 internship.

During his visit, Pedro Torres worked with UTEN to engage in enterprise strategy and collaborative meetings with select Austin-based social media firms. Meetings included the CEO of Appiction, Inc. (www.appiction.com), a mobile application development firm, and Ricardo Guerrero, founder of Dell's Twitter social media campaign and founder of Stwittergy (http://stwittergy.com). Pedro had meetings with the Austin-based entrepreneurial support group TechRanch (www.techranchaustin.com) that focuses on social media research and commercialization in Central Texas. Under the ZON award, Pedro plans to return to Austin in January 2011 for a six-month internship to further explore the field of social media and innovation and to develop working models, relationships, and projects to help build and internationalize his Portuguese social media company. Since his return to Portugal, Pedro's firm has continued to receive U.S.-based interest, and he is currently exploring collaboration with the U.S. firm Public Relay.

UTEN also provides technology commercialization advice and networking support to CoLab researchers on FCT-funded research projects. For example, Verónica Costa Orvalho, Computer Science Department, Faculty of Sciences at U.Porto, conducts research on facial animation technologies that has been commercialized through her company, Face In Motion (http://faceinmotion.com). Face In Motion automates the rigging process within the animation pipeline, enabling digital artists to create more lifelike characters in shorter times and at lower cost than with traditional techniques. Currently, links are being explored for this technology based on conversations with Paramount Pictures.

Verónica is Principal Investigator on an FCT-funded CoLab R&D grant with UT Austin's J. K. Aggarwal, Electrical and Computer Engineering (a facial recognition expert), and Yan Zhang, School of Information (specializing in user interface design). Their research project applies facial animation to the problem of teaching autistic children to recognize facial expressions through educational games. In addition, one of Verónica's PhD students, Nuno Barbosa, was a visiting scholar at UT Austin in the summer of 2010 with an internship at Texas Advanced Computing Center (TACC). Nuno's work concerns the animation of skin tones, another problem with commercial applications.

By helping Verónica and her team explore the market potential of technologies that emerge from their work, UTEN contributes to commercialization skills for senior and emerging Portuguese scholars—fulfilling one of CoLab's longer-term objectives to help build sustainable research and commercialization clusters in specific technology sectors, such as digital media.

In the effort to fully leverage the impressive technical capabilities of CoLab internships and exchanges, the UTEN program is working collaboratively to place interns and visiting scholars in meaningful computer science and digital media-related internships more solidly focused on commercialization. Early stage partnerships for placement have been reached throughout the Austin area with venture capital firms, start-up companies, and primary industry to help place digital media interns. Examples include:

- Innography, an Austin IP-based start-up that recently closed a US$6 million Series A round of funding
- Several venture firms, including Emergent Technologies and Austin Ventures, work to pair CoLab digital media students with portfolio companies in a variety of capacities
- Microsoft Corporate in Austin promotes UTEN/CoLab interns to its network of 400+ small-to medium-sized regional business partners to pair Portuguese skill sets with U.S.-based IT and digital media company needs.

In keeping with the "think and do" mission of UTEN, it is believed that involving CoLab researchers and interns with cutting-edge industry, as well as with valuable, meaningful projects, will serve a two-fold purpose as it also increases awareness of Portugal as a source of top talent in digital media and other emerging technology industries.

2.
On-the-job Training

"One of the main benefits of the UTEN program for UATEC has been the on-site training in technology transfer and commercialization provided by international internships in prestigious institutions."

José Rainho, UATEC Director & UTEN International Intern

2.1 International Internships

The UTEN International Internship Program was initiated by the FCT in 2009 and has proved to be one of the most important UTEN initiatives. The vision of this program was to set-up a national platform of high-level professionals in S&T commercialization and technology transfer, building on the existing network of TTOs and university incubators in Portugal.

The main objectives of the UTEN International Internship Program are twofold:

1. Acquire international S&T transfer and commercialization knowledge, skills, and know-how from expert mentors and their host institutions (by providing opportunities for real world observation and practice in international technology licensing and venture formation)
2. Support commercialization and on-shoring for specific Portuguese technologies and academic spin-offs.

This program is expected to help TTOs and University incubators to:

- Enhance understanding and exposure to new models for successful TT and commercialization for identification of "Best Practices" which could be adapted and deployed in Portugal
- Develop sustainable international institutional and industry linkages for Portuguese TTOs and their universities including professional connections and network building for off-shoring Portuguese S&T.

UTEN Internships - First Call (2009/2010)

The International Internship Program has shown itself to be one of the most important of UTEN's initiatives by (1) enhancing the professionalization of Portuguese TTO managers and staff through providing hands-on learning, know-how, and the ability to facilitate successful international commercialization of Portuguese S&T (science and technologies) and (2) generally increasing the capacities and performance of Portuguese technology transfer offices. Based on survey feedback, each of the Portuguese interns gave the highest possible rating in terms of gaining valuable work experience.

The interns stated that their internships will generate benefits—both for their individual TT offices in the near term, and in future years—through increased professionalization of Portugal's technology transfer operations. The interns were competitively selected through a national FCT call that was limited to active technology transfer staff at public institutions. Applications were reviewed by an international committee and the selection of final candidates was based on their relevant experience, home institution support, and the technology transfer projects that they could pursue during their internships.

Internships ranged from two weeks for senior TTO managers to two to three months in duration for TTO staff. The 2009 internships included two two-week training courses conducted at IC² Institute, The University of Texas at Austin (see UTEN Annual Report, 2008-2009) followed by two- to three-month internships at host institutions in the U.S. and EU. The interns typically received one-on-one mentoring by TT experts during their internships while they also conducted international market assessments of technologies from their home institutions. Several interns also had a second two- to three-month internship in the summer of 2010. In all cases, considerable effort was made to assign each intern to the most appropriate host institution to achieve win-win scenarios for both the interns and the host institutions (see table 1).

UTEN Internships - Second Call (2011)

The FCT has recently opened a call for six individual internships specialized in technology transfer and commercialization, including on-the-job training in technology transfer offices or similar organizations (deadline: Oct. 29, 2010). For the official announcement in Portuguese, please see: http://alfa.fct.mctes.pt/apoios/cooptrans/parcerias/uten

2.2 Internship Assessments

According to the interns, the primary purposes of the on-site internships, in order of priority, were to:

- Network with staff at their host organizations
- Learn about technology business activities in the United States
- Learn about advanced TT and commercialization tools and procedures
- Observe and participate in tasks of the host organization
- Assess market and commercialization opportunities for specific Portuguese technologies

Assessments by Texas Interns [1]

Overall, the interns rated their Texas-based internships extremely high. Exit interviews and questionnaires showed:

1. Twelve of 13 internships received the highest rating possible ("Yes, absolutely") when asked if they had valuable work experience.

2. Nine of 13 internships were rated as "Exceeded my expectations" or "Far exceeded my expectations," with the other four internships rated as "Met my expectations."

3. Nine of 12 internships (one person skipped the question) received the highest possible rating in terms of recommendations of the internship experience to a friend or colleague, emphasizing the (1) educational value of learning skills and techniques, and/or (2) their observations that the professionals in the host institutions were willing to help, were supportive, and were friendly.

4. Ten of 13 internships received the highest possible rating ("very satisfied") in terms of satisfaction, with the other three internships rated "satisfied."

Interns also provided a number of specific activities they would like to pursue in collaboration with their host institutions and several of their institutional hosts also indicated that they expect to continue communication, targeted cooperative activities, and planned next steps with their interns. In addition to their general feedback, interns

1. UTEN Austin assessments of the International Internship Program focused on the on-site activity of the Texas-based interns. Data and information were collected systematically from both the interns and their mentors at the host institutions. This review is based on 13 survey responses from interns and 10 survey responses from host mentors, as of April 2010. A full assessment report is available from UTEN Portugal.

Table 1. International Internships & Host Institutions, 2009-2010

University of Algarve (CRIA)
*Sofia Vairinho, Carnegie Mellon University, Pittsburgh, Pennsylvania and Cambridge Enterprise
Hugo Barros, Carnegie Mellon University, Pittsburgh, Pennsylvania
Alexandra Marques, South Texas Technology Management (STTM), San Antonio, Texas
University of Tras-os-Montes e Alto-Douro (OTIC-UTAD)
Carla Mascarenhas, South Texas Technology Management (STTM), San Antonio, Texas
University of Aveiro (UATEC)
*José P. Rainho, IC^2 Institute, The University of Texas at Austin and Carnegie Mellon University, Pittsburgh, Pennsylvania
*Marlos Silva, OTC The University of Texas at Austin, Texas and Emergent Technologies, Austin, Texas
Ana Rita Remigio, South Texas Technology Management (STTM), San Antonio, Texas
*David Resende, IC^2 Institute, The University of Texas at Austin, Texas
Ana Pinto, Carnegie Mellon University, Pittsburgh, Pennsylvania
University of Beira Interior
Pedro Serrao, IC^2 Institute, The University of Texas at Austin, Texas
University of Coimbra (GATS)
Jorge Figueira, IC^2 Institute, The University of Texas at Austin, Texas
FCT
Luís Serina, European Space Agency
Technical University of Lisbon, IST (TT & IST)
**Maria José Francisco, IC^2 Institute, The University of Texas at Austin, Texas
Technical University of Lisbon, ISA (INOVISA)
Isabel Alte de Veiga, Texas A&M University and Borlaug Institute, College Station, Texas
INPI/New University of Lisbon
***Dina Chaves, IC^2 Institute, The University of Texas at Austin
Miguel Moura, South Texas Technology Management (STTM), San Antonio, Texas
University of Minho (TecMinho)
Marta Catarino, IC^2 Institute, The University of Texas at Austin, Texas
*Pedro Silva, OTC, The University of Texas at Austin, Texas and Emergent Technologies, Austin, Texas
University of Porto (UPIN)
*Maria Oliveira IC^2 Institute, The University of Texas at Austin, Texas and Boston University, Massachusetts
Filipe Castro, OTC, The University of Texas at Austin, Texas

* Select participants received a two-phase internship: the first phase in Summer 2009, and the second phase in Summer 2010, usually with a new host institution.

** Currently Maria José Francisco is UTEN Program Manager, INESCPorto, and FCT Liaison.
*** Currently Dina Chaves is a TTO at New University of Lisbon

On their return to Portugal, international interns are active in UTEN events and on-the-job in their TTOs. In this photograph of a Portugal UTEN event, at least six international interns can be identified in this photograph.

also cited a range of important specific accomplishments from their internships as follows:

1. I received a first-hand view on go/no-go decisions on technology commercialization cases.

2. Through participation, I understand better licensing process flows, and the work-flows and internal procedures of a TTO.

3. I gained improvement in assessment and commercialization skills, networking, license opportunities with U.S. companies, and cooperation between my TTO and my Texas TTO host.

4. Making contacts with companies using the UT brand for the first approach (cold phone call) was a big help. This is almost impossible to do in Portugal.

5. I learned negotiation techniques, licensing techniques, marketing techniques...

6. All the objectives of the internship were achieved. In my opinion, the most important accomplishment is related to the technology assessment process and the possibility to implement it at my home TTO.

Assessments by Intern Supervisors/Mentors

Uniformly, the supervisors and mentors at the host institutions were very satisfied with the interns and their internship experiences. Six of the supervisors said their intern's performances "exceeded" expectations and three said they "far exceeded" expectations. Further, all 10 supervisors and mentors stated that the internships had been beneficial to their organizations. Some of the benefits cited by the supervisors follow:

1. The intern …helped us understand IP from a EU patent examiner's perspective.

2. The intern helped us find a partner in African agriculture development projects.

3. We …established a long-term relationship. ...we intend to follow-up at least twice a month for on-going projects.

4. The intern helped us move a few technologies further in the process. The international perspective was helpful.

5. We have many nascent technologies that require significant incubation prior to realizing a path to wealth creation. (The intern) helped us define the challenges ahead and solutions to address these challenges.

6. Our intern was a great force multiplier who brought a different perspective to what we do at STTM. By force multiplier, I mean I took great comfort in knowing that I could hand off a project to her and it would be handled in a conscientious and diligent manner. She took over several REAL projects as the primary licensing associate in charge of the project... that I had neglected for too long due to simple lack of bandwidth.

7. Real progress was made on multiple cases and we learned about programs in Portugal we may want to try at our location.

8. Case management assistance (by the intern) was very helpful and the global perspective of technologies helped with evaluations.

9. (Intern) helped us develop a licensing strategy for a technology that had previously not gained any momentum.

10. Our intern helped with technology evaluations; industry agreement evaluations (comps); and exposure to complex inter-university/company negotiations involving confidentiality and inter-institutional and sponsored research.

2.3 Case Examples

The following pages describe select cases of Texas-based internships, including a breakout of individual activities in commercialization and technology assessments. While intellectual property concerns sometimes limit the details that may be described, these reports provide an overview of the activities pursued to promote Portuguese S&T for transfer to the international market.

Two interns, Marlos Silva (UAveiro/UATEC), and Pedro Silva (UMinho/TecMinho), returned for a second internship in Texas. The strategic value of choosing the same location for a second internship is shown in the more intense work they completed in their second phases. In addition to the Connect-US case studies featured in section 3.2 of this report, both Pedro and Marlos were able to pursue the development of their Portuguese technology portfolios to the extent that they each made two private equity pitches in which they presented Portuguese technologies to U.S. investors for possible funding opportunities.

Table 2 provides an overview of commercialization activities and technology transfer activities engaged in by the interns, by region. Table 3 defines these terms.

Table 2. Texas Interns: Technology Assessments & Commercialization Activities

Tech Transfer Office	UAlg/ CRIA	UMinho/ TecMinho	UTAD	UAveiro/ UATEC (3 interns)	ISA/ Inovisa	IST	UNL	UPorto/ UPIN (2 interns)	Total
INTERNS' TECHNOLOGY ASSESSMENTS									
Technologies screened	2	20	2	21	1	3	4	11	64
MarketLooks completed	--	4	1	1	1	1	2	1	11
MarketLooks underway	1	--	1	4	--	--	2	1	9
INTERNS' COMMERCIALIZATION ACTIVITIES									
Prospects identified	20	65	6	96	16	11	34	22	270
Interest expressed	3	13	--	18	--	1	12	4	51
Negotiations initiated	2	3	--	6	--	1	1	--	13
Licensing	--	--	--	3	--	--	--	--	3
On-shoring	--	4	--	2	1	--	2	1	10
Private Equity Presentations	--	2	--	2	--	--	--	--	4

Table 3. Definitions: Technology Assessments & Commercialization Activities

TECHNOLOGY ASSESSMENTS	
Technologies screened	Defined as the early stage evaluation of a technology for commercialization activities (See section on RapidScreen)
MarketLooks completed	Actual commercialization reports and strategy documents produced by either U.S.-based consultants or Portuguese interns themselves
MarketLooks underway	Actual commercialization reports and strategy documents produced by either U.S.-based consultants or Portuguese interns themselves
COMMERCIALIZATION ACTIVITIES	
Prospects identified	A prospect is usually identified through in-depth discussions with either industry or academic institutions that are targets for potential commercialization activities centered on the Portuguese technology. More than a lead, a prospect is characterized as being based on an extensive email communication between parties, or at least a 10-minute conversation, to describe the technology and explore how it might be pertinent for the prospect organization. Example prospects that were identified and developed by interns under the guidance of UTEN mentors include Fortune 100 companies Microsoft, IBM, Halliburton, Schlumberger, MI Swaco, Stryker, Johnson and Johnson, Glaxo Smith Kline, and others. Academic institutions with private research concerns were also represented: UC Davis, Carnegie Mellon, UNC-Chapel Hill, Georgia Institute of Technology, Texas A&M University, and UT Austin.
Interest expressed	Interest expressed is defined as a request by a prospect for additional information related to a Portuguese technology that was showcased. Expressions of interest are characterized by a request for additional information, the delivery of that information, and follow-up discussion with the prospect.
Negotiations initiated	Negotiations are characterized by a formal request for information from the Portuguese intern related to pricing/terms for acquiring a technology or product associated with the UTEN program. Specific negotiation details are held by individual TTOs and, given their fluid state, many of these negotiations have been withheld from public-facing documents.
Licensing	The actual licensure of a Portuguese technology as a result of introductions made or presentations facilitated by the UTEN program.
On-shoring	On-shoring is defined as helping to move a Portuguese venture or technology to an international market through joint venture, IP bundling, spin-off, or similar mechanisms.
Private Equity Presentations	A pitch seeking investment funding for Portuguese technologies and/or ventures from venture capital, angel, or other private equity markets.

Filipe Castro making a presentation at the IC² Institute as part of his internship.

International Intern

• Filipe Castro, UPorto/UPIN

University of Texas Office of Technology Commercialization (OTC)
February 1 through March 31, 2010

Filipe's internship took place at the University of Texas Office of Technology Commercialization (OTC) under the mentorship of Max Green, technology licensing specialist. A key focus of his internship was developing professional technology transfer skill sets specific to organizational needs at the University of Porto, including the documentation of OTC's technology commercialization processes. He worked with OTC's associate director of marketing on a summary of existing OTC documentation, *How to Market a Technology Transfer Office: A Brief Approach to OTC Marketing Tools*. In addition, UTEN Program Manager Heath Naquin worked with Filipe on training and network building focused on U.S. market assessments of S&T from the University of Porto. Filipe engaged in related network building when possible, as when he attended the 2010 World's Best Technologies (WBT) showcase in Arlington, Texas, where he made useful contacts with U.S. venture capitalists, leading technology entrepreneurs, and business angels.

According to Filipe, his OTC internship was an excellent opportunity to rethink and readapt his thoughts on organizing OTC procedures and to consider how best to use this know-how to improve the TT and commercialization processes within UPIN. Specific internship-related activities & training included:

- Developing more advanced skills on a range of technology commercialization processes
- Relating technology commercialization issues with spin-off support activities
- Developing more effective marketing efforts for technology commercialization
- Gathering information to transfer knowledge and benchmark how to organize events to foster entrepreneurship and technology commercialization
- Collecting information about databases that improve the process of building business intelligence on technology assessments
- Patent searching in the United States using USPTO database, Google Patents, FreePatents Online, and Espacenet database
- Analyzing UT Austin's OTC Licensing Intern Training Manual for use by UPIN

Follow-on activities include the completion of In-situation Training at UPIN, the restructuring of UPIN TTO procedures and processes, continued international commercialization activity, and the restructuring of UPIN's industry liaison links.

TECHNOLOGY ASSESSMENTS	
Technologies screened	11
MarketLooks completed	1
MarketLooks underway	1

COMMERCIALIZATION ACTIVITIES	
Prospects identified	22
Interest expressed	4
Negotiations initiated	--
Licensing	--
On-shoring	1

Dina Chaves' internship at the IC² Institute focused on technology transfer of Paper-e, an award-winning UNL technology with multiple market applications.

International Intern

• Dina Chaves (UNL/GAPI)

IC² Institute, The University of Texas at Austin
July 15 through September 5, 2009

Dina's internship took place at The University of Texas IC² Institute, where her primary goal was to make significant headway in the international market assessment and commercialization of Paper-e, an award-winning UNL technology. UTEN Program Manager, Heath Naquin mentored Dina in this activity, which initially focused on developing a U.S. industry-oriented presentation of the Paper-e technology to the advisory board of the Austin Technology Incubator that determined that Paper-e was a platform technology too far upstream for ATI consideration. The focus then shifted to visiting research-based industry partners. OTC contacts at UT Dallas helped set up a visit to Kilby Labs at Texas Instruments in Dallas, Texas. This visit helped initiate a cooperative research project between UNL, UT Dallas, and Kilby Labs. A cooperative research proposal has been submitted to the National Science Foundation.

Specific activities and training during Dina's internship included:

- Working to further analyze key market insertion points related to the electronic paper market
- Developing and reviewing technology marketing documents and information
- Gaining key insights into active technology commercialization processes in the U.S.
- Building a licensing and commercialization body of knowledge for UNL
- Analysis of different methods to approach Portuguese industry and to interface with U.S. technology partners
- Developing technology pitches for U.S. industry
- Development of international joint research projects.

Additional follow-on activities include completion of in-situ training at UNL; restructuring of UNL's TTO procedures and processes; and continued international commercialization activity with established industry links with Texas Instruments.

TECHNOLOGY ASSESSMENTS	
Technologies screened	4
MarketLooks completed	2
MarketLooks underway	2

COMMERCIALIZATION ACTIVITIES	
Prospects identified	34
Interest expressed	12
Negotiations initiated	1
Licensing	--
On-shoring	2

Cliff ZIntgraff and Alexandra Marques working on a MarketLook assessment. during her internship.

International Intern

• Alexandra Marques (UAlg/CRIA)

South Texas Technology Management (STTM), San Antonio, Texas
January 2 to March 26, 2010

Alexandra Marques, University of Algarve, completed her two-month internship at South Texas Technology Management (STTM) on March 26, 2010. While at STTM, Alexandra's primary mentor was Dr. Christine Burke, technology licensing associate. She was also mentored by Sean Thompson, technology licensing manager. During her internship, Alexandra was fully embedded in the operational processes of STTM, getting wide exposure to all aspects of technology valuation, transfer, and commercialization processes. She also took advantage of numerous professional presentations and other opportunities to learn about tools and techniques available to advance the mission of technology transfer.

Alexandra's core activity was to provide support for the ongoing licensing and commercialization efforts of STTM, including active participation in disclosure activities, inventor follow-up, marketing, and company contacts and presentations. She participated in office background training and support activities, including meetings with the legal department and discussions regarding conflicts of interest management. She learned about databases and relevant software that support the commercialization process, and attended numerous meetings that added value to her internship experience. Working with Cliff Zintgraff, Program Manager, UTEN Austin, she also assessed commercialization potential for technologies from the University of Algarve, gained market insights, and made contacts for future business development.

Regarding her scientific background in Marine Sciences, Alexandra had the opportunity to visit the University of Texas Marine Science Institute in Port Aransas and UT Pan American to work on STTM technologies and to establish contacts with administrative staff and researchers. While visiting these institutions, she was able to initiate grounds to establish scientific collaborations between U.S. and Portuguese research teams. Specific internship-related activities and training included:

- Working licensing cases including disclosures, inventor follow-up, marketing, company contacts, legal department contacts, and benchmarking
- Company meetings with Epacenet.com, Antisense Pharma, STEM Cell, Inc., and Spring Bank Pharmaceuticals
- Exposure to databases and tools including Inteum, ReCap and Integra, and VentureCapitalTools.com
- Participation in patent/technology license agreement meetings and exploring the development of a common form for Texas institutions; participation in three-way technology transfer collaboration discussions with Georgetown University, researchers and inventors, and STTM; and participation in an STTM/INPI patent agreement meeting for the consideration of collaboration between a U.S. TTO and the Portuguese patent office.
- Meetings with UTEN/UT Austin staff and partners, UT Office of Technology Commercialization, and InCell Corporation, San Antonio, Texas.
- Technology and market assessments of Fish Food Additives and Recycled Grass Clippings
- Development of a public technology offer, a public portfolio, and numerous market contacts.

TECHNOLOGY ASSESSMENTS	
Technologies screened	2
MarketLooks completed	--
MarketLooks underway	1

COMMERCIALIZATION ACTIVITIES	
Prospects identified	20
Interest expressed	3
Negotiations initiated	2
Licensing	--
On-shoring	--

Carla Mascarenhas in discussion regarding her findings for a MarketLook assessment.

International Intern

• Carla Mascarenhas (UTAD/OTIC)

South Texas Technology Management (STTM), San Antonio, Texas
January 8 through March 8, 2010

Carla Mascarenhas, University de Trás-os-Montes e Alto Douro, completed her two-month internship at South Texas Technology Management (STTM), San Antonio, Texas, on March 5, 2010. Carla primary mentor was John Fritz, Technology Licensing Associate, as well as Sean Thompson, Technology Licensing Manager. During her internship she focused her training on international technology transfer licensing and negotiation; evaluation and validation of invention disclosure forms; research on patent applications; non-confidential descriptions with U.S.-based enterprises; and technology marketing. She regularly participated in meetings with university researchers and in conference calls between University of Texas researchers and U.S. companies. She attended workshops at the University of Texas at San Antonio (UTSA) Center for Innovation and Technology Entrepreneurship (CITE), and Technology Entrepreneurship Boot Camp. She attended *Tech Forum: Collaborative Technology Commercialization*, organized by STTM. During her Internship, Carla also worked with Cliff Zintgraff, UTEN Manager Technology Development, UTEN Austin, conducting RapidScreen and MarketLook assessments with U.S.-based companies concerning Alto Douro technologies.

Key internship-related activities & training included:

- On-the-job training in licensing and negotiation
- Involvement in STTM processes and procedures, helping with technologies at key points including evaluation, validation, marketing, and commercialization.
- Research regarding the state-of-the-art processes relative to recently received Invention Disclosure Forms (IDFs)
- Researcher meetings to discuss commercialization assessments and feasible actions
- Involvement in initial and ongoing company contact, and NDAs (non-disclosure agreements)
- Technology and market assessments of technologies including development of a public technology offer, a public portfolio, RapidScreen interviews, market contacts, and a MarketLook for New Agglomerate for Wood Particles
- Substantial insights into a MarketLook process for New Agglomerate for Wood Particles and processing strategic implications.

Follow-on activities for Carla include implementation of relevant STTM office procedures at UTAD and pursuing U.S. technology leads, especially for New Agglomerate for Wood Particles; working to arrange the visit of John Fritz and Sean Thompson to UTAD.

TECHNOLOGY ASSESSMENTS	
Technologies screened	4
MarketLooks completed	1
MarketLooks underway	--

COMMERCIALIZATION ACTIVITIES	
Prospects identified	25
Interest expressed	3
Negotiations initiated	--
Licensing	--
On-shoring	--

Ana Rita Remigio at her work station at the South Texas Technology Management (STTM).

International Intern

• Ana Rita Remigio (UAveiro/ UATEC)

South Texas Technology Management (STTM), San Antonio, Texas
August 8 through October 31, 2009

Ana Rita's main mentor at STTM was Sean Thompson, Senior Technology Licensing Specialist. A key objective for Ana Rita was to document STTM's "licensing processes and frameworks" while also helping to establish a cooperative agreement between STTM and UATEC. Ana Rita also worked with Cliff Zintgraff, UTEN Program Manager, to learn how to assess the international marketability of technologies from the University of Aveiro. Ana Rita wrote:

> *The value of the individual specialized internship in technology transfer, comprising both training and internship components, is of undeniable importance.…The on-the-job training provided me with a deep dive into the world of technology transfer with all the challenges, expected and unexpected outcomes, and successes that are likely to occur in a U.S. university-based TT Office.…Regarding our Portuguese technologies… I believe the first steps towards a promising future have been taken and the gate to the U.S. and global market is now opened.*

Specific internship related activities & training included:

- Licensing, negotiations, and closing the deal
- Formation, launch, and growth of university spin-outs
- Technology development and licensing to meet the needs of industry
- Managing a TTO to optimize technology commercialization
- Marketing and entrepreneurial skills for TTOs
- Technology screening and market validation methodologies for TTOs

Ana Rita is currently working to transfer her experiences and increased know-how to UATEC including:

- Improvement in prior art search during technology evaluation processes
- IP management and prosecution improvement
- Fostering an increase of patent application filings in the U.S.
- UATEC licensing process review and improvement including best practices and procedures improvement
- Creating standardized documents including the elaboration of an inventor's guide
- Establishing a formal cooperative agreement with STTM.

TECHNOLOGY ASSESSMENTS	
Technologies screened	3
MarketLooks completed	--
MarketLooks underway	1
COMMERCIALIZATION ACTIVITIES	
Prospects identified	4
Interest expressed	3
Negotiations initiated	--
Licensing	--
On-shoring	--

Marlos Silva worked at Emergent Technologies in his second internship in Texas.

International Intern

• Marlos Silva (UAveiro/UATEC)

Phase #1 Internship with UT Austin Office of Technology Commercialization (OTC)
July 16 through October 14, 2009

Marlos Silva's first three month internship was with The University of Texas at Austin's Office of Technology Commercialization (OTC) working with two mentors: Jitendra Jain (JJ) and Max Green, licensing specialists in the fields of computing technologies and green technologies. Marlos was involved in day-to-day OTC operations and gained important knowledge and perspectives on how a well-developed OTC conducts business and leverages faculty, student, and community resources. Marlos also worked on commercializing UATEC technologies in the U.S. market, and he continues working to transfer this knowledge back to UATEC at the University of Aveiro. As he stated:

> *A business attitude is required to work in technology transfer. Spending time with licensing specialists from the UT OTC allowed me to face the reality that it is possible to have this attitude at the university and, more important, it is essential to foster the improvement of results in technology transfer activities.*

Specific internship related activities and training included:

- Establishing formal institutional cooperation between UATEC and the UT Austin OTC including the exchange of expertise and resources focused on technology bundling, cross licensing, and commercialization of technologies in the U.S. and EU.
- Development of subject matter experts for technology valorization
- Assessment of best practices in technology evaluation and commercialization plan development
- Establishing procedures at UATEC for using student interns
- Establishing procedures for building a seed capital and ignition fund
- Writing scientific, technology transfer papers, i.e.:
  - » *Knowledge Transfer between UATEC and UT OTC*
  - » *The Influence of the UTEN Program on UATEC*

Additional follow-on activities include:

- Continued development of international network for licensing and business development
- Increased skills in business creation, team-building, capital sourcing, and licensing for new companies
- Implement best practices within UATEC to help the TTO become more organized in terms of evaluating technologies and commercialization plans
- Spending less time on paperwork and more time in commercialization efforts
- Establish an in-situ training work plan for UATEC

Phase #2 Internship with Emergent Technologies, Austin, Texas
July 22 through August 30, 2010

Marlos's second phase internship was at Emergent Technologies (www.emergenttechnologies.com), a life sciences-based venture firm with over $20 million in venture investment placed in Austin, Texas. His internship focused on building direct relationships with venture firms and private equity groups in the U.S. for potential investment in Portuguese technologies and ventures. He worked directly with Emergent VP of Strategic Services, Kris Looney, and UTEN Program Manager, Heath Naquin, to define future models of collaboration focused on the commercialization of Portuguese technologies. Over the course of his internship he met with venture capital leaders and organizations including EDCO Ventures, TechRanch, Austin Ventures, TEXO Ventures, Baylor Angel Network, and others. Considerable time was spent in developing relationships at Austin Ventures with both the director of research and the director of new business development. Technologies from the University of Aveiro were presented to Sante Ventures, Johnson & Johnson, 3M, and others via UTEN Austin's talent network. A supplemental component of Marlos's internship was working with IC² Institute's Global Commercialization Group with Donna Wilcox, Manager for Strategic Alliances on international industry/government programs. As part of this experience, Marlos presented commercialization best practices from the UTEN program to a delegation from the Brazilian Ministry of Science.

TECHNOLOGY ASSESSMENTS (over both internships)	
Technologies screened	17
MarketLooks completed	1
MarketLooks underway	2

COMMERCIALIZATION ACTIVITIES	
Prospects identified	86
Interest expressed	15
Negotiations initiated	6
Licensing	3
On-shoring Deals in Progress	1
Private Equity Pitches	2

Pedro Silva also worked at Emergent Technologies in his second internship in Texas.

International Intern

• Pedro Silva (UMinho/TecMinho)

Phase #1 Internship with UT Austin Office of Technology Commercialization (OTC)
July 15 through September 5, 2009

Pedro Silva's first five week internship was with UT Austin's Office of Technology Commercialization (OTC). His main mentor was Dr. Ray Atilano, an OTC licensing specialist who worked with him on the "conception of a pre-seed fund for life sciences (BioIgnition Fund)." He was also mentored by UTEN Program Manager Heath Naquin to assess the U.S. market potential of several TecMinho technologies. As Pedro noted,

> *The training program and the work with UTEN staff and OTC hosts [opened] new routes for my technologies. I received five expressions of interest in four technologies.*

After returning to TecMinho, Pedro concluded:

> *Some lessons I learned while at UT Austin are now being employed in my everyday work as key principles to observe: selectivity, prioritization, focus, discipline, teamwork, and rigorous time allocation are the good habits taken from my internship. Finally, it was quite impressive to observe the acute business attitude of most of the people that I have worked with: the entrepreneurial spirit, proactiveness, the positive competitiveness, the high sense of professionalism and responsibility, and belief in self-capacities.*

Key internship-related activities included:

- Setting up a structured industry liaison program
- Gaining insight on proof-of-concept/prototype development strategies, programs, funds, and agreements
- Pursuing commercialization routes for select technologies from UMinho in strict collaboration with UTEN officers, consultants, and hosts
- Acquiring substantial know-how and skills in marketing and negotiation processes
- Identifying strategies, tactics, methodologies, tools, procedures, and practices for TecMinho adoption
- Technology scouting: early-stage technology screening and evaluation, and market assessment
- Identification of leads, targets and key contacts—technology marketing—negotiation and licensing
- Improving, systematizing and documenting processes and procedures throughout the valorization and commercialization processes including identification, screening, protection, evaluation, acceleration, and licensing of technologies developed at UMinho.

Follow-on activities promote on-going collaboration with the coordinator of the Life Sciences Group at UT's OTC, short-term focus on inventors' outreach, and technology marketing and valorization strategies; identifying technology bundling/joint marketing opportunities; recruitment, integration and working with interns; identifying suitable strategies, tactics, methodologies, tools, and practices related to negotiation and licensing; opening new commercialization channels through strategic partnerships with U.S.-based individuals and institutions; and working to restructure TecMinho TTO procedures and processes.

Phase # 2 Internship with Emergent Technologies, Austin, Texas
July 26 through September 26, 2010

Pedro second internship was with Emergent Technologies, an Austin-based venture capital firm focused on life sciences. His internship was targeted on active commercialization of UMinho technology and exploring potential IP bundling for Portuguese technologies for additional value creation, with UT OTC and other OTCs such as UT Health Science Center in Houston. Pedro also spent time working with the IC² Institute's Global Commercialization Group to explore public/private partnership models with Brazil, India, and Korea. He met with Austin-based start-up Innography, to discuss the expansion of service offerings from UMinho in IP. He visited Chicago discuss best practices in venture acceleration and commercialization with the University of Illinois Technology Transfer Office In Chicago, he also met with the chief entrepreneur in residence for the NSF Engineering Center at Carnegie Mellon University.

Pedro will continue to work to identify commercialization opportunities for UMinho and is working on a joint research paper cataloguing the lessons learned and the effectiveness of the UTEN in-situation training conducted at UMinho in October 2009.

TECHNOLOGY ASSESSMENTS (over both internships)	
Technologies screened	18
MarketLooks completed	6
MarketLooks underway	--

COMMERCIALIZATION ACTIVITIES	
Prospects identified	94
Interest expressed	26
Negotiations initiated	22
Licensing	--
On-shoring Deals in Progress	4
Private Equity Pitches	2

3.

Technology Commercialization & Industrial Liaison

"Regarding our Portuguese technologies… I believe the first steps towards a promising future have been taken and the gate to the U.S. and global market is now opened."

Ana Rita Remigio, UAveiro/UATEC
UTEN International Intern

3.1 Intern Technology Assessments

Since the start of the UTEN program in March 2007, a key strategy has been to deliver technology transfer and commercialization training for international markets using Portuguese S&T.[1] This approach has numerous advantages as it applies UTEN staff effort against real cases to learn key issues and challenges faced by Portuguese technology transfer offices (TTOs). For TTOs, it helps place learning in context, while it results in work that contributes directly to productivity. This use of "living cases" also helps UTEN Austin implement training processes at a grass roots level, while building positive relationships and trust with TTOs. It also promotes UTEN's interest beyond generic training, toward the larger goal of making an overall impact on Portuguese technology transfer and commercialization activities.

This section details three technology assessment case studies and two pilot in-situ case studies. The technology assessment case studies focus on lessons of three interns while exploring U.S. markets for Portuguese technologies. This training has been grounded in three key methodologies:

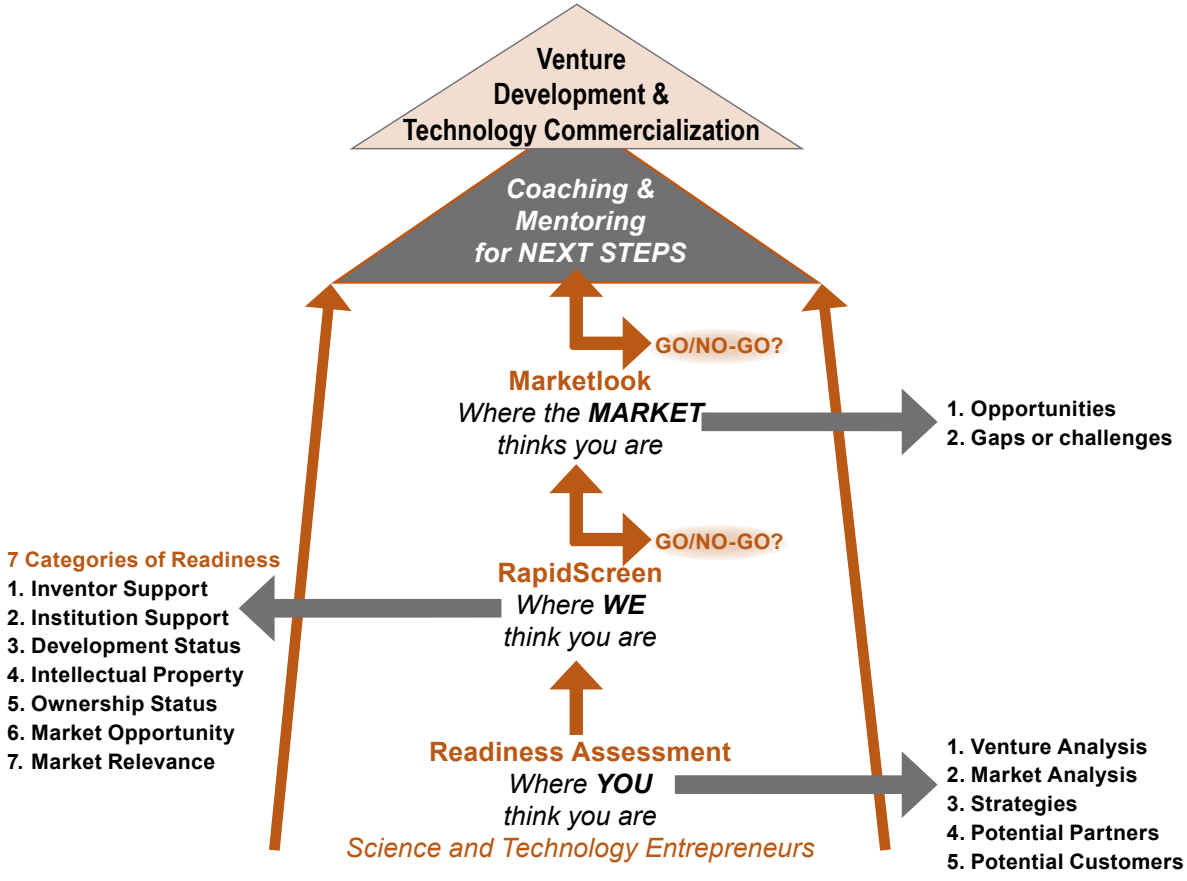
1. UTEN has populated more than 150 technologies from Portuguese institutions and companies into a database that is made available in a national portfolio. Ninety-two have been assessed, primarily from Portuguese public universities, with many recent assessments performed independently by Portuguese TTOs. Twelve Portuguese institutions have received S&T assessment training for their technology transfer staff. In some cases, university researchers were also trained to help them better understand commercialization issues (www.utenportugal.org).

RapidScreen. This assessment consists of a four- to eight-hour review of the technology, the technology team and institution, and the market, against seven categories of readiness (Figure 1). The goal is to identify technologies most ready to commercialize, according to market viability and the readiness of inventors, technology transfer offices, and the technology.

MarketLook. This 40- to 60-hour assessment helps determine the "voice of the market" so that the TTO can work with the inventor to negotiate a license, form a spin-off, accelerate needed additional research, assess development and sales collaborations, and/or address shortcomings that are barriers to market acceptance. MarketLook uses primary interviews (phone calls, in-person interviews, and email exchange) with potential customers, end users, partners, competitors, and other expert validators in the technology's target markets. UTEN has worked with Portuguese technology transfer office staff to conduct U.S.-based expert interviews and develop 8-10 page MarketLook reports on Portuguese technologies.

Additional Coaching and Mentoring. Both the RapidScreen and MarketLook methodologies help clarify technology challenges and market opportunities. UTEN Austin works further with Portuguese TTOs and entrepreneurs on international market outreach and business development *with a focus on transferring knowledge and practice to the Portuguese participants, and particularly on identifying and pursuing new opportunities as they arise.*

Figure 1. UTEN's approach to mentor Portuguese TT managers & staff



Intern Technology Assessment Case Study, Dina Chaves

• Paper-e: non-volatile memory paper transistors

New University of Lisbon (UNL)

Technology Description

Paper-e is a technology developed by researchers at the New University of Lisbon. This technology received the Academic R&D Award from IDTechEx Printed Electronics USA 2009. Paper-e applies field effect transistors on and with paper as well as non-volatile memory paper transistors based on the gate floating concept, where the active materials deposited on both sides of the paper sheet are less than one hundred nanometers thick. Paper-e is unique because the paper is not only the structural support, but is also the dielectric, an active and integral part of the function of the transistor. FET components are fabricated onto both sides of the paper sheet. The authors of this invention call this new structure an "interstrate" device.

Tests indicate the paper transistor performs better than amorphous silicon transistors and even approaches the performance of state-of-the-art oxide thin-film transistors. Furthermore, the technology can be manufactured at room temperatures as opposed to the extreme temperatures required for silicon transistors. Since paper is a lighter weight, lower-cost substrate than silicon, Paper-e opens the way for inexpensive, or even disposable and biodegradable paper displays, smart labels, RFID technology, logic circuits with and without memory effects, and disposable non-volatile memory circuits.

The University: UNL

The UNL Technology Transfer Office's (TTO) overall mission focuses on the promotion of multidisciplinary research, and active analysis of university research activities in order to support their protection, development, and licensing. UNL staff attended nine UTEN-sponsored conferences and workshops. Staff member Dina Chaves received a two-month internship at the IC² Institute in Austin, Texas, in which she worked directly with UTEN to actively assess and identify potential business opportunities for an award-winning UNL technology.

Training Methodology

UTEN Austin conducted an initial RapidScreen and a MarketLook of the technology in early Spring 2009. Contact was made with 43 commercial and academic organizations with potential vested interest in flexible or organic transistors. In-depth interviews focusing on the commercial potential of the innovation were conducted with 13 industry experts. Findings were positive yet inconclusive given the complexity and far-reaching applicability of the Paper-e innovation as a platform technology. However, MarketLook documentation and primary research highlighted three primary focus areas for further investigation: RFID markets, flexible electronics, and solar applications. It was recommended that further investigation into each of these verticals be conducted.

In order to better focus future commercialization efforts, it was determined that the first to be more thoroughly evaluated would be the RFID market. Over the course of her two month intensive internship at the IC² Institute, Dina—working with a program manager from UTEN Austin—contacted U.S.-based industry experts and developed a focused MarketLook for Paper-e technology centered on RFID markets. Dina was immersed in RapidScreen and MarketLook assessment training methodologies as she explored Paper-e's commercial viability for U.S. markets.

Assessment Findings and Deliverables

Assessment results were generally positive, with all experts agreeing that Paper-e was a potentially transformative technology. One of the largest barriers to communicating commercial potential effectively with industry was the relatively high technology status of the innovation. Based on feedback from the director of the Austin Technology Incubator's wireless division, considerable time was spent on developing a clear and concise technology description in order to better approach RFID markets.

Dina utilized methods learned from her IC² Institute training to develop a targeted list of U.S.-based senior industry representatives in the RFID market. She contacted Texas Instruments, 3M, IBM, and RFID Saw. In all, the Paper-e technology and related information was distributed to 20 senior level industry representatives. With support provided by Heath Naquin, Dina conducted many primary research interviews. Accordingly, Dina was well-versed in networking tactics related to approaching U.S.-based industry and was able to effectively communicate highly technical concepts to U.S. industry contacts.

Texas Instruments proved to be the most promising partner for further pursuing the technology, including the inclusion of Paper-e in TI's Kilby Labs Innovation Center for further development. The University of Texas at Dallas is also interested in pursuing a potential research partnership related to organic semiconductor research at its independent research foundry.

Training Lessons

1. Follow-up is key: Effectively commercializing technology is a lengthy process and consistent and considerable follow-up with key industry contacts must be maintained.

2. Lack of answers is also an "answer": It was often difficult to get the information required, even though it was only

through executing the process that it became clear what information was needed. Lack of answers is an important (almost always negative) indicator.

3. Research partnerships can cause delays: While cooperative research is always interesting, waiting for a research partnership to form and progress can lead to significant delays in commercialization activities.

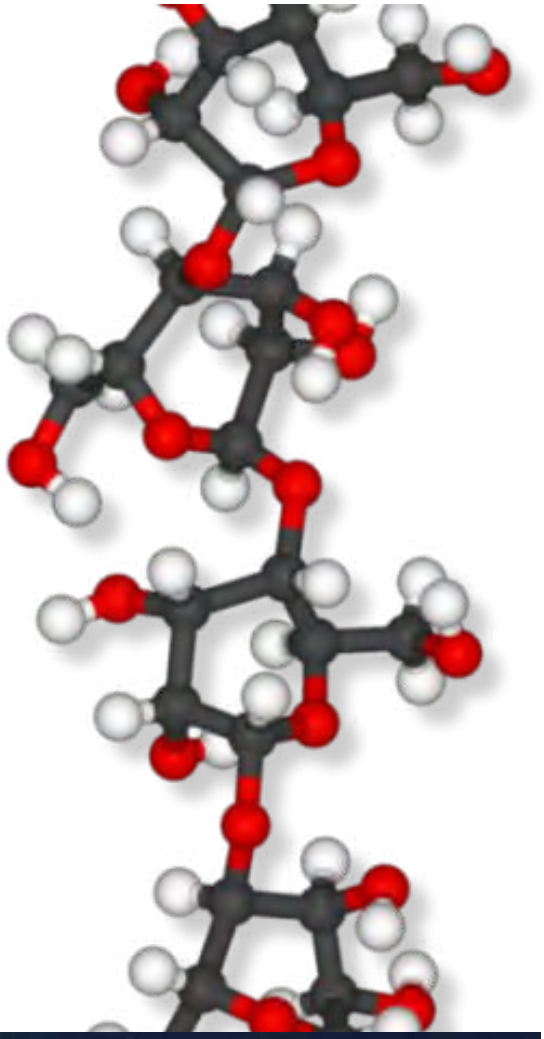
4. Silence is a warning; be cautious of creeping delays: A creeping delay can indicate a lack of full disclosure and withholding of important information.

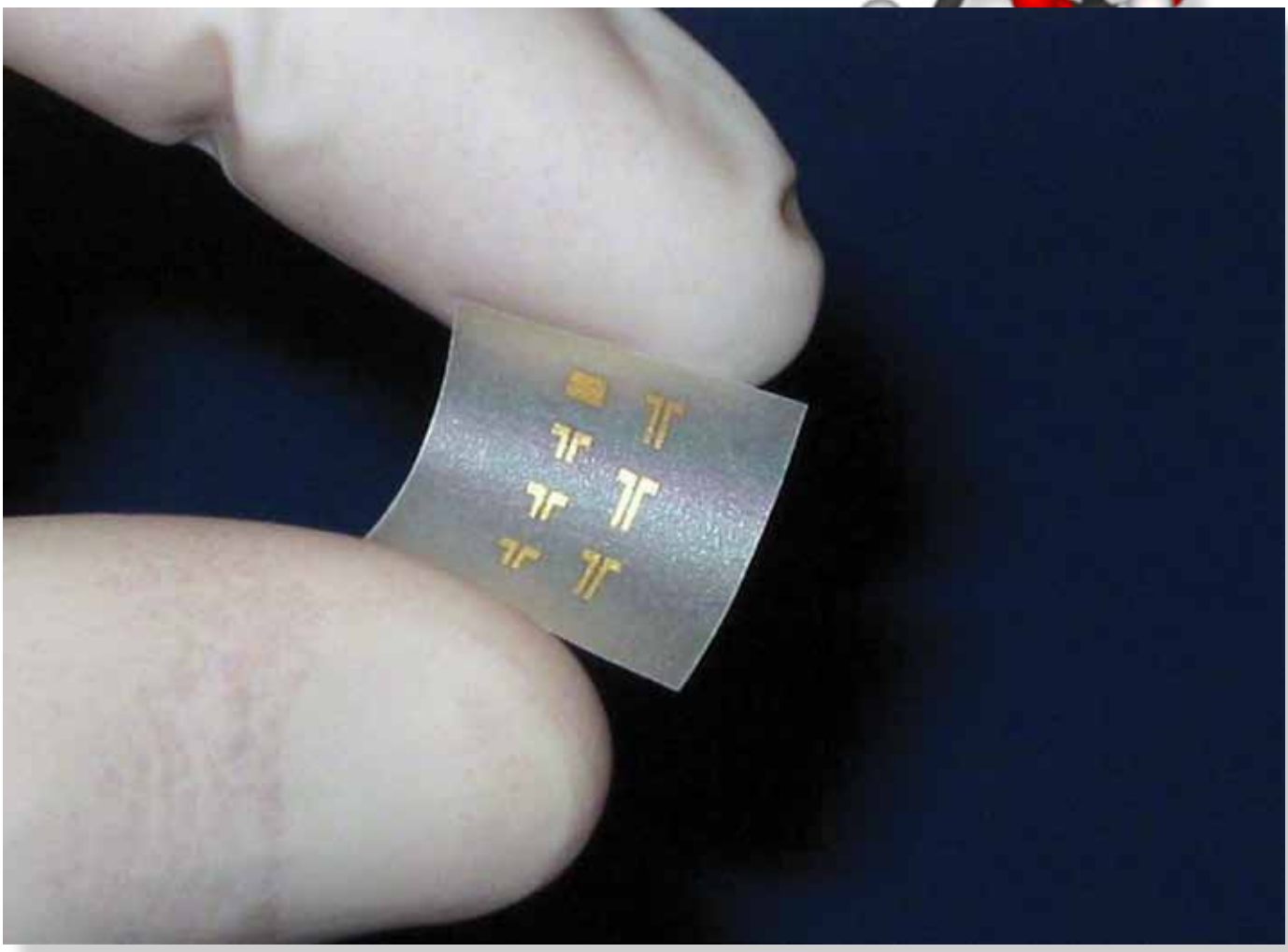
5. Industry is approachable: Given an effective technology description, U.S. industry is generally open to collaboration.

Impact on TTO Practices

As a result of this technology-based training exercise, Dina Chaves has recommended two main changes to the technology transfer processes at UNL:

- *Development of public technology descriptions with inventors:* UNL has started working with researchers to create public descriptions of their technologies, both for promotion and also to help researchers engage in the issues required for successful commercialization.
- *Incorporation of broad market review into standard processes:* UNL is conducting rapid market surveys to get broad market perspective on technologies instead of mainly relying on one industry's opinion of the technology's potential.





Intern Technology Assessment Case Study, Carla Mascarenhas

• New Agglomerate: Wood Fibers

University of Trás-os-Montes e Alto Douro (UTAD)

Particleboard from Wood Fibers (New Agglomerate)

New Agglomerate: Wood Fibers is a UTAD technology developed under the leadership of João Claro. The technology is contained in two patents that have entered the national phase of the PCT patent process.[1] New Agglomerate uses a process of manufacturing particleboard from raw wood sources such as pine, eucalyptus, and even sawdust. The technology addresses a major environmental concern by avoiding use of formaldehyde in the manufacturing process. While its use of di-isocyanate is not unique, the technology process has added two additional chemicals which address shortcomings of di-isocyanate in the market.

The UTAD TTO

The UTAD Technology Transfer Office's (TTO) overall mission focuses on the promotion of multidisciplinary research, and active analysis of research activities carried out within University of Trás-os-Montes and Alto Douro, in order to support their protection, development, and licensing. UTAD enhances knowledge, encourages innovation and, most importantly, promotes the university's liaison with industry to create an environment of cooperation between the University and private enterprise. UTAD is staffed by two full-time employees. The office organizes itself by patenting, licensing, and grant submission. The TTO has 35 patented technologies, and a portfolio of nine technologies being promoted by the university. UTAD staff have attended nine UTEN-sponsored conferences and workshops. Staff member Carla Mascarenhas did a two-month internship with UTEN Austin's partner, South Texas Technology Management (STTM) in San Antonio, Texas, which included working with Cliff Zintgraff, UTEN program manager to perform technology RapidScreen and MarketLook analyses of New Agglomerate.

Assessment Findings and Deliverables

RapidScreen assessment results were generally positive, characterizing a good infrastructure to support commercialization efforts. The major "critical" finding regarded a previous contract with a major industry player whose terms had impacted many ongoing commercialization decisions.

The MarketLook quickly exposed the voice of the market, and to a significant extent, the response was a testament to the relevance of the new agglomerate technology to current regulatory concerns regarding formaldehyde. But the process also enabled assessment results, as four introductory e-mails with a market-based technology description led to three phone interviews with a major wood projects manufacturer, the Director of Certification for a large association, and a prolific industry journalist. The keys to this success included:

- Insightful Internet research to identify key issues and targets
- An attention grabbing introduction and technology description
- Relevance in the eyes of the market players

These interviews resulted in email exchange that laid out in great detail how the market would assess the technology and which characteristics of the technology matter most. This knowledge inspired the creation of a competitive matrix and identified for the TTO and inventor the areas that required focus to achieve successful commercialization. Following is an excerpt from the email content, with specific numbers removed and paraphrases included for readability:

> *I have looked over the information and I have asked our resident chemist to look it over, too. Basically, the inventor proposes to use a di-isocyanate to make an adhesive for composite wood panels. One of the slides shows addition rates of* x – y%. *pMDI adhesives are used in the MDF industry today at addition rates between* x *and* y%. *Currently, the adhesive cost in a composite wood panel is about* $x – $y *per thousand square feet on a 3/4 basis for urea formaldehyde resins depending on addition rates. This typically represents x – y% of the total cost of the product. The adhesive cost for non-formaldehyde emitting adhesives that are on the market today is between* $x *and* $y *per thousand square feet on a ¾ basis. So you can see that this is a significant cost increase. This higher cost has limited the growth of these products although regulatory pressures and evolving technology is changing that. The inventor's product needs to show a distinct cost advantage over what's already out there.*

Training Lessons

Primary training takeaways were as follows:

- *TTO impressions about promising technologies do not always match market perceptions:* In this process (considering all technologies reviewed), market

1. In PCT: This means the patent is granted in one country – in this case, Portugal—and is therefore considered provisional in other countries who are signatory to the Patent Cooperation Treaty and listed on the patent application. As provisional, the approval date in Portugal will be the effective date in other countries that grant the patent, and the Portuguese patent affects positively the potential in other countries.

feedback did not always match the TTO's initial perceptions about which technologies have the most promise in the market.

- *Lack of answers is also an "answer":* It was often difficult to get the information required, and sometimes, it was only through executing the process that it became clear what information was needed. Lack of answers is an important (almost always negative) indicator.
- *The good and bad of industry cooperation:* The positive tactic of industry cooperation later became a difficult issue in the project as creeping delays slowed forward progress. In this case, a creeping delay indicated a lack of full disclosure and withholding of important information by the industry partner.
- S*ilence is a warning*: The challenges were difficult to recognize until the process surfaced the evidence. In the words of a member of the TTO staff, "We spent too much precious time waiting for results and answers from a partner."
- *Publish your claims and then check assumptions*: An EU regulatory requirement that had become "gospel" with the team could not be confirmed. This was discovered because claims of the inventor and team were included in the technology description and were questioned by an expert informant.

Impact on TTO Practices

As a result of this technology-based training exercise, the UTAD TTO is making these changes to its technology transfer processes:

- *Development of public technology descriptions with inventors:* UTAD has started working with researchers to create public descriptions of their technologies, both for promotion, and also to help researchers engage in the issues required for successful commercialization.
- *Incorporation of broad market review into standard processes:* UTAD will conduct more rapid surveys of the market to get broad market perspective on a technology, and will avoid relying on one industry opinion of a technology's potential.
- *Aggressive marketing before patenting:* The process of marketing and market research will occur before applying for patents; in essence, UTAD will begin the search for potential buyers at the very beginning of the process.
- *Consideration of time limits in contracts and processes:* UTAD will specifically incorporate procedures and contract terms to avoid unnecessary delays and to motivate forward movement of the technology commercialization process.

Intern Technology Assessment Case Study, Alexandra Marques

• Solefish Food: aquaculture fish food additive to increase growth

Universidade do Algarve (UAlg) and CCMAR

Additive for Solefish Food

Additive for Solefish Food is a technology developed by Adelino Canário's CCMAR research group at the University of Algarve. In aquaculture, a main objective is to achieve fast and healthy growth of fish. However, some species, due to characteristics of texture, taste or smell of food, or other reasons not known, have difficulties ingesting food in the quantities required for their physiological needs and growth. Fish food manufacturers use various additives to artificially stimulate growth, but these additives are not fully effective and (despite creating minimal environmental impact) create questions about food safety in the minds of consumers and add significant cost to the price of fish food.

Solefish Food technology is an additive that contains amino acids that are present in the natural prey of solefish. In minute quantities it stimulates fish to search for food and eat more of the food required for fast growth without artificial stimulants. The additive is effective for solefish but may also have similar effects for other carnivorous fish and invertebrates in cultivation such as decapod crustaceans or cephalopod molluscs. Studies have shown that solefish in particular has a high olfactory sensitivity to a particular amino acid present in its preferred natural prey.

Algarve Regional Centre for Innovation (CRIA)

The University of Algarve Technology Transfer Office (TTO) reports to the Vice Rector for Research and Scientific Extension. The office's overall mission is the promotion and support of entrepreneurship, technology transfer, and intellectual property. It has ten full-time employees, and organizes itself along key functions: entrepreneurship, knowledge and technology transfer, intellectual property, incubation facilities, and general studies. The TTO has 35 patented technologies and a portfolio of 50 technologies being promoted by the university. UAlg staff attended six UTEN-sponsored conferences and workshops. Three staff members went through the UTEN internship program, with intern hosts including UTEN Austin partner South Texas Technology Management (STTM) in San Antonio, Texas; Carnegie Mellon University, and Cambridge Enterprise.

Assessment Findings and Deliverables

Alexandra Marques performed both a RapidScreen and a Market-Look assessment of Additive for Solefish Food working with Cliff Zintgraff, a program manager from UTEN Austin. The RapidScreen indicated a technology that has promise, but is some distance from commercialization. Solefish Food has a provisional patent, but no office actions returned from the patent office. Lab quantities of food additive have been created and tested, but field test quantities have not been generated. There is also a need to collect and file paperwork that documents the agreement between the institutions involved in the original research. Initial market research indicates significant interest in additives that can help fish grow faster, including interest in partnerships. RapidScreen results can be summarized as follows:

- *Highest-rated:* Inventor engagement, institution staff size and commitment
- *Lowest-rated:* Development status, ownership status (could improve with clarification), intellectual property
- *Other:* Significant interest from market during interviews.

Note: Lower ratings highlight areas that require focus, not necessarily factors that will stop commercialization.

The MarketLook located a researcher from Mississippi State University who was generally familiar with the field and gladly shared contacts for researchers working with flounder, a fish similar to solefish. Four interviews indicated that the speed and size of fish growth is a significant issue in the industry, and that additives are believed to be a possible solution to the problem, and in fact, additives are already used, but to improve diet, not to stimulate eating more food. Carnivores are most expensive to feed, which makes this technology, which uses amino acids from the fish's natural prey, more interesting.

UTEN obtained significantly different feedback from those one-degree removed from the deep experts. General experts in fish aquaculture rapidly saw the promise in the technology and offered almost immediately to collaborate, raising detailed technical questions about how the additive would be provided, and the depth and length of testing required. However, fish nutritionists—as deep experts—immediately began asking questions about the "amino acid profile," talked about the complexities of creating a balanced dietary profile, and also discussed "feed-grade amino acids" already available at the "local feed store."

Because the patent is not yet published, it was not possible to establish differentiation between the amino acids of this technology and those in feed-grade offerings. Even an increase of five dollars-per-ton in costs would be viewed as significant in the industry. Finally, this effort helped crystallize the complementary but different benefits of "better diets" and "eating more of the same, good diet."

The benefit of this technology is the latter, not the former. As is often the case, contact with the market forced UTAD to update the technology description and sharpen the message. The MarketLook effort also highlighted for the review team the need to include fish nutritionists in the effort, and stimulated the idea of looking for nutritionists in Portugal to advise the commercialization effort.

Training Lessons

RapidScreen

- *A good technology description and good Internet research can lead to strong initial primary interviews.* The first interview was two degrees ("hops") from a deep expert in the field.
- *Corollary—university researchers make good first interviewees.* They are willing to talk and share and can inform one about industry possibilities.
- *Complex ownership arrangements involving multiple institutions should be documented in writing and readily accessible.*
- There is a difference between the end-user technology and the underlying patent. It is more difficult to assess patents when the exact technology being patented is not yet published.

MarketLook

- *Good interviews can help rapidly determine whether a market exists or not.* We knew within three calls that there is no solefish industry in the U.S. However, we did learn of several producers of flounder that might find the additive of value.
- *Opinions can change radically with just one hop in the value chain.* Aquaculture managers and fish behavior researchers immediately saw the potential value in the technology. Fish nutritionists saw the potential problems. (We believe it remains to be seen whether nutritionists are catching problems or missing the point of the opportunity—eating more, as opposed to better diet.)
- *The MarketLook process created two opportunities for collaboration,* a confirmation that an assessment-oriented (as opposed to sales-oriented) process can lead to collaboration opportunities.

Impact on TTO Practices

As a result of this UTEN training, Algarve Regional Center for Innovation (CRIA)is implementing the following procedures in its operations:

- *Technology ranking and stages:* CRIA is implementing a process to rank technologies and identify their stage of development. This process will be used to identify appropriate next steps for priority technologies.
- *Central collection of analysis data:* Processes will be defined such that technology analysis results will be included in the central collection of analysis data, for efficient execution of processes.
- C*larify needs of research and industrial markets around UAlg technologies:* UAlg will apply processes that rapidly expose the market interest in UAlg technologies, working to see the technologies from the market's perspective. The goal of the process is to see all options for a technology and develop alternative applications that may go beyond the researcher's initial expectations and intent.
- *Identify specific potential collaborations:* Beyond overall market understanding, processes will be defined to identify and pursue specific licensing and other opportunities for UAlg technologies.
- *Implementation of UTEN tools:* The RapidScreen and MarketLook tools will be included as appropriate in TT processes, consistent with the overall needs of the office.

Technology Transfer Office Case Study

• TecMinho In-Situ Pilot Training

Universidade do Minho (UMinho)

In-Situation in Practice

Based on an increased awareness of the challenges of transferring extensive know-how back to Portuguese TTOs, the first UTEN in-situation training was piloted as a one-week program at TecMinho in September of 2009. A detailed schedule of meetings and project planning sessions was produced in advance to get direct input for TecMinho staff as well as to familiarize the office as a whole on UTEN trainings and competencies. Heath Naquin worked directly with Pedro Silva and Eduarda Silva over the course of one week and interfaced with other staff in the office as necessary and appropriate. The scheduled breakdown of training session was as follows:

- Day 1: Meeting with TecMinho departments/ planning sessions
- Day 2: Clearing the TecMinho IP portfolio working session/Analysis of TTO technology intake process
- Day 3: Working session dedicated to designing and developing an updated technology intake process and creation of associated forms and support materials
- Day 4: Project management integration of materials and process, IP integration strategy session
- Day 5: New TTO process for intake, evaluation, and assessment presented to management.

TecMinho

Founded in 1990, TecMinho is a private, non-profit association, sponsored by the University of Minho and the Association of Municipalities of Vale do Ave. Its basic mission is to be an interface to society for the University of Minho, especially in the areas of science and technology, and contributing to regional development. TecMinho focuses on the following core functions:

- Promotion of innovation and development of new technologies/products/processes and their transfer to businesses
- Promotion of continuous training activities (including e-learning), organizational development, and transnational mobility of human resources
- Support to the creation of enterprises, with emphasis on academic spin-offs
- Kick-start projects of research/development, as well as guidance in implementation.

TecMinho has been heavily involved in UTEN activities since 2007. UMinho staff have participated in intensive on-site training and extended internship programs, and conducted technology assessments under the mentorship of UTEN and The University of Texas at Austin Office of Technology Commercialization (OTC). At the time of the In Situ training, Pedro Silva, TecMinho licensing manager, had completed a two-month internship at the OTC in Austin, Texas, working directly with OTC and UTEN staff. Pedro's internship focused on developing skill sets needed to restructure TecMinho TT processes including:

- Setting up a structured industry liaison program
- Getting valuable insights on proof-of-concept/ prototype development strategies /programs/funds/ agreements
- Pursuing commercialization routes for the most relevant technologies of the University of Minho in strict collaboration with UTEN personnel, consultants and hosts
- Acquisition of substantial know-how and skills during marketing and negotiation processes
- Identification of suitable strategies, tactics, methodologies, tools, procedures, and practices
- Early-stage technology scouting, screening and evaluation, market assessment, and validation
- Technology marketing, negotiation, and licensing.

Needs identification

It was determined that while Pedro's knowledge gain was considerable as a result of UTEN training, it was difficult for him to implement at TecMinho all the practices he had learned through training and experience. Accordingly, it was felt that the needed knowledge transfer could be completed best through an intense period of on-site assistance and work with the TecMinho staff. In this regard, Heath Naquin worked closely with TecMinho Director Marta Catarino and Pedro to identify skill gaps of the office at large related to technology transfer and in-office operations. Key areas of focus for training, in addition to technology marketing and licensing were to include: project management, IT interface, support tools, invention disclosures, and marketing of the TTO.

Created materials

Over the course of the in-situation training, Pedro Silva, Heath Naquin, and Eduarda Silva created key materials for use within the TecMinho ecosystem by drawing upon UTEN best practices training combined with the institutional reality of TecMinho. These materials included:

- Business analysis guidelines
- Secondary research documentation

- Inventor agreement forms
- Updated inventor disclosure forms
- Market Analysis questionnaire for staff
- Updated processes for TecMinho.

The created items and associated processes are being integrated into TecMinho's operations for determination of effectiveness and improvement over existing processes.

Key lessons learned

Over the course of the In-Situation Training, several key lessons were learned related to the actual implementation of technology transfer best practices within a TTO.

- *Learning is not doing:* As with any training, at a certain point the learning and knowledge must be transferred into implementation. This is readily apparent in the TTO context of universities. TecMinho benefitted from ensuring that personnel take the next step to actually implement UTEN learning within the organization and top down support of this seems to be a requirement for success.
- *Best practices aren't always for the best:* Best Practices in the context of TTOs can more accurately be termed "Good Operating Principles." Given the unique context and nature of nearly every TTO worldwide, with the notable exception of IP strategy and protection procedures, TTO Best Practices collections are generally reduced to guidelines that form the basis for individual office best practices development. It is important to realize that while "best practice" content is important, each office must make a concerted effort to incorporate and develop this information to be most useful within their own context.
- *Staff time is precious*: As was mentioned by TecMinho's Director, Marta Catarino, "Every hour of training and discussion with our technology transfer staff is an hour taken away from marketing our technologies to the world." In any technology transfer related training, it is important to realize this fact and ensure that material being provided is focused on directly impacting staff effectiveness on their primary job of transferring technology.
- *Physical presence:* As with any complex knowledge transfer engagement, physical proximity is required. Despite the advent of state-of-the-art technology for video conferencing and collaboration, there is currently no feasible way to recreate the context of the entire TTO setting virtually. Interoffice dynamics are incredibly important to the successful implementation of TTO guidelines. Without the placement of a knowledgeable change agent within a TTO for an extended period of time, it is difficult (if not impossible) to achieve the knowledge-based process engineering within a TTO.

TecMinho's In Situation training was followed by Marta Catarino receiving manager-level training in Austin; and Pedro Silva pursuing a second internship in Texas in summer of 2010.

Technology Transfer Office Case Study

• UNL, In-Situ Pilot Training

New University of Lisbon

In-Situation in Practice

Cliff Zintgraff and Dina Chaves worked together to benchmark the UT Austin OTC and other OTC web sites, to help develop a specification for developing the UNL TTO office web site which was seen as an essential tool for outreach and education about the office mission and value of commercialization, solicitation of disclosures, and interface with the various customers of the office. Perhaps most importantly, developing the web site created a challenge to cast the vision of the office and how it will interface with different university-based regions.

An important issue for TTOs is receiving disclosures from inventors. For a small office, with a staff of one, it is important for these disclosures to permit needed analysis and efforts, and also to be user-friendly so as not to impose an administrative burden. A form that is too simple would likely encourage less serious disclosures. A form that is too complex would create an unmanageable administrative burden. During in-situ training, UNL reviewed the disclosure process of the UT Austin Office of Technology Commercialization and other selected universities, and created a disclosure form that meets the office's needs. The form appears in the full case study on the UTEN website, http://utenportugal.org.

A larger goal was to map the overall TT process from disclosure to patent decision and beyond, and to incorporate UTEN training and tools deemed appropriate for the FCT/UNL commercialization process.

FCT/UNL

The New University of Lisbon includes faculty campuses in the metropolitan Lisbon area and in the Almada region, including Caparica. The campus for the Faculty of Science and Technology, FCT/UNL, is in Caparica, directly opposite Lisbon across the Rio Tejo. Founded in 1977, FCT/UNL has an enrollment of about 7,500 students, with nearly 1,400 graduate students (MSc and PhD). Since its foundation, FCT/UNL has given priority to the promotion of research in its areas of activity, hosting 16 research centers.

FCT/UNL keeps close links with many Portuguese and international universities with regard to the exchange of academic staff and students, as well as collaboration within research projects. FCT/UNL has about 500 academic and research staff (320 PhD holders) and 220 administrative staff. It has fourteen departments/sectors and eight support services. The Technology Transfer Office's overall mission is to turn ideas into assets through the commercialization of technologies, and through market-based technology assessment, along with active industry promotion of selected promising technologies. The TTO has 49 patented technologies.

TTO Coordinator Dina Chaves has attended ten UTEN-sponsored conferences and workshops, and two two-week UTEN training sessions in Austin, Texas. She completed a three-month U.S. internship at The University of Texas at Austin IC² Institute, focusing on market assessment and promotion of selected FCT/UNL technologies working with UTEN staff and UTEN partner institutions.

Needs Identification

It was determined that the primary need for the office was to create a systematic process from "disclosure to patent," and disseminate that and other important information to stakeholders via a web site. We adopted these detailed objectives:

1. Develop and outline the overall TT process with UTEN training elements programmed into the process.

2. Develop an FCT/UNL-appropriate disclosure form based on The University of Texas at Austin Office of Technology Commercialization disclosure form, identifying best practices while being sensitive to the status and staff size of the FCT/UNL TTO.

3. Develop a web site specification, based on benchmarks from UT Austin OTC and other web sites, that further sets the vision and process and also provides a faculty and department outreach tool.

4. Opportunistically advance FCT/UNL technologies and the TTO's market outreach capacity.

Created Materials

Over the course of the week long in-situation engagement, Dina Chaves created key materials for use within the FCT/UNL ecosystem by drawing upon UTEN best practices training combined with the institutional reality of FCT/UNL. These materials included:

- Disclosure form
- Web site specification and screen mock-up
- Patent-to-disclosure process

Key Lessons Learned

1. Web Site as Vision Cast and Integrator: Development of a web site drives and integrates a number of issues, forcing systemic thought about fit into the university mission, its clients, how to relate to clients, how technology review processes should be executed, how to communicate

policies to clients, and how to connect the TTO mission to the educational mission of the university. For a small office, this is a practical way to address these issues and simultaneously get real work done.

2. Where to Focus: Serve all, but focus on the most promising. The need for a small office to prioritize its efforts is in tension with the reality that all submitted technologies must be addressed in a meaningful way. This reality demands that processes exist for technology review that make efficient use of office resources and moves as quickly as possible to focus on those technologies with a realistic chance in the market.

3. Always Education: Because a university's core mission is education, every interface with clients is an opportunity to educate those clients. For the FCT/UNL TTO, every interface with faculty and researchers is an opportunity to compare and contrast academic pursuits with commercialization efforts, and to raise awareness of the requirements for successful commercialization. Students are both a resource for commercialization work and a target for workshops and knowledge sharing.

3.2 Connect-US Technology Transfer Cases

The case studies that follow were prepared by Portuguese interns Marlos Silva of UATEC, University of Aveiro and Pedro Silva, TecMinho, University of Minho, in conjunction with their second internships in Austin, Texas. Pursuing their second internships in the same location as their first allowed them to dig deeper with both mentors and industry contacts with whom they had already established foundational relationships and to further develop professional contacts in the region. The case studies that follow confirm the value-add for concentrating added internships in an identified location, to take previous international commercialization training to a deeper level.

Connect-US Technology Transfer Case

• Antimicrobial Coatings based on Ag-Ti

Technology Description

In this work different Ag-Ti (C, O, N) based thin films were prepared by reactive magnetron sputtering, obtained by changing gradually and systematically some deposition parameters such as: targets composition, applied electric current, and gas flow. Results demonstrated that these coatings presented good mechanical behavior, good adhesion, good tribological properties, promising corrosion properties, and do not present cytotoxicity. Moreover, due to silver nanoclusters incorporation and titanium presence, these coatings proved to inhibit fungal adhesion and biofilm formation, and also to avoid some bacterial colonization. The combined effects of these materials, gives the coating Ag-Ti-(C, N, O) its unique multifunctionality. Applications: biomedical devices, surfaces, food safety.

Connections Made in U.S.

- Proof-of-concept and testing requirements specs were obtained through contacts with Selenium, a U.S. company that develops antimicrobial coatings based on selenium
- The technology is being assessed by experts and companies in the field, including Managing Directors of Emergent's Portfolio Companies; companies developing antimicrobial coatings for biomedical applications; key contacts provided by Ray Atilano (UT Austin OTC), Mary Pat Moyer (INCELL, San Antonio, Texas), and managing directors of Emergent's (Austin, Texas) portfolio companies.
- Contacts are being established with different U.S. Universities to source expertise related to silver nanoparticles.
- Emergent portfolio company Aeonclad Coatings is in touch for collaboration on nanoparticle adhesion.
- Strategic IP analysis has been initiated.

Findings/Conclusions

- Specs for proof-of-concept were already sent for the research team. Main findings of testing requirements and protocols to be followed were also issued.
- Assessment of the technology is under way, but it is too early to report conclusions.
- Discussions are being held with faculties with consolidated expertise on silver nanoparticles.
- Information about Aeonclad coating process has been forwarded to the inventor.

Next Steps

- TecMinho is conducting additional due diligence to quantify the technology's market value. A preliminary assessment report will be concluded soon.
- Technical discussions will be held with experts on silver nanoparticles.
- Research team will start proof-of-concept works and testing of the technology according to requirements and protocols sent.
- IP strategy will be defined.

Connect-US Technology Transfer Case

• Antioxidants Sensor

Technology Description

A Portuguese University has developed a new analytical method for determination of the antioxidant (AO) activity of chemical species based on its reducing capacity. By means of a large scale electrochemical oxidative attack conducted at a fixed potential the action of a natural reactive oxygen species (ROS) is simulated without employing synthetic oxidants. The antioxidant capacity is evaluated by means of its oxidative response in potentio-static assays where the anode potential is adjusted according to the nature of the system under study, namely the identity of the relevant ROS and pH. Besides the improvement in reliability, the non-use of synthetic oxidants brings extra advantages related to the lower duration and cost of the assays.

Connections Made in U.S.

- Pedro was put in contact with VP of Testing for BASi, and international drug discovery and testing firm. Initial feedback on the potential interest of the technology was provided.
- The technology is being assessed by experts in the field, including managing directors of Emergent's portfolio companies; and key contacts provided by Ray Atilano (UT Austin OTC), Mary Pat Moyer (INCELL), and managing directors of Emergent's portfolio companies.
- Contacts are being established with different U.S. universities to find expertise for development of the technology, particularly in relation to the development of porous material.

Findings/Conclusions

While it appears that there is some interest in the technology, feedback obtained so far is not conclusive. Some known previous market approaches of antioxidants sensors were unsuccessful. Further work should be done to quantify the value of the innovation to potential licensees.

Next Steps

TecMinho is conducting additional due diligence to quantify the technology's market value is conducting additional due diligence to quantify the technology's market value.

Connect-US Technology Transfer Case

• Biodegradable Flexible Membrane

Technology Description

The Biodegradable Flexible Membrane Technology is a new concept of flexible biodegradable membranes, developed by TecMinho, University of Minho, Portugal. This technology may be used in a series of periodontal and orthopedic applications, aimed to direct the growth of new bone and soft tissue at sites having insufficient volumes or dimensions for proper function or to isolate bone defects. The periodontal and orthopedic applications apply to both humans and animals (dogs and horses).

Connections Made in U.S.

- Pedro Silva was connected with potential licensing candidates and entrepreneurial groups in the U.S.
- RapidScreen was completed with promising findings
- Market entry strategy was defined
- Strategic IP analysis was performed using Innography tool
- Strategic IP consulting with IP experts at Emergent
- Presentations were made to private equity groups including Emergent, Austin Ventures, and UT Austin OTC for potential pairing with portfolio companies/technologies.

Findings/Conclusions

There is potential market interest, but additional applications and in vitro testing should be explored. The U.S.-based entrepreneurial team's assessment of the technology states, "Our research indicates multiple potential markets, within a short time horizon, for biomaterial that can facilitate the regeneration of tissues in defined regions, by minimizing the effect of the pressure inflicted by surrounded soft tissues or preventing the penetration of conjunctive and epithelial tissue. To validate whether the Biodegradable Flexible Membrane is capable of performance in excess of the proof of concept presented in the Technology Status section, we advocate raising additional funds to pursue in vitro testing and further research to optimize production.

"We would advocate a more in-depth market analysis to further narrow our initial entry. We would refine our interviews to explore the specific circumstances our target audiences are, or will be, dealing with the FDA in the very near future, to initially best target the one of the four markets. To commercialize this technology we recommend:

- Raise $500,000
- Create comprehensive business plan
- Conduct more in-vivo and in vitro tests
- Explore production requirements
- In depth analysis of markets
- Solidify patent protection
- Optimize technology for one market segment

The veterinary market was chosen as the entry market. Strategic IP analysis resulted in good inputs for PCT National Phases selection and an understanding of similar products with tracked IP, as well as main companies active in the field with solid IP. Selected patents are being analyzed for possible claims rewriting.

Strategic IP consulting determined the main follow-on actions to be taken along the IP protection path. It has been concluded that the patent application should be specific to the veterinary market first and give raise to a family of patents.

Next Steps

Currently TecMinho and the U.S.-based entrepreneurial team are coordinating efforts for business development of the technology. A comprehensive business plan will be elaborated for the creation of a vehicle company to license the technology to a major company. Licensing negotiations with the team that will create the vehicle company are being held. IP strategy is being deployed and further due diligence is being pursued. Claims will be rewritten as the application enters the National Phases (Dec 2010). Technology bundling and joint commercialization activities will continue to be assessed with the UT Austin OTC.

Connect-US Technology Transfer Case

• Body Modeling Garment

Technology Description

A Portuguese University has developed a highly multi-functional and customizable body modeling garment making use of a combination of different active principles, fibers, textile structures and conventional production techniques. The resulting product is to be used to reduce the skin exceeding fat, known as cellulite, to fix body areas, such as chest, belly, arms and legs, recover some skin problems such as ageing, and prevent at a certain degree diseases related with deficient blood circulation, by compressing on some areas like the calf. It was specially developed for women, but it can also be used by men, with slight production modifications. The close-fitting product consists of a shirt and leggings that are attractively designed to be worn either an under garment, or as outer wear. It can also be used for fitness workouts, sports, as well as an everyday garment.

Connections Made in U.S.

- Contacts are being kept with U.S. companies that market body modeling products, to assess potential interest in the technology
- IP strategic and competitive landscape analysis is being carried on to determine the best IP protection strategy

Findings/Conclusions

There is considerable interest in this market as it is an emergent field, but competing companies and products are also getting to the market fast. IP protection turned into products seems to be low for the moment, but is gradually increasing. Further due diligence is needed to get a deeper picture of the market and IP space. Qualified feedback is still required.

Next Steps

TecMinho is conducting additional due diligence to quantify the technology's market value and define the appropriate protection and business development strategy. IP strategy will need to be defined until the end of the month, as provisional patent needs to be converted.

Connect-US Technology Transfer Case

• Braided Vascular Prosthesis

Technology Description

A Portuguese University has developed a new technology for production of a wide range of hybrid braided vascular prostheses, in which different diameters, mechanical properties, wall thicknesses, and permeabilities can be achieved, according to the blood vessel to be replaced. A unique combination between new fiber compositions and new braiding techniques has been devised, in order to overcome major problems that available vascular prosthesis show: non-uniform growth of endothelial cells around the prosthesis; drastic decreasing in permeability capacity after 3–5 years. A cost-effective manufacturing method has been obtained. The current state of the technology makes it especially suited for prostheses replacing blood vessels with diameters 6–8 mm, which are those that often present major problems with uniform growth of endothelial cells and permeability capacity. This technology can also be applied toward endo-vascular devices, i.e. grafts and stents.

Connections Made in U.S.

The technology was assessed by different experts in the cardiovascular market. Qualified insights were provided by experts in companies such as C. R. Bard, Vascutech and Monebo Technologies.

Findings/Conclusions

- The market is relatively small and innovation is slow.
- Large bore grafts do not have significant issues in regards to permeability and long-term integrity.
- Small bore grafts have had issues with patency mid- and long-term.
- A bio-degradable/reabsorbable strategy sounds good in theory, but every body reacts differently and the disease state is dynamic. If the prosthesis degrades prior to endothelialization, the product will leak.
- The clinical pathway to prove this technology will most likely be in patients where no native artery option exists, or proven technology is unavailable, which indicates a very long patient recruitment period. Also, the patient follow-up period would most likely be years, which would put the clinical trail period in the five- to eight-year time frame, followed by a three year regulatory approval cycle.
- Considering market size, need, and clinical and regulatory time, this does not appear to be of high interest.

Next Steps

After considerable assessment and marketing efforts, and now that the patent application is entering the PCT National Phases, it has been decided not to pursue further assessment and marketing efforts at this stage. Feedback on the veterinary market's potential interest is still awaited.

Connect-US Technology Transfer Case

• Ceramic Pigments

Technology Description

This technology is a process to produce mixed-metal-oxide inorganic pigments using industrial waste as raw materials. The industrial sludge can be a mix of the following metals: chromium, nickel, iron, copper, magnesium and zinc. Selected wastes might be used in the as received condition or after drying or calcination. This process comprises the following steps: (i) characterization and selection of wastes; (ii) their treatment, if required; (iii) formulation and dosing and mixing of components; (iv) drying and calcination; and (v) washing and milling. Next the sludge is mixed with alcohol and dried at 110 degrees Celsius in electronic oven. Afterwards the dried material is heated at a temperature below the melting point of the metals to removal any volatile waste. Finally the material is washed and milled into a fine powder.

Connections Made in U.S.

- The technology was presented to the Master of Science in Technology Commercialization (MSTC) 2010 class, and it was selected by one of the groups, the Team SOAR. Marlos was able to work actively with this group while they developed a MarketLook.
- Through the MarketLook results, Marlos was able to present the technology to selected companies and entities involved in the hazardous waste treatment in the State of Texas.

Findings/Conclusions

Based on market feedback, the technology itself has great potential in the treatment side however, the ceramic pigments are low-added products and the market presents several barriers.

Next Steps

Conversations with metal producers to engage licensing, regarding the treatment applications featured by the technology.

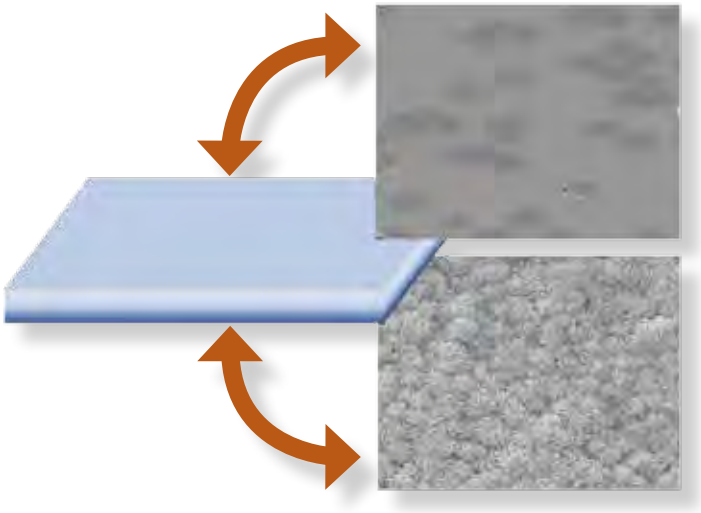
Connect-US Technology Transfer Case

• Combined bone implant

Technology Description

This technology is a combination of mechanical and chemical fixative to secure bone implants in high stress joints (i.e. knee, shoulder, hip). Currently the mechanical solutions (press-fit) reduce initial stability of implant and show lower capacity for load transfer. The chemical solutions (full cemented) result in bone destruction in cases of additional surgery and limit the lifetime of implant. The new implant concept presents the ability for contact/fixation with bone by two different interfaces simultaneously:

1. Bone-implant interface contact
2. Implant-cement-bone interface contact



Connections Made in U.S.

- Marlos was put in contact and presented this technology to various industrial links.
- Marlos was able to present the technology to two venture capital firms specializing in biomedical applications.
- Marlos was assisted in identifying partners for additional animal testing and FDA approval.

Findings/Conclusions

Based on commercial feedback, animal testing will be critical to commercial acceptance. It was found that this technology would indeed be classified as a Class 2 medical device and will need a U.S. presence in order to apply for approval.

Next Steps

Expand animal trials and testing and present findings to interested private equity and commercial parties identified.

Connect-US Technology Transfer Case

• Ecoticket

Technology Description

Ecoticket is an R&D company that aims to bring to the textile industry and to other industries focused on the consumer, such as cosmetics and detergents, the possibility of using more ecological processes for increasing quality. The technology focuses on the use of nanoparticles and other alternative ways to reduce waste of natural resources.

Connections Made in U.S.

- Ecoticket is being connected with possible U.S. industrial partners for co-development, licensing, joint venture of nearer-to-market technologies.
- Ecoticket is being connected with business development experts.
- Ecoticket is being connected with U.S. industrial partners to get proof-of-concept specs for pipeline applications of the technology.

Findings/Conclusions

- Discussions are being held with an U.S. company that supplies some of the U.S. and Canada largest hospital and hotel laundries, concerning a rechargeable antimicrobial product. Discussions are related with a complementary rechargeable antimicrobial containing peroxide nanoparticles developed by Ecoticket.
- Initial information about Ecoticket most promising developments is being sent out to business development people at U.S. textile corporations for initial assessment.

Next Steps

- NDA was signed with an interested U.S. company for deeper exchange of technical information
- Follow-up contacts with interested industry partners
- Obtain technical and proof-of-concept specs for pipeline applications and pipeline technology developments.

Connect-US Technology Transfer Case

• Ion-selective dry microelectrode of solid contact with production method

Technology Description

The technology is a new type of dry ion-selective micro-electrode. The electrodes or ion-selective microelectrodes (or ISE) are generally used in chemical analysis, to provide real time information about the presence of ions or other specific compounds in complex samples. This new microelectrode features a new ion selective membrane composition by changing your criteria of selectivity.

The invention relates to an ion-selective solid contact microelectrode with the length of the measuring point preferably but not limited to equal or less than 10 micron, particularly 0.5 - 10 micron, a method for producing such an electrode and use of an ion-selective solid contact microelectrode as a working electrode in different scanning measuring systems, such as SECM, SIET, MIFE and others, for measurements activity (concentration) of different ions in the modes of three-dimensional gradient scanning, plane two-dimensional scanning, vertical or horizontal profiling, one point measurements or any other point by point measurements over an active surface. For example, the present invention aims to substitute the glass-capillary microelectrodes used in localized measurements. The invention describes a needle-shaped rigid electrically-conductive substrate; an insulation layer, except in the tip of said substrate; an electrically-conductive layer; and a layer of ion-selective membrane.

Connections Made in U.S.

- Marlos was able to present and discuss the technology with potential licensees in U.S.
- Marlos was able to discuss the technology with a high-level subject matter expert in U.S.

Findings/Conclusions

Based on market and experts' feedback, while the technology is interesting, some doubts were raised regarding the small size of the microelectrodes in regard to current market application. On the other hand, microbiological applications, such as cell manipulation presents a possible target because these highly-sensitive membranes are easily destroyed by the use of larger electrodes.

Next Steps

Conversations with R&D partners to perform tests regarding cell manipulation.

Connect-US Technology Transfer Case

• Injectable dextrin/biomedical apps

Technology Description

Different formulations of oxidized dextrin hydrogels with adipic acid are being developed to include in polysaccharides, proteins, nanogels, osteogenic bioactive granules or cells in its formulations, for tissue regeneration and controlled release of bioactive agents. This invention aims at the development of injectable materials, with high biocompatibility, and degradable and excretal abilities, for uses in regenerative medicine as carrier of granulated materials and cells, or as a controlled release system of drugs, including therapeutic proteins. This invention is unique because it presents a hydrogel based on dextrin, which is obtained through simple, quick and inexpensive chemical processes, without requiring toxic initiators or catalyzers. These processes enable a flexible handling, injection and adjustment of hydrogels with mechanical and biocompatible properties that are adaptable to each application. These characteristics also enable an easy incorporation of bioactive ceramics, biomolecules, cells and dextrin nanogels. These latter confer the multidimensional composite material an enhanced versatility for its application as drug carrier and release of bioactive molecules.

Connections Made in U.S.

- New market opportunities are being explored with potential U.S. industrial partners for applications not covered by a current licensing deal.
- The technology has been selected by UT Austin OTC for analyzing bundling opportunities with a technology that is giving birth to a start-up.
- New developments related with ongoing research on nanogels and drug delivery systems of peptides are being briefed to potential U.S. partners.

Findings/Conclusions

Contacts are still at an exploratory phase, but it seems that there is potential for different collaboration opportunities.

Next Steps

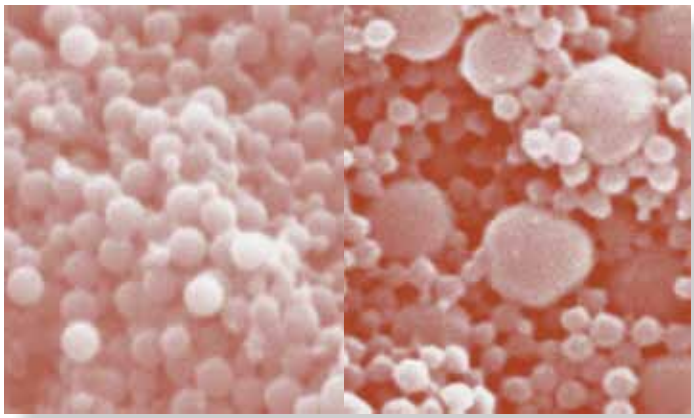
Further technical information is being discussed with U.S. partners. Discussions around different collaboration agreements are being initiated.

Connect-US Technology Transfer Case

• Medical Glues

Technology Description

A Portuguese University has developed an innovative production process of Cyanoacrylate monomers. The proposed technology allows producing high quality medical adhesives and drug delivery systems. This innovative process is cleaner, faster and simpler, thus the final product is obtained at a much lower cost. The University has proof-of-concept funds for the development of the industrial prototype and is looking for partners interested in co-developing and bringing this technology to the market.



Connections Made in U.S.

- Pedro was able to present this technology to various private equity and industry contacts, including: 3M, Baxter and Austin Ventures. The goal was to get specs for the efficacy studies to be conducted, in case of interest in the technology.
- Pedro was put in contact with the VP of Testing for BASi, and international drug discovery and testing firm, for getting further info on testing to be done in accordance with the FDA.
- Pedro was put in contact with an expert with vast experience in the development of similar technologies and related regulatory pathways
- Contact was made with the FDA regarding proper toxicology testing to be run.

Findings/Conclusions

It appears that in-vivo toxicity tests should be conducted in line with ISO standards which have mirrored standards with FDA. It was recommended to use a qualified CRO for these studies. Due to the overall cost of the studies and support for the whole process, the creation of a company to raise funds is being considered.

Next Steps

Preliminary toxicity steps will be conducted in Portugal to determine if more in-depth studies should be conducted and funded. Preliminary in-vivo studies will be conducted in accordance with internationally significant standards, to enable the possibility of attracting a corporation to continue the regulatory approval of the glues. Follow up contacts will be conducted with parties who have expressed interest post toxicity test completion (e.g. Baxter and 3M).

Connect-US Technology Transfer Case

• Metallic Mg Oxygen Diffusion Barrier

Technology Description

This technology consists of a method for producing electronic devices with an oxygen diffusion barrier, ultra-thin, with the composition of metal-Mg. The industry of electronic devices has among its biggest challenges the control of oxidation of metal electrodes. Manufacturers of electronic devices and/or MOSFET transistors (acronym for Metal Oxide Semiconductor Field Effect Transistor) are sought for the licensing agreement.

Connections Made in U.S.

- Marlos was put in contact and presented this technology to the Global Manager for Business Development at IBM.
- Marlos was able to present the technology to several private equity firms in the U.S. for potential investment/licensure.

Findings/Conclusions

Based on private equity and commercial interest there appears to be interest in the market regarding the technology.

Next Steps

- Further assess U.S. market for commercialization pathway.
- Continue to work with existing U.S. relationships to further promote the technology.

Connect-US Technology Transfer Case

• New Textiles

Technology Description

Next generation fabric and textiles focused on delivering therapeutic effects. New Textiles is a Portuguese R&D Company that has created a range of bio-functional clothing, the SKINTOSKIN brand, made for people with sensitive skin conditions, but equally appropriate for anyone who needs or appreciates maximum comfort close to the skin.

Connections Made in U.S.

- New Textiles is being connected with business consultants to help with the on-shoring process to the U.S. market. Discussions are being held for contracting consulting agreements.
- Initial regulatory and market-related due diligence is being conducted in the U.S.
- New Textiles is being connected with UT Austin OTC to analyze technology development and licensing opportunities.

Findings/Conclusions

Based on entrepreneurial, commercial and regulatory feedback from the U.S. market, it appears that the best path to early stage commercialization is the development of a solid go-to market strategy document and launch of a web presence in the U.S.

Next Steps

- Initiate a contract with American entity for definition of initial on-shoring strategy and plan.
- Identify and analyze new product development opportunities with U.S. technologies.
- Establish interaction and enter in collaboration with other U.S.-based entities.

Connect-US Technology Transfer Case

• Surgical System/Pectus Excavatum

Technology Description

A Portuguese innovative team has developed a novel strategy to customize orthopedic prosthesis for correction of Pectus Excavatum, a medical condition characterized by a depression deformity of the chest wall that occurs in 1 out of 1,000 live births. The most common surgical procedure is minimally invasive and consists of the placement of a stainless steel bar in the sub-sternal cavity through bilateral cutaneous incisions in the thoracic wall. This surgical system consists of three components: software that generates a computational model of the patient's chest based on a CT (Computerized Tomography) scan; a numerical method that calculates the appropriate bar size and shape; and a bending machine that is coupled to the computer and automatically bends the bar. The outcome of this system is a personalized prosthesis that uniformly distributes the support forces, attenuates pain, reduces surgery duration, and requires recovery and hospitalization of eight to five days. Further, the system offers the patient to view a model of the post-operative result before the surgical intervention.

Connections Made in U.S.

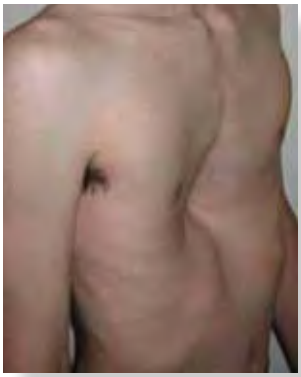
Pedro was able to present this technology to various private equity and industry contacts. The goal was to attract possible funding for the next phases of business development, including regulatory approval, marketing and distribution. The WBT Showcase in Arlington, Texas, has been selected as a good target for the funding needs of the technology. Through this event participating technologies are presented to over 100 seasoned venture investors and Fortune 500 licensing scouts representing a variety of industries, each supported by private funding, federal R&D grants or both.

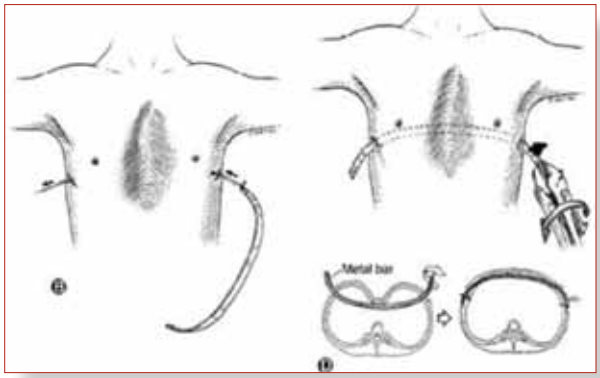
Findings/Conclusions

Contacts with private equity and industry contacts are still at a preliminary phase. It has been understood that the early application to WBT (due Sep 27) could maximize the chances of the technology to be selected for this event.

Next Steps

- Follow-up initial contacts established with potential investors in the technology.
- Start contacts with newly identified targets.
- Prepare and submit an early application to the WBT Showcase.





Connect-US Technology Transfer Case

• X-Ray Digital Imaging System

Technology Description

X-Ray Digital Imaging System is an advanced digital radiographic diagnosis system based on an innovative combination of Complementary Metal Oxide Semiconductor technology (CMOS) detectors, per-pixel readout electronics, wireless data transfer, and scintillators embedded in reflective layers, which form light guides. This system is particularly suitable for dental radiography and other medical radiography due to its excellent portability, high spatial resolution, increased sensitivity, significant reduction of the operational radiation dosage, and reduction of the production cost.

The invention refers to a radiation detector, which can be used in obtaining digital radiographic images. The detector is composed of two parts: a scintillator matrix embedded in walls manufactured from a reflector material, and a matrix of image elements (pixels), where each element is constituted by a photodetector and an analog to digital converter.

Connections Made in U.S.

- Pedro was able to present this technology to various private equity and industry contacts. The goal was to attract partners for the next phases of business development, including: 1. Joint development of prototype for dental imagery; 2. Regulatory approval; 3. Licensing, marketing and distribution; 4. Joint development of the technology for new applications
- Contacts initiated with Creatv MicroTech, a start-up specializing in micro-fabrication and bio-detection for the water, food, environmental, pharmaceutical and medical industries.

Findings/Conclusions

The multiple contacts established are still at an initial stage, so conclusions are currently not possible.

Next Steps

- Follow-up initial contacts established with potential partners.
- Start new contacts with other identified targets.
- Enter in deeper discussions for joint work with Creatv MicroTech.

Connect-US Technology Transfer Case

• WeAdapt

Technology Description

WeAdapt is a Portuguese R&D Company that develops and sells products resulting from ongoing research projects for people with special needs.

Connections Made in U.S.

- Company is being connected with business consultants to help defining a U.S. market entry strategy.
- An U.S. entrepreneurial team with proper business development and management skills is being sought for developing an U.S. subsidiary.
- Company is being connected with OTC to analyze technology development and licensing opportunities.

Findings/Conclusions

The company has great market potential, but needs to enroll in proper business development and marketing activities which the company is challenged to fund at this stage. An entrepreneurial management team needs to be recruited for starting a U.S.-based company to begin the necessary fund raising.

Next Steps

- Recruit U.S. entrepreneurial team.
- Identify and analyze new product development opportunities with U.S. technologies.

Special Note

The WeAdapt team won first place in the area of Products and Services in the MIT Portugal Innovation & Entrepreneurship initiative (MPP-IEI) international venture competition, held September 2010. See section 3.6 in this report for details on this win.

Connect-US Technology Transfer Case

• Yeast Strain for Bioethanol Production

Technology Description

The present invention differs from the state-of-the-art by allowing the yeast strain used for bioethanol production to flocculate. This could enhance the industrial process for bioethanol production by allowing the recycling of yeast by simple sedimentation for repeated batch fermentations. This novel yeast strain could also be used in a continuous fermentation system.

It involves the introduction of the flocculation ability into the industrial S. cerevisiae strain PE-2 that is widely used for bioethanol production in Brazil. The strain PE-2 is used by about 30% of the Brazilian distilleries, generating roughly 10% of the world's bioethanol supply.

Connections Made in U.S.

- Pedro was put in contact with an expert on biofuels that held important positions at Novozymes and Danesco.
- The technology was also presented to ATI portfolio company Austin Biofuels for assessment.
- Strategic IP analysis is being conducted.

Findings/Conclusions

While it appears that there is some interest in the technology, feedback obtained so far is not conclusive. It seems that this technology would have to undergo further development in order to be considered for adoption at an industrial scale.

Next Steps

- TecMinho is conducting additional due diligence to quantify the technology's market value.
- Strategic IP analysis needs to be concluded.
- Preliminary assessment report needs to be issued and forwarded to the research team.

3.3 A Survey of Technology Transfer Offices

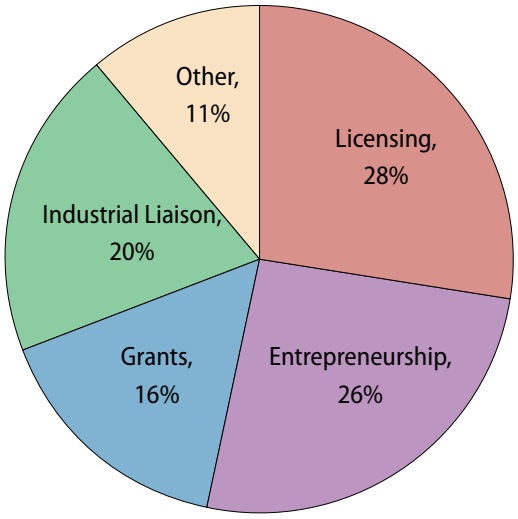
In 2010 the first annual UTEN network survey of technology transfer offices was conducted to obtain a more comprehensive view of technology transfer activities in Portugal. The survey results presented here are based on responses from eleven Portuguese technology transfer offices.[1] Key findings follow.

Organization and Budget[2]

Maturity of TTOs. Many of the TTOs have been established only recently. 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 one to nine per office. A total of 49 technical/professional employees work in the offices of the TTOs that responded. Across the responding TTOs, on average employees divide their time among several key functions, as shown below.

Primary Functions of TTO Employees
(Average for 11 TTOs)



Expenditures. Resources vary considerably across the TTOs. In 2009, expenditures ranged from approximately €50,000 at one TTO to more than €200,000 at other TTOs. The total resources expended in 2009 by the TTOs were approximately €2,652,000.[3]

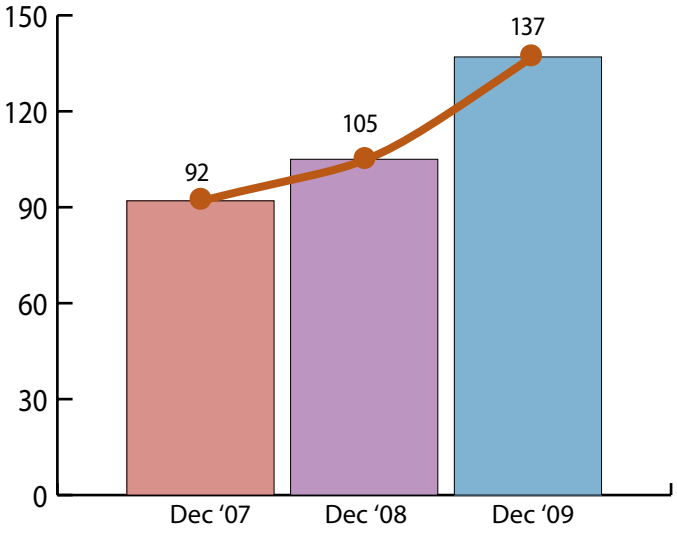
Sources of Revenues. As with expenditures, there is variation in the sources of revenues. In 2009, five of the eleven TTOs received no funding from their institutions, and three others received 25% or less of their revenues from their institutions.

Intellectual Property and Commercialization

Royalties. While the university receives 100% of royalties at two institutions, eight TTOs report that royalties are split between their institutions and the inventors in varying proportions, usually 50%-50% or 40%-60%. [4]

Invention Disclosures. There is a clear trend of increasing invention disclosures by the TTOs as shown in the figure below.

Invention Disclosures over the Past 3 Years



Licenses, Option Agreements, and Assignments. Nearly all of the licenses, agreements, and assignments have been executed with Portuguese partners. As shown below, the number has increased over the past three years.

	2007	*2008*	*2009*
Executed with Portuguese Partners	16	20	24
Executed with EU Partners	1	3	2
Executed with U.S. Partners	2	1	2
Executed with other int'l partners	0	0	0

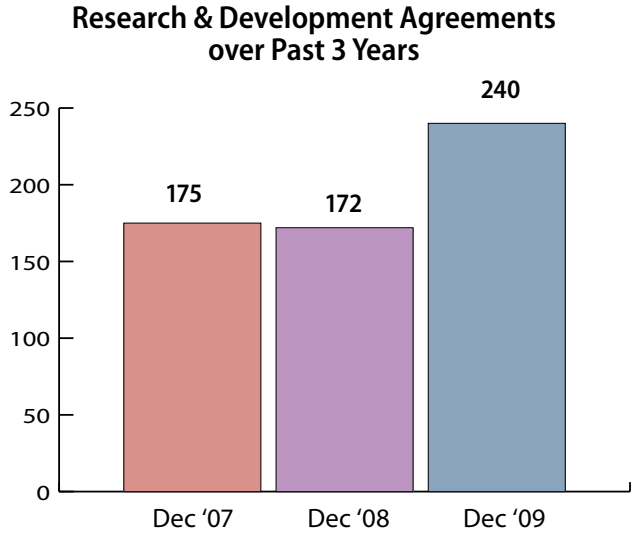
1 The two researchers with primary responsibility for the survey were Dr. James Jarrett of the IC² Institute and Dr. Aurora Castro Teixeira of the University of Porto. Additional significant contributions were made by Ana Paula Amorim and Maria José Francisco. A group of four senior technology transfer office professionals in Portugal reviewed a preliminary version of the survey questionnaire and made valuable suggestions. We wish to thank all of the technology transfer offices for their cooperation and effort in providing information.

2 Nineteen offices were contacted. Responses were received from 11 TTOs: New University of Lisbon, Technical University of Lisbon (ISA, INOVISA), University of Minho (TecMinho), University of Algarve, University of Aveiro, University of Coimbra (IPN), University of Coimbra, University of Evora, University of Lisbon, University of Porto, and University of Trás-os-Montes e Alto Douro.

3 One TTO stated its 2009 expenditures were not yet available.

4 One TTO reported the allocation was unavailable.

Research and Development Agreements. The TTOs reported they executed some 240 R&D agreements in 2009, up substantially from both of the prior years, as shown below.



3.4 Technology transfer and commercialization activities in Portugal: A quantitative overview[5]

Higher education organizations have extended activities beyond their primary tasks of education and research, into the area of commercialization of knowledge and business activity. To this purpose they have established a range of new institutions such as technology licensing offices, industry liaison offices, and science parks, as well as extensive incubation policies.

In recent years, there has been a rapid rise in commercialization of publicly-funded research at European universities. In Portugal this trend was particularly evident and was accompanied with the emergence and implementation of several national public policy initiatives involving international partners, most notably The University of Texas at Austin, Carnegie Mellon University, and Massachusetts Institute of Technology (MIT). Focusing predominantly on the commercialization and internationalization of Portuguese science and technology, the University Technology Enterprise Network (UTEN), part of the UT Austin program, includes Portuguese institutions with relevant activities of technology transfer and commercialization from universities, polytechnic institutes, associated R&D labs, university-linked incubators, and science parks.

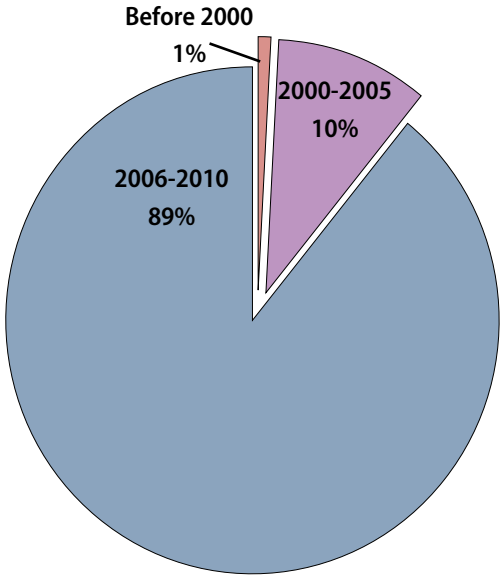
The present section provides a quantitative overview of the main activities performed by the Portuguese members of UTEN (excluding FCT and IPIN) in the five year period 2006-2010, categorized into three main areas: protocols, patents, and the formation and support of spin-off companies. [6]

From the target 28 UTEN Portuguese members, 17 (40%) participated in the survey. As evidence in table 4 the activity associated with spin-off formation emerges, in quantitative terms, as the most relevant activity.

The volume of spin-off creation is rather extraordinary even when compared to other European countries. For instance, in Spain, where the spin-off creation process experienced a major breakthrough after 2000, Morales-Gualdrón, et al. (2009) identified 459 academic spin-offs tied to 39 public universities and public research organizations (year of reference: 2007), which represents an average of 12 academic spin-offs per institution. This figure compares favorably with the Portuguese numbers presented here: the 17 organizations surveyed were responsible for supporting the creation of 154 spin-offs which represents an average of 9 academic spin-offs per institution. It is important to recall, however, that this Portuguese figure is quite underestimated, given that 3 out the 5 science parks and 3 out the 4 incubators of the UTEN did not participate in the study.

In the Portuguese case the formation of academic spin-offs seems to be also a quite recent phenomena. The bulk (136 or 89%) of academic spin-off tied to UTEN's organizations was created in the last five years (figure below).

Portuguese academic spin-offs created between 1996 and 2010 tied to UTEN's member organizations



5 This study was coordinated by Aurora Teixeira with the research assistance of Claúdia Moutinho Brandão, Inês Santos Silva, Mafalda Carmo, and Sara Fernandes. The research team sincerely and gratefully acknowledge all coordinators of the technology transfer and commercialization organizations who kindly spent part of their precious and scarce time responding to our requests and promptly answering our queries. Without their valuable and insightful collaboration this study would not be possible.

6 The data gathering process occurred into two phases. The first consisted in direct contacts with all Portuguese technology transfer and commercialization organizations which are members of UTEN, asking information regarding their technology transfer and commercialization activities in the last four years (2007-2010)— namely protocols established with large firms, patents and the formation and support of spin-offs. Then, in a second phase, based on the previous information about spin-offs, fifteen firms from distinct scientific and industry areas were selected as object of more detailed analyses. Such analyses aimed at uncovering their economic and employment potential, their internationalization paths, and their perception on the role of technology support infrastructures (e.g., technology transfer offices (TTOs), science parks, incubators) at the level of the Portuguese science and technology system.

Table 4. Technology transfer and commercialization activities of Portuguese UTEN members, 2006-'10

	Acronym	Name	Founded	Spin-offs	Patents	Protocols
University TTOs	TecMinho	TecMinho (includes OTIC-Minho and GAPI), Universidade do Minho	1990	25	35	-
	UPIN	UPIN, Universidade de Porto Inovação, Universidade de Porto	2004	3	9	16
	OTIC UC	OTIC UC, Oficina de Transferência de Tecnologia e de Conhecimento, Universidade da Coimbra	2003	5	26	-
	OTIC-GAPI UTAD	OTIC-GAPI UTAD, Oficina de Transf. de Inovação e Conhecimento & Gabinete de Apoio à Promoção da Propriedade Industrial, Univ. de Trás-os-montes e Alto Douro (UTAD)	2006	1	-	-
	UBIACTIVA	UBIACTIVA, Office of Technology and Knowledge Transfer, University of Beira Interior (UBI)	2006	4	-	-
	TECMU Madeira	OTIC-TeCMU - Oficina de Transferência de Tecnologia e Conhecimento, Universidade da Madeira	2009	1	-	-
	DPI Évora	DPI Évora, Divisão de Projectos Informação, Univ. de Évora		1	-	-
	GAPI Madeira	GAPI at Madeira Tecnopólo, Gabinete de Apoio à Promoção da Propriedade Industrial, Madeira Tecnopólo		1	-	2
	TT@IST	tt@ist - Transferência de Tecnologia do IST		4	-	-
	INDEG/ Audax	INDEG/AUDAX, Empreendedorismo e Empresas Familiares, Instituto Superior de Ciências do Trabalho e da Empresa (ISCTE)	2005	3	-	-
	INOVISA	INOVISA, Assoc. para Inov. e Desenv. Empresarial, Instituto Superior Agronomia, UTL	2006	5	-	-
	CRIA	CRIA - Centro Regional para a Inovação do Algarve	2007	21	3	3
University-linked Incubator	grupUNAVE Aveiro	Grupunave inovação e serviços, lda	1998	12	-	-
Associated R&D labs	INESC Porto	INESC Porto LA, Inst. de Eng. de Sistemas e Computadores do Porto	1985	7	-	-
	IMM	IMM, Instituto de Medicina Molecular, University of Lisbon Medical School	2004	2	4	-
Science parks	UPTEC	UPTEC, Associação de Transferência de Tecnologia da Asprela, University of Porto	2007	35*	-	-
	Parkurbis	Parkurbis, Science and Technology Park of Covilhã	2006	24	-	-
			Total	154**	77	21

* The most recent list of academic spin-offs of UPTEC (from September 2010) provides a significantly higher number of spin-offs; we opted nevertheless to consider as in the remaining cases, the number of spin-offs that by July 2010 were listed in the official web sites of the corresponding organizations and/or were provided until that date by the organizations.

** Of the total 154 spin-offs, 18 (12%) were created between 1996 and 2005.

From a regional economic perspective, such dynamics in spin-off processes and the fostering of growth of small firms, namely through incubation policies, is critical. Table 5 highlights that the process of academic spin-off creation has been particularly dynamic in the North and Centre regions, with these two regions encompassing over three-quarters of the academic spin-offs created in the period in analysis. In terms of industries, Portuguese academic spin-offs were created essentially in ICT/Software/Digital Media (42%) and Energy/Environment/Sustainability (23%). The North emerges more specialized in ICT/Software/Digital Media whereas the Algarve predominates in Energy/Environment/Sustainability.

An exhaustive list of all the 154 academic spin-offs is provided in Annexes A and B, with identification of the TTO/Incubator/Science Park they are associated with, the year of establishment, industry sector, and, when available, the location and spin-off source are also provided.

The activities related to patents and protocols with large firms—on the whole and by reference to the organizations surveyed—evidence more modest figures albeit revealing

promising paths for establishing linkages with the industry. Indeed, regarding protocols, the three (UPIN, GAPI Madeira and CRIA) out of the 17 respondent organizations that provided details on the protocols established with large firms reveal a quite selective and demanding industrial partners (e.g., Galp Energia, Alcatel – Lucent, Soares da Costa, Iberdrola, Qualitron) and other organizations (Fundação Gomes Teixeira, ADVID, APIMA, APICER), not only collaboration protocols, but also contracts for services provision by the TTO and exclusive license agreement for technology. Concerning patents, the volume of activity is reasonably sizeable but rather concentrated in two respondent technology transfer organizations—TecMinho and OTIC-UC—which are responsible for almost 80% of the patent activity listed.

Table 5. Technology transfer and commercialization activities of Portuguese UTEN's members, 2006-2010

NUTs II	Region	TTO	Number of Spin-offs	Agri/Food	Bio/Pharma	Energy/Environment /Sustainability	ICT/Software/Digital Media	Medical devices / Diagnostics	Microelectronics / Robotics	Other
North (#71; 46.1%)	Guimarães	TecMinho	25	3	1	6	12	2	1	0
	Porto	INESCPorto	7	0	0	1	3	0	3	0
	Porto	UPIN	3	1	1	1	0	0	0	0
	Porto	UPTEC	35	1	3	8	18	1	4	0
	Trás-os-Montes	OTIC-GAPI UTAD	1	1	0	0	0	0	0	0
Centre (#46; 29.9%)	Aveiro	grupUNAVE Aveiro	12	1	1	1	8	0	1	0
	Coimbra	OTIC-UC	5	3	0	0	2	0	0	0
	Covilhã	Parkurbis, Parque de Ciência e Tecnologia da Covilhã	24	0	0	5	15	0	2	2
	Covilhã	UBIACTIVA - Gabinete de Apoio a Projectos e Promoção da Investigação da UBI	4	0	0	0	3	0	1	0
	Évora	Uévora	1	1	0	0	0	0	0	0
Lisboa (#13; 8.4%)	Lisboa	INDEG	3	1	0	0	0	0	0	2
	Lisboa	INOVISA – Associação para a Inovação e o Desenvolvimento Empresarial	5	3	1	0	1	0	0	0
	Lisboa	Instituto de Medicina Molecular (IMM)	2	0	2	0	0	0	0	0
	Lisboa	TT@IST	4	0	0	1	1	2	0	0
Algarve (#21; 13.6%)	Algarve	CRIA - Centro Regional para Inovação do Algarve	21	4	0	11	2	1	1	2
Madeira (#2; 1.3%)	Madeira	Gapi Madeira	1	0	0	0	0	1	0	0
	Madeira	TECMU Madeira	1	0	0	1	0	0	0	0
		Total	**154**	**19**	**9**	**35**	**65**	**7**	**13**	**6**
		Percentage	*100%*	*12.3%*	*5.8%*	*22.7%*	*42.2%*	*4.5%*	*8.4%*	*3.9%*

Recent research suggests that science technology transfer organizations, and in particular, TTOs vary in their mandates and capabilities. Whereas, in general, licensing remains their primary activity, TTOs are also involved in negotiating multiparty research contracts, performing incubator services, and, to a larger extent in Portugal by comparison to other countries, actively investing in and managing university-based spin-offs.

This brief quantitative and exploratory study shows that in Portugal in the last five years the activities of technology transfer and commercialization of science and technology organizations observed a huge increase, with particular emphasis on spin-off creation. The diverse public initiatives aimed at fostering entrepreneurial attitudes and international business competitiveness of Portuguese science and technology, facilitating access to market opportunities worldwide (e.g., workshops and advanced international internships for TTO staff) explain, at least in part, such noticeable dynamism.

3.5 Portuguese Academic Spin-offs and the Role of Science and Technology Transfer Organizations[7]

In recent years, interest in academic spin-offs has increased.[8] Academic spin-offs 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.[9]

These companies, created to exploit the results of scientific research, are considered important by the argument that they contribute to the creation of employment and wealth, and local economic development, and also that they are key instruments for the transfer of knowledge developed in academia which is crucial for innovation.[10] Academic spin-offs, therefore, might be considered as tangible evidence of the implementation of entrepreneurship in universities. In the European case, the development of spin-offs is incipient, although there is a strong interest in their promotion and development.[11]

In the document "Europe 2020: A strategy for smart, sustainable and inclusive growth," the European Commission, under the flagship initiative Innovation Union,[12] claims the need to promote entrepreneurship by supporting young innovative companies. It is conveyed that the European countries need to do significantly more to both *increase quantity* of individuals prepared to become entrepreneurs and to *enhance the quality* of the businesses which these individuals establish. Significantly, such improvements should increase the number of "successful" new technology-based firms, including academic spin-offs which, in turn, would increase the number of entrepreneurial role models.

In this section we present a qualitative account of twelve case studies of Portuguese academic spin-offs.[13] We provide a brief characterization of their core business, main products/services supplied, economic and employment potential and degree of innovativeness and internationalization. We further analyze their perceptions regarding the support mechanisms for academic spin-offs and obstacles to the creation and development of academic spin-offs with an emphasis on the role of science and technology transfer organizations. In addition, detailed write-ups on each of these twelve companies follows Annexes A and B.

The selection criteria adopted here involved requirements of diversity concerning the industry, location, and science and technology organizational partners. The final sample of cases studies includes four companies from ICT/Software/Digital Media (Metatheke, Practical Way, Tecla Colorida and Inovmapping), two from Bio/Pharma (Technophage, Biodevices), two from Medical devices (Tomorrow Options, PETsys), two from Energy/Environment/Sustainability (MarSensing, Simbiente), one from Microelectronics (Selftech), and one from 'Other' industries (Science4you). Three of these firms are located in the North (Practical Way, Tecla Colorida, Tomorrow Options), three in Centre (Metatheke, Inovmapping, Biodevices), four in Lisbon (Technophage, PETsys, Selftech, Science4you), one in Algarve (MarSensing) and one in Braga and Azores (Simbiente). The majority of the firms were established in 2007 and 2008—with exception of Bio/Pharma companies which were established earlier (Technophage in 2005 and Biodevices in 2006), and two companies that were established more recently, in 2009 (Simbiente/Azores and Inovmapping). Ten out of the 17 science and technology transfer organizations surveyed are tied with the case studies in analysis.

Although some of the academic spin-offs registered noticeable dynamics (see table 6) both in sales (e.g., Metatheke; Practical Way) and employment (e.g., Biodevices; Science4you), in general, firms' businesses involve quite negligible turnover/sales volumes (no firm expects to surpass the threshold of 1 million euros in 2010) and employ a rather reduced number of collaborators (the employment figure of the selected case studies does not

7 This study was coordinated by Aurora Teixeira with the research assistance of Claúdia Moutinho Brandão and Inês Santos Silva. The research team is deeply indebted to the CEOs of the twelve academic spin-offs analyzed who kindly and patiently devoted part of their valuable time explaining the process of creation and development of their venture, and the role of science and technology organizations, namely TTOs, incubators and science parks, in this process. Their generous collaboration was critical in highlighting the main obstacles and potential solution avenues for improving the process of academic spin-off creation in Portugal.

8 Landry, E., Amara, N., & Rherrand, I. (2006). "Why are some university researchers more likely to create spin-offs than others? Evidence from Canadian universities." *Research Policy,* 35(10), 1599–1615.

9 Steffensen, M., Rogers, E.M., & Speakman, K. (1999). "Spin-offs from research centers at a research university." *Journal of Business Venturing,* 15: 93–111.

10 Shane, S. (2004). *Academic entrepreneurship: University Spinoffs and wealth creation*. Massachusetts: Edward Elgar.

11 Wright, M., Clarysse, B., Mustar, P., & Lockett, A. (2007). *Academic entrepreneurship in Europe*. United Kingdom: Edward Elgar.

12 EC (2010), Europe 2020. *A strategy for smart, sustainable and inclusive growth,* Brussels, 3.3.2010, COM(2010) 2020, in http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf, accessed July 15, 2010.

13 Fifteen academic spin-offs were contacted but three of these firms failed to provide the required information for the case studies. Whenever possible, face-to-face interviews were made and additional queries solved by email and telephone.

Table 6. Technology transfer and commercialization activities of Portuguese UTEN's members, 2006-2010

Industry	Spin-off (Year established)	Sales		Employment		Degree of Internationalization	Degree of Innovativeness
		Volume (2010)	Evolution (Δ genesis - 2010)	Volume (2010)	Evolution (Δ genesis - 2010)		
ICT	Inovmapping (2009)	*n/a*	*n/a*	○	○	○	●●
	Metatheke (2007)	●●	●●●●		●●●	●●	●●
	Practical Way (2008)	●	●●●●		●●●	○	●●
	Tecla Colorida (2009)	*n/a*	*n/a*	○	○	●	●●●
Bio/Pharma	Biodivices (2006)	*n/a*	*n/a*		●●●●	●●●	●●●
	Technopage (2005)	●●	●●●		●●●	●●	●●●●
Medical devices	PETsys (2008)	○	○	○	●		●●●●
	Tomorrow Options (2007)	○	○		●●●	●●●●	●●●
Energy	Marsensing (2007)	○	○	○	○	○	●●
	Simbiente (2004; 2009)	●	●●●		●●●	●	●●
Microelectronics	Selftech (2008)	○	●●●	○	○	○	●●●
Other	Science4you (2008)	●	●●●	○	●●●●	●●	●●

Legend: ○None/Very low; ●Low; ●●Medium; ●●●High; ●●●●Very high; n/a: not available.
Note: Author's construction based on the information gathered from interviews and case study materials.

overcome 14 collaborators, including founders, in 2010). Such evidence corroborates earlier studies on European academic spin-offs, which document that a careful review should be given to the contention, in Europe, that new technology-based firms (including academic spin-offs) can be a major source of direct and indirect employment.[14]

The modest outcomes in terms of volume of sales and degree of internationalization uncovers some obstacles faced by these companies: shortage in management skills, shortage in market knowledge and marketing skills to access the market, and to a lesser extent, financial obstacles such as lack of cash flow and lack of investment capital. These financial obstacles are particularly acute in Medical Devices where length of time between the establishment of the firm and effective sales is greater than for the remaining industries.

Notwithstanding the evident shortage of management and market skills by the top team management of the majority of the selected spin-off market-related barriers (lack of knowledge of marketing, sales skills and customer) are only clearly identified as a critical obstacle in the development of the spin-offs by the companies in ICT/Software/Digital Media industry (cf. table 7). Most of the obstacles that academic spin-offs identify are exogenous to the companies themselves: confusing and poorly integrated policies and strategies for transferring technology; risk capital market is still in its infancy; rigidity of the labor market; and weak capacity of Portuguese universities for development of commercial applications (focus on disinterested research and aiming only publication).

14 Storey, D.J. and Tether, B.S. (1998), "New technology-based firms in the European Union: an introduction," *Research Policy* 26: 933–946.

Table 7. Perceived obstacles for academic spin-offs

	All	ICT/ Software/ Digital Media	Bio/Pharma	Medical Devices	Microelectronics	Other
Very important	Policies and strategies for transferring technology are confusing and poorly integrated	The risk capital market is still in its infancy	Policies and strategies for transferring technology are confusing and poorly integrated	Policies and strategies for transferring technology are confusing and poorly integrated	Weak capacity of Portuguese universities for development of commercial applications (focus on disinterested research and aiming only publication)	Rigidity of the labor market
	The risk capital market is still in its infancy	Weak / tenuous relationship University-Industry	Weak / tenuous relationship University-Industry	Weak / tenuous relationship University-Industry	Obstacles such as government regulations and bureaucracy	Shortage of financial institutions
	Rigidity of the labor market	Weak capacity of Portuguese universities for development of commercial applications (focus on disinterested research and aiming only publication)	Rigidity of the labor market	Financial barriers (cash flow, capital investment, investment in R & D)	Rigidity of the labor market	The risk capital market is still in its infancy
	Weak capacity of Portuguese universities for development of commercial applications (focus on disinterested research and aiming only publication)	Market-related barriers (lack of knowledge of marketing, sales skills and customer)	Obstacles such as government regulations and bureaucracy	Obstacles in management (inability to cope with uncertainty)	The risk capital market is still in its infancy	
Not important			Shortage of financial institutions		Market-related barriers (lack of knowledge of marketing, sales skills and customer)	Weak / tenuous relationship University-Industry
	Shortage of financial institutions		Financial barriers (cash flow, capital investment, investment in R & D)		Physical obstacles (buildings, infrastructure and distance to suppliers, markets, etc.).	Obstacles such as government regulations and bureaucracy
	Physical obstacles (buildings, infrastructure and distance to suppliers, markets, etc.).	Physical obstacles (buildings, infrastructure and distance to suppliers, markets, etc.).	Physical obstacles (buildings, infrastructure and distance to suppliers, markets, etc.).	Physical obstacles (buildings, infrastructure and distance to suppliers, markets, etc.).	Obstacles in management (inability to cope with uncertainty)	Physical obstacles (buildings, infrastructure and distance to suppliers, markets, etc.).

For the sample as a whole, and in the particular case of Bio/Pharma and Medical Devices spin-offs, *Confusing and poorly integrated policies and strategies for transferring technology* emerges as the most important obstacle for spin-offs' development. Another obstacle related with science and technology transfer organizations is the *Weak capacity of Portuguese universities for development of commercial applications (focus on disinterested research and aiming only publication).*

Such perceived obstacles highlight the need for universities, and more specifically TTOs, to develop more sophisticated processes for the assessment of the decision of whether to license or spin-off intellectual property. Such processes would allow universities to better understand the license or spin-off decision and weigh all of the factors that influence venture viability and the financial return to licensing. Moreover, there appears to be a need for science and technology transfer organizations to develop broader approaches to due diligence: beyond verifying ownership of intellectual property, to considering the broad range of commercial aspects of the venture. The evidence regarding the role of the academic—in both *opportunity recognition* and in the *decision to commercialize*—suggests a need for science and technology transfer organizations to develop knowledge in both, and enable these activities to be carried out successfully.

The bridging role of science and technology transfer organizations is particularly evident in the testimonies of the selected academic spin-offs. These firms recognize that the most important mechanisms for spin-off development

Table 8. Perceived support mechanisms for academic spin-offs

	All	ICT/ Software/ Digital Media	Bio/Pharma	Medical Devices	Microelectronics	Other
Very important	Access to formal and informal networks of business, at national and international (institutional investors, corporations and consulting organizations)	Have access to potential partners with business skills	Access to knowledge infrastructure (eg, libraries) and expertise (experts)	Have access to potential partners with business skills	Access to skilled labor (students)	Financial support such as access to venture capital and business angels
	Access to skilled labor (students)	Access to formal and informal networks of business, at national and international (institutional investors, corporations and consulting organizations)	Access to skilled labor (students)	Financial support such as access to venture capital and business angels	Have access to potential partners with business skills	Shareholdings in the spin-off
	Have access to potential partners with business skills	Mentoring and business counseling	Access to formal and informal networks of business, at national and international (institutional investors, corporations and consulting organizations)	Access to knowledge infrastructure (eg, libraries) and expertise (experts)	Access to formal and informal networks of business, at national and international (institutional investors, corporations and consulting organizations)	Access to skilled labor (students)
		Access to skilled labor (students)		Access to skilled labor (students)	Contest / prizes for business plans	Mentoring and business counseling
Not important	Support in the recruitment of external resources	Evaluation of intellectual property			Access to knowledge infrastructure (eg, libraries) and expertise (experts)	
	Support the exploration of technological opportunities	Support in the recruitment of external resources	Support in the recruitment of external resources	Support the exploration of technological opportunities	Mentoring and business counseling	Support the exploration of technological opportunities
	Advice on access to public subsidies	Contact with a creative field	Financial support such as access to venture capital and business angels	Advice on access to public subsidies	Advice on access to public subsidies	Contest / prizes for business plans

are, beside the *Access to skilled labor (students)*, the *Access to formal and informal networks of business, at national and international (institutional investors, corporations and consulting organizations)* and *Access to potential partners with business skills* (see table 8).

Efforts by universities and other science and technology organizations to prevent and overcome shortage and inadequacies in entrepreneurial capabilities of their spin-off companies—for instance, by providing courses in entrepreneurial awareness, marketing knowledge, and sales skills—are in demand. Although these efforts would be likely to provide useful contribution to academic spin-off staff and founders, it might happen that obstacles remain prominent, even in the event such efforts materialize. It is important to underline that marketing knowledge/skills cannot be fully achieved through formal courses. In concrete, markets associated with the selected academic spin-offs are highly specialized and often niche markets whereas standard courses are not sufficiently specific to provide the knowledge needed. Moreover, sales skills include skills in communication, negotiation, and convincing potential customers; these skills cannot be fully provided in a standard marketing course but in personal training. At this level, science and technology transfer support organizations (e.g., TTOs, incubators, science parks) might perform a critical 'marriage bureau' role by pursuing efforts and actions to combine the empirical, technical skills of scientists and engineers with the managerial, marketing, and negotiation skills of others who have experience in the industry/private sector.

Top management teams in the selected spin-offs companies are somewhat immature and incomplete with respect to their management and organizational dynamics, and team skills composition. Thus, science and technology transfer organizations should devote more attention to developing the top management team of a new venture they are tied with, if the spin-off is to be successful. This might also encompass the need to recruit technology transfer officers with an appropriate private sector background, including experience in starting a business.

Annex A. Early Stage Spin-offs

Company Name	Industry Sector	Year Est.	Location	TTO/Incubator/ Science Park
Infosistemas, Lda.	ICT/Software/Digital Media	1996	Algés	Parkurbis
Micro I/O Sistemas de Electrónica, lda	ICT/Software/Digital Media	1998	Aveiro	grupUNAVE Aveiro
CPC - Castro, Pinto & Costa, Lda. - Qualidade e Inovação	Agri-Food	2000	Maia	TecMinho
AMBIETEL	Energy/Environment/Sustainability	2000	Leça da Palmeira	UPTEC
Micropolis - Produção e Desenvolvimento de Polímeros em Pó	Bio/Pharma	2001	Maia	TecMinho
Biotempo - Consultoria em Biotecnologia	ICT/Software/Digital Media	2002	Guimarães	TecMinho
TIM w.e.	ICT/Software/Digital Media	2002	Lisboa	Parkurbis
Reetec Ibérica	Energy/Environment/Sustainability	2003	Covilhã	Parkurbis
Genomed	Bio/Pharma	2004	Lisboa	IMM
EWEN	Energy/Environment/Sustainability	2004	Porto	UPTEC
Simbiente- Engenharia e Gestão Ambiental	Energy/Environment/Sustainability	2004	Braga	TecMinho
Awaiba	Medical devices/diagnostics	2004	Funchal	Gapi Madeira

Annex B. Mature Spin-offs

Company Name	Industry Sector	Year Est.	Location	TTO/Incubator/ Science Park
Vinalia	Agri-Food	2005	Braga	TecMinho
Technophage	Bio/Pharma	2005	Lisboa	IMM
EDIT VALUE – Consultoria Empresarial	Energy/Environment/Sustainability	2005	Braga	TecMinho
UAVision	ICT/Software/Digital Media	2005	Lisboa and Torres Vedras (production center)	Inovisa
Ubisign	ICT/Software/Digital Media	2005		TecMinho
Fibersensing, Sistemas Avançado de Monitorização, S.A	Microelectronics/Robotics	2005	Maia	INESCPorto
Dandlen&Vasques, Lda.	Agri-Food	2006		CRIA
Foodmetric	Agri-Food	2006		grupUNAVE Aveiro
Micoplant - Micologia Aplicada, Lda.	Agri-Food	2006	Gondomar	OTIC-GAPI UTAD
WineID	Agri-Food	2006	Lisboa	Inovisa
ECOINSIDE	Energy/Environment/Sustainability	2006	Porto	UPIN
GyRad, controlo de qualidade e protecção radiológica, Lda.	Energy/Environment/Sustainability	2006		CRIA
IndAircontrol	Energy/Environment/Sustainability	2006		TECMU Madeira
SINERGEO	Energy/Environment/Sustainability	2006	Vila Verde	TecMinho
Marca Líquida Produções, Lda	ICT/Software/Digital Media	2006		Parkurbis
Omnisys	ICT/Software/Digital Media	2006	Covilhã	UBIACTIVA - GAPI UBI
Pugnatrix, Technologias da Informação, Lda.	ICT/Software/Digital Media	2006	Covilhã	Parkurbis
spectralBlue - Pervasive Technologies	ICT/Software/Digital Media	2006	Guimarães	TecMinho
SAR – Soluções de Automação e Robótica	Microelectronics/Robotics	2006	Guimarães	TecMinho
Covieng, Gestão de Projectos e Obras, Lda.	Other	2006	Covilhã	Parkurbis
Cooking.Lab	Agri-Food	2007	Lisboa	Inovisa
DietGest, Lda.	Agri-Food	2007		CRIA
Lumisense	Agri-Food	2007		INDEG
Mercearia Bio, Lda.	Agri-Food	2007		CRIA
ProSense	Agri-Food	2007	Lisboa	Inovisa
Biodevices, SA	Bio/Pharma	2007		grupUNAVE Aveiro
NZYTech	Bio/Pharma	2007	Lisboa	Inovisa
AMBISYS	Energy/Environment/Sustainability	2007	Póvoa do Varzim	TecMinho
Ecoceanus	Energy/Environment/Sustainability	2007		CRIA
Marsensing, Lda.	Energy/Environment/Sustainability	2007		CRIA
XXL Refill, Lda	Energy/Environment/Sustainability	2007	Covilhã	Parkurbis
Acutus	ICT/Software/Digital Media	2007	Póvoa do Varzim	TecMinho
Digital View, Unipessoal, Lda.	ICT/Software/Digital Media	2007		CRIA
ESI – Engenharia, Soluções e Inovação	ICT/Software/Digital Media	2007	Famalicão	TecMinho
iUZ Technologies, lda	ICT/Software/Digital Media	2007		grupUNAVE Aveiro
Metatheke Software Lda	ICT/Software/Digital Media	2007		grupUNAVE Aveiro
SOMATICA M&S - Materials & Solutions	ICT/Software/Digital Media	2007		TecMinho
Sonatrix, Lda.	ICT/Software/Digital Media	2007		Parkurbis
TECNOWAVE	ICT/Software/Digital Media	2007	Guimarães	TecMinho

Tendências e Conceitos, Lda.	ICT/Software/Digital Media	2007	Covilhã	Parkurbis
Tomorrow Options	Medical devices/diagnostics	2007	Porto	UPTEC
Audolici	Microelectronics/Robotics	2007	Porto	INESCPorto
Loggin	Microelectronics/Robotics	2007	Covilhã	Parkurbis
Xarevision	Microelectronics/Robotics	2007	Porto	INESCPorto
Douro Prime	Agri-Food	2008	Porto	UPTEC
FOOD IN TECH	Agri-Food	2008		UPIN
GoodMoments, Lda.	Agri-Food	2008		CRIA
NaturalConcepts	Agri-Food	2008	Guimarães	TecMinho
AquaExam, Lda.	Energy/Environment/Sustainability	2008		CRIA
ArborValue - Valorização do Património Vegetal	Energy/Environment/Sustainability	2008	Caldas das Taipas	TecMinho
ArqSense, Lda.	Energy/Environment/Sustainability	2008		CRIA
Carbono Eficiente, SA	Energy/Environment/Sustainability	2008		grupUNAVE Aveiro
Ecoticket	Energy/Environment/Sustainability	2008	Braga	TecMinho
IDEIA Critica, Lda.	Energy/Environment/Sustainability	2008		CRIA
INOVSea, Lda.	Energy/Environment/Sustainability	2008		CRIA
Naturanáutuca, Lda.	Energy/Environment/Sustainability	2008		CRIA
OCEANSCAN-Marine Systems & Technology, Lda	Energy/Environment/Sustainability	2008	Porto	UPTEC
OMNITA	Energy/Environment/Sustainability	2008	Porto	UPTEC
Smartwatt – Eficiência Energética e Microgeração	Energy/Environment/Sustainability	2008		INESCPorto
SolarEarth, Lda.	Energy/Environment/Sustainability	2008	Covilhã	Parkurbis
Sparos, Lda.	Energy/Environment/Sustainability	2008		CRIA
StarEnergy, Lda	Energy/Environment/Sustainability	2008	Covilhã	Parkurbis
Terraprima — Serviços Ambientais, Sociedade Unipessoal, Lda.	Energy/Environment/Sustainability	2008	Belmonte	TT@IST
EDS – Engenharia, Desenvolvimento e Suporte	ICT/Software/Digital Media	2008	Braga	TecMinho
EXVA – Experts in Video Analysis	ICT/Software/Digital Media	2008	Guimarães	TecMinho
idTour - unique solutions, lda	ICT/Software/Digital Media	2008	Aveiro	grupUNAVE Aveiro
KEEP SOLUTIONS	ICT/Software/Digital Media	2008	Braga	TecMinho
New Textiles	ICT/Software/Digital Media	2008	Guimarães	TecMinho
Next-To-You Network Solutions	ICT/Software/Digital Media	2008	Porto	INESCPorto
NWC Network Concept, Lda.	ICT/Software/Digital Media	2008		TT@IST
Openside, Lda.	ICT/Software/Digital Media	2008	Covilhã	Parkurbis
Process Net, Sistemas de Informação Lda	ICT/Software/Digital Media	2008	Porto	INESCPorto
SSIAGRI, Soluções e Sistemas de Informação para a Agricultura, Lda	ICT/Software/Digital Media	2008	Covilhã	Parkurbis
Tecla Colorida	ICT/Software/Digital Media	2008	Porto	INESCPorto
VoiceInteraction — Tecnologias de Processamento da Fala, S.A.	ICT/Software/Digital Media; Medical devices	2008	Lisboa	TT@IST
Crucial Sky Technologies	ICT/Software/Digital Media; Microelectronics/Robotics	2008	Covilhã	UBIACTIVA - GAPI UBI
SelfTech, Lda.	ICT/Software/Digital Media; Microelectronics/Robotics	2008	Covilhã	Parkurbis
PETsys — Medical PET Imaging Systems, S.A.	Medical devices/diagnostics	2008	Oeiras	TT@IST
WeAdapt	Medical devices/diagnostics	2008	Braga	TecMinho
Digital Domus, Lda.	Microelectronics/Robotics	2008		CRIA
Science4you	Other	2008	Lisbon	INDEG
Chiratecnics	Bio/Pharma	2009	Évora	Uévora
ICNAS Produção unipessoal Lda	Bio/Pharma	2009		OTIC-UC
INOVAPOTEK	Bio/Pharma	2009		UPIN
Luzitin	Bio/Pharma	2009		OTIC-UC
Cosero	Energy/Environment/Sustainability	2009	Covilhã	Parkurbis
Equivicentinos, Lda.	Energy/Environment/Sustainability	2009		CRIA
Wild Paradise, Lda.	Energy/Environment/Sustainability	2009		CRIA
BPO Consulting, Lda.	ICT/Software/Digital Media	2009		CRIA
Cidades obscuras - Arquitectura e urbanismo Lda	ICT/Software/Digital Media	2009		OTIC-UC
Inovmapping	ICT/Software/Digital Media	2009	Coimbra	OTIC-UC
Ivigisoft, Lda.	ICT/Software/Digital Media	2009	Covilhã	Parkurbis
Printable Version	ICT/Software/Digital Media	2009		Parkurbis

RN2S, Lda. (Confinium)	ICT/Software/Digital Media	2009	Aveiro	grupUNAVE Aveiro
Roff SDF, Lda	ICT/Software/Digital Media	2009	Covilhã	Parkurbis
WIVDO	ICT/Software/Digital Media	2009	Aveiro	grupUNAVE Aveiro
GenoGla Diagnostics, Lda.	Medical devices/diagnostics	2009		CRIA
iSurgical3D	Medical devices/diagnostics	2009		TecMinho
SeixeConcept, Lda.	Other	2009		CRIA
TecTraining, Lda.	Other	2009	Lagos	CRIA
Smart Medicines	Bio/Pharma	2010		OTIC-UC
Nano SmarTek	ICT/Software/Digital Media	2010		grupUNAVE Aveiro
Orbis Global – Management Systems	ICT/Software/Digital Media	2010		TecMinho
TELAVE	ICT/Software/Digital Media	2010		grupUNAVE Aveiro
Korange, Lda.	Microelectronics/Robotics	2010	Aveiro	grupUNAVE Aveiro
InfraLab	Other	2010	Covilhã	Parkurbis
Basetec	Bio/Pharma			UPTEC
Biognosis	Bio/Pharma			UPTEC
Grisp	Bio/Pharma		Porto	UPTEC
Bilobite Engenharia, Lda	Energy/Environment/Sustainability			UPTEC
Bluemater	Energy/Environment/Sustainability			UPTEC
Efisenergy	Energy/Environment/Sustainability		Porto	UPTEC
Planeta Vivo	Energy/Environment/Sustainability		Matosinhos	UPTEC
Adclick	ICT/Software/Digital Media		Porto	UPTEC
Advantage – Ciência para vencer	ICT/Software/Digital Media		Porto	UPTEC
Auditmark	ICT/Software/Digital Media		Porto	UPTEC
BrandFive	ICT/Software/Digital Media		Covilhã	Parkurbis
Cardmobili	ICT/Software/Digital Media		Porto	UPTEC
Clínica de Arquitectura	ICT/Software/Digital Media			UPTEC
Consispro	ICT/Software/Digital Media		Covilhã	UBIACTIVA - GAPI UBI
CorSimTec	ICT/Software/Digital Media			UPTEC
Declarativa	ICT/Software/Digital Media		Porto	UPTEC
Gema	ICT/Software/Digital Media			UPTEC
Ideia M.	ICT/Software/Digital Media		Porto	UPTEC/UPIN
I-Zone Knwoledge Systems	ICT/Software/Digital Media		Covilhã	Parkurbis
Lobby	ICT/Software/Digital Media		Covilhã	UBIACTIVA - GAPI UBI
Methodus Inovação, Unipessoal, Lda	ICT/Software/Digital Media		Covilhã	Parkurbis
Neoscopio	ICT/Software/Digital Media		Porto	UPTEC/UPIN
Netflow	ICT/Software/Digital Media		Porto	UPTEC
Newmensus	ICT/Software/Digital Media			UPTEC
OSTV	ICT/Software/Digital Media		Porto	UPTEC
Practical Way	ICT/Software/Digital Media		Porto	UPTEC/UPIN
Projecto Construir	ICT/Software/Digital Media		Porto	UPTEC
Red Desert	ICT/Software/Digital Media		Porto	UPTEC
Strogstep	ICT/Software/Digital Media		Porto	UPTEC
Wad Software	ICT/Software/Digital Media		Porto	UPTEC
A3P	Microelectronics/Robotics		Porto	UPTEC
Bimet, Lda.	Microelectronics/Robotics		Covilhã	Parkurbis
Delira net	Microelectronics/Robotics			UPTEC
Nonius	Microelectronics/Robotics			UPTEC
Silicon Gate	Microelectronics/Robotics		Porto	UPTEC
Timendi	Other			INDEG

Portugal Technology Spin-off Case Study

• Metatheke (grupUNAVE, University of Aveiro)

Sector: ICT/Software/Digital Media

www.metatheke.com

Metatheke Software, a corporate spin-off of the University of Aveiro, was founded in 2007 with the support of the NEOTEC initiative from the Agência de Inovação (AdI). The company sells four products/services:

- *File management:* targeted at large enterprises and institutions and fully customized to the company's needs
- *Digital Kiosks:* managing the site recortes.pt, with agreements with more than 50 publications (apart from this site, the company installs this solution with large media groups)
- *Platforms to manage e-book sales:* a solution that enables storage and sale of e-books (multi-editor and multi-dealer)
- *Institutional portals*

Metatheke's corporate vision to adapt technological solutions for the business sector, along with extensive experience in developing digital content management solutions, was the decisive factor for establishing the company. Since its founding, the company has collaborated with various national and international institutions to create, develop, and install digital content management platforms. Metatheke's development process, with continuous analysis and adaptation, has resulted in practical, innovative solutions to meet clients' needs.

All Metatheke software is developed by the company and is unique to Portugal. Metatheke tailors software solutions to individual customer needs.

Year of Commercialization: **2007**

Sales Evolution: 2007: €16,000
2008: €100,000
2009: €130,000
2010: €600,000 (est.)
Part of this revenue comes from grants and public support.

Number of Employees: 2007: 3
2008: 7
2009: 9
2010: 11/12 (est.)

Workforce: Designer, computer programmers, chemical engineers, and administrators

Internationalization: There is no defined strategy for internationalization. However, by 2009, between 25% and 30% of sales were to Angola, due a partnership with a Portuguese company. Metatheke has also provided products/services to the United States. In 2011, after consolidating its market position in Portugal, the company will define a strategy for internationalization.

Funding: Obtained through governmental support

Markets: Large companies, with particular focus on media groups

Challenges and lessons learned: The company applied for the program NEOTEC, which was financially supported by the Agência de Inovação. This financial support helped the company develop its business plan, improve the technology, and validate the technology with the market. GrupUNAVE was especially important in the incubation process, by providing essential facilities and infrastructure, along with business model validation. The main obstacle Metatheke has faced is a lack of industry contacts. Currently, the CEO of the company is working with the University of Aveiro to develop tools that facilitate the technology transfer process. From his perspective, this new situation is complex, given the panoply of situations which the TTO addresses (patents, licensing, royalties, etc.). The company believes it might benefit most from TTO assistance in the areas of marketing, communication, and networking, as well as in the organization of events that would bring potential customers to the incubator.

Portugal Technology Spin-off Case Study

• Practical Way (UPTEC)

Sector: ICT/Software/Digital Media

http://practicalway.eu

Practical Way Software is a company founded in 2008 to develop high quality, innovative web applications to meet customer needs. Practical Way Software aims to become known for the development of integrated solutions for web environments and markets. Currently, the company is best known for creating the Portal ORZARE.COM, which is tailored to meet needs in the construction industry. Practical Way is also working on Facebook and Iphone applications and website development. The company plans to expand the Orzare concept to develop platforms that meet sector-specific needs in other industries.

Practical Way's main competitive advantage is a strong combination of tools: it provides users with a free platform that includes online budgeting, a catalog that is organized against product characteristics, and great interaction between different suppliers, intermediates, and the final customer. Construction industry manufacturers provide the revenue source. (Competitive products offer a catalog only.)

This product provides features not duplicated by competitors.

Year of Commercialization:	2008
Sales Evolution:	2009: €5,000 The company expects sales in 2010 to reach €200,000.
Number of Employees:	Three founders started the company who, after some time, brought in an additional three colleagues. The company had 12 employees while in the development stage, but has scaled back to 10 for its present needs.
Workforce:	Programmers, designers, marketers, and civil engineers
Internationalization:	Plans for expanding sales to Brazil and Spain are in preliminary stages; contacts have been targeted, and initial meetings have been scheduled outside Portugal.
Funding:	Initial funding (€250, 000) from two business angel investors and one founder's family
Markets:	Portuguese construction industry, with expansion to agriculture, scientific research, and restaurants/shopping industries.

Challenges and lessons learned: UPTEC was very important in helping Practical Way develop networking through the allocation of a consultant who assisted in developing the initial business plan. Other important help included the opportunity to present the project to 20 experienced teachers, who provided valuable feedback. In the beginning, the company felt it suffered from a lack of industry contacts, market knowledge, and business knowledge in general. These qualities contributed to difficulties in finding seed funding, in addition to the challenge of overcoming a cultural stigma that exists in Portugal for those who choose to create their own company. The company had the opportunity to meet with staff from The University of Texas at Austin, who provided key insights as the company developed its business model. Practical Way has also met with an American venture capital company, although this meeting did not result in funding. In terms of UPTEC, the company would like to see increased interaction between firms for knowledge sharing and service exchange. It also places high importance on UPTEC's promotion as a brand, so that member companies might gain increased opportunities.

Portugal Technology Spin-off Case Study

• Tecla Colorida (INESC Porto)

Sector: ICT/Software/Digital Media

http://escolinhas.pt

Tecla Colorida specializes in developing web platforms and solutions for educational purposes: Web 2.0, social software, e-learning, and educational software for children. Founded in 2008, Tecla Colorida is a spin-off of FEUP and INESC Porto.

The company's largest released product is the portal www.escolinhas.pt—the first social and collaborative platform specifically designed for elementary schools and children from 4 to 12 years of age—having usability, simplicity, and security as major design concerns. The portal provides schools with a platform for "Escolinhas" (little schools), with a selection of useful web and social software features (wiki, blogs, collaboration tools, private social networks, instant messaging, etc.) for educational purposes. Escolinhas empowers young children with very simple tools and editors that informally promote creativity, innovation, collaboration, sharing, and learning by playing—all in a very natural way. Currently, Escolinhas is available for free, across Portugal, and is positioned to move quickly into the global market. The company enjoys the competitive advantage of having an innovative product in the hands of a small, therefore nimble, company that should be able to respond to market needs quickly.

Tecla Colorida faces, in Portugal, a small, heavily dominated market (i.e., companies such as Shared Mind) while it promotes an advanced product to an emerging global market.

Year of Commercialization: 2009

Sales Evolution: Currently provides free service across Portugal

Number of Employees: The company began with a team of 3 people. Today the company has 6 employees, with assistance of students from the Engineering Faculty.

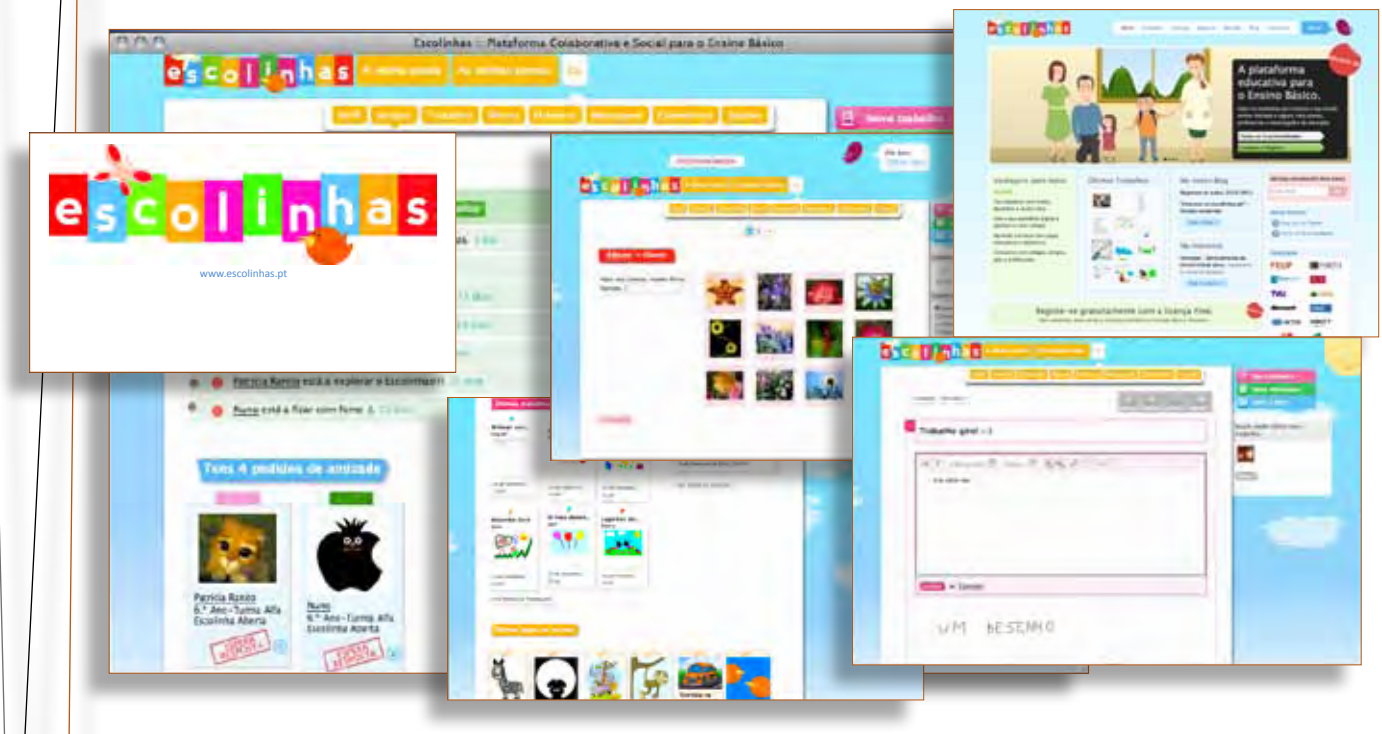
Workforce: Software engineer; board; designer; promoter

Internationalization: The company has entered into a partnership with a Brazilian company and has entered negotiations with a Spanish entity as part of an international offering. A United States entity has expressed some interest.

Funding: Initial equity investment. INESC Porto, as well as an investor, have joined as capital partners with the company.

Markets: Elementary school students and their teachers

Challenges and lessons learned: Importance lay in the association of a good image; FEUP support services, for the dissemination of events and other initiatives; and INESC support in networking and business model development. The company believes it would benefit from enlarged networking opportunities to increase its number of contacts within the market, the industry, and across institutions.



Portugal Technology Spin-off Case Study

• iNovmapping (GATS, University of Coimbra)

Sector: ICT/Software/Digital Media

www.inovmapping.com

iNovmapping LDA is a dynamic, young Portuguese company founded in 2009 to develop services and products that link Systems Geographical Information (SIG) with Web2.0 in a functional synthesis that assures a unique and innovative cartographic platform. Utilizing API of the Google Earth/ Google Maps in its base architecture, iNovmapping received its main scientific support through the Labs iNovmap Project at Coimbra University, with support from the headmaster's office and the GATS. The company's products consist of:

- *Cartographic platforms* with potential applications in civil protection, management and planning of health services, transportation, tourism, and education
- *Integral spatial modeling* to provide 3-D modeling of buildings, streets, etc.

The company enjoys a partnership with Mtourist; works with Tourism of Coimbra EM; and is a service provider of 3-D Modeling for Google Earth.

iNovmapping has developed innovations in 3-D cartography that are unique at the international level.

Year of Commercialization: 2009

Sales Evolution: Not disclosed

Number of Employees: 2009 and 2010: 2 employees

Workforce: Geographers

Internationalization: Not yet established

Funding: Fifty percent of sales revenue is reinvested in R&D. By choice, the company has not accepted external financing; it achieved self-financing through sales.

Markets: Civil protection, management and planning of health services, transportation, tourism, and education

Challenges and lessons learned: OTIC UC (www.uc.pt/gats) performed an important role in monitoring the business plan. The 3-D modeling developed by iNovmapping represents a commercial asset in an expanding market. While projects are underway, the company has not yet obtained international sales.

Portugal Technology Spin-off Case Study

• TechnoPhage SA (Inst. de Medicina Molecular/IMM)

Sector: Bio/Pharma

www.technophage.pt

TechnoPhage SA is a multi-platform biotech company founded in 2005 that performs research and development (R&D) to create new molecules for diverse therapeutic areas. Located in Lisbon at the Institute of Molecular Medicine, the company is engaged in three main R&D programs, managed by different business units:

- TechnoPhage: R&D of novel bacteriophage-based products for the treatment, diagnosis, and prevention of bacterial infections
- TechnoAntibodies: R&D of recombinant single domain antibody fragments (SdAbs) for therapeutics and diagnostics of human diseases using proprietary intellectual property
- TechnoZeb: Innovative approaches to drug discovery by using zebra fish as an in vivo model system with proprietary intellectual property in skeletal formation and regeneration

Products are the result of R&D conducted in the company's three business units and, as such, represent almost the totality of sales. R&D is mainly performed in cooperation with pharmaceutical companies at different stages of product development; the company relies on strategic partners' capabilities to promote clinical trials, marketing, and large-scale manufacturing. The company has provided customized microbiology services for hospitals, food industry companies, pharmaceutical companies, research institutions, and other private or public institutions:

- *Customized microbiology tests*
- *Facilities disinfection and control*
- *Phage display* and/or screening in a fully automated system.

TechnoPhage has filed eight patent applications with either the USPTO and/or under the PCT. For example, U.S. patent applications have been filed for: a) Integrated development of stable/smaller immunized SdAbs using proprietary intellectual property, and b) skeletal formation and repair.

Year of Commercialization:	2005
Sales Evolution:	2005, 2006, 2007: €250,000 2008: €400,000 2009: €500,000 2010: €750,000 (est.)
Number of Employees:	2005: 1 2006: 4 2007, 2008, 2009: 8 2010 (est.): 12
Workforce:	2 PhD (including 1 board member) 1 MBA 1 MSc with PhD
Internationalization:	Sales in the European market; sales prospects in the American market
Funding:	Not disclosed
Markets:	Health, pharmaceutical

Challenges and lessons learned: TechnoPhage has experienced a lack of information regarding business organization, and lack of support in implementing its business model. TTO processes seem slow for procedures such as the procurement of licenses, the development of agreements, etc. The company would like to see an improved flow of information, both for entrepreneurial business model implementation, and in general communication and responsiveness for technology and business challenges.

Portugal Technology Spin-off Case Study

• Biodevices SA (GrupUNAVE; IEETA)

Sector: Bio/Pharma

www.biodevices.pt

Biodevices SA is a spin-off from IEETA (Institute of Electronics and Telematics Engineering of Aveiro/ University of Aveiro) that was founded in 2006 with the mission of developing, commercializing, and exporting biomedical engineering solutions for medical diagnosis support. The company team includes specialists from different areas of engineering, health, and biotechnology. A strong relationship between Biodevices SA and IEETA enables high technology advancement. Currently its main product is *VitalJacket:* a t-shirt that allows mobile, non-invasive heart monitoring for up to five days using miniaturized components and a small electronic device box placed in a pocket. VitalJacket comes in four sizes: Regular, Women, Unisex, and Babygrow. Signals are sent for analysis in real time to a PDA using wireless technology, and are also recorded for later analysis with VitalJacket Desktop Pro software; this software allows real time reading systems of arrhythmia analysis and reporting on PDA/Smartphone, and a large set of specialized visualization tools. The information is also recorded to create a user database for later in-depth analysis. The integrated team engages in a business model based on close collaboration with Petratex and the University of Aveiro.

This product incorporates a high degree of innovation, with patents pending at the national level. The company's main partner, Petratex, holds several patents that allow the company to incorporate strong and innovative textiles into all product lines; for example, Petratex created and patented the technology *nosew*, which is a glue used to secure seams with superior results in terms of appearance and comfort.

Year of Commercialization: 2009

Sales Evolution: Data not available, approximately 100% of sales reinvested in R&D

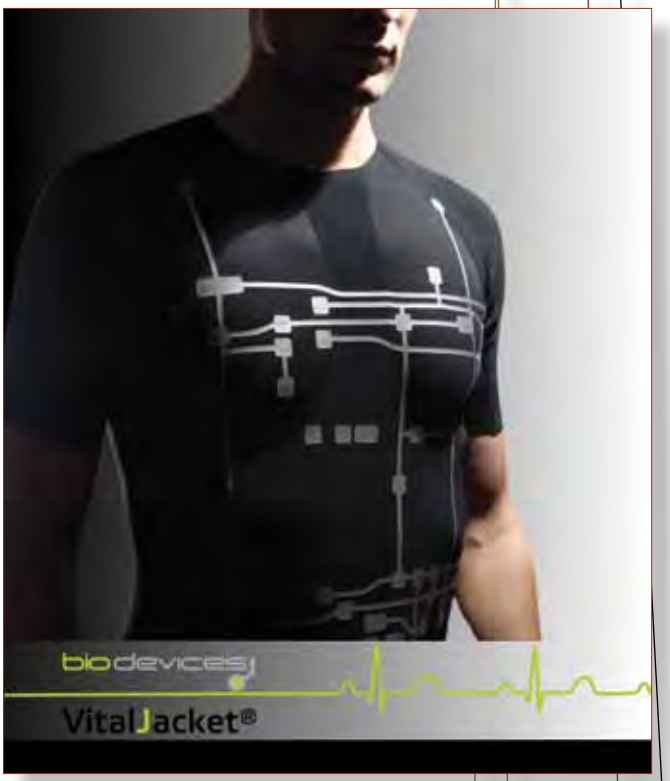
Number of Employees: 2006: 1
2007: 3
2008: 5
From 2009 until July 2010: 14

Workforce: 1 PhD (CEO)
2 MSc (pre-Bologna)
The remaining are MSc, with 1 administrative

Internationalization: Distribution partners in Greece, Britain and Italy; exports to France, Spain, Brazil and Israel

Funding: Not disclosed

Markets: Medical devices market (in-hospital and out-patient) and sports markets



Challenges and lessons learned: While the company agrees that the incubator of UA managed by grupUNAVE works well, it believes that after helping the team develop strong contacts with investors, grupUNAVE's support became residual in nature.

At the same time, the University of Aveiro, through its Technology Transfer Unit—UATEC—showed continued interest for Biodevices to remain within its infrastructure. While the company has not experienced outstanding obstacles due to UATEC's efforts, it would like to see generally stronger links between academia and industry, perhaps through directives that link university research with industry problems, increased pairing of basic research to potential business applications, and more applied research partnered with industry know-how.

Portugal Technology Spin-off Case Study

• Tomorrow Options (INESC Porto/UPIN/UPTEC)

Sector: Medical Devices

www.tomorrow-options.com

Tomorrow Options was founded in 2007 to develop and produce electronic devices to satisfy niche B2B global markets. To date, the company has concentrated all efforts in the medical devices industry sector. Its products include *WalkinSense* and *MovinSense*. WalkinSense is a medical device that monitors lower human limb movement, and has a wide range of applications: orthopedics, neurology, cardiology, and podiatry. The noninvasive, portable, wireless, and easy-to-use device is already proving to be valuable in fighting diabetic foot disorders. The dynamic information provided wirelessly by WalkinSense, in conjunction with simple installation and product robustness, also means it can be used within the sports industry to monitor and assess athletes and to prevent injuries.

The company's philosophy does not rely solely on technological breakthroughs, but also employs flexible business models to meet the various needs of its customers, in order to deliver increased value. A conservative market has been very receptive of the product, but the company faces a non-mandatory, but demand-driven need for clinical trials that is delaying the commercialization process.

Tomorrow Options products employ a high degree of innovation that allows the company to compete worldwide with cost effective, easy to-use solutions.

Year of Commercialization:	2009, in Portugal at Centro de Medicina de Reabilitação de Alcoitão
Sales Evolution:	Not disclosed
Number of Employees:	2008: began with 3; currently the company employs 8, plus 2 U.K. employees
Workforce:	5 software and hardware engineers and 3 administrative employees
Internationalization:	The company expanded to the U.K., which was chosen as a country outside of Portugal's Euroregion that provides a good export platform to the United States. Moreover, the U.K. business culture has a highly receptive attitude towards innovation, the English language facilitates recruitment, and procurement in British hospitals is convenient for the needs of the company (short days' purchases outstanding for payment).
Funding:	Inside and outside equity (it started with €75, 000)
Markets:	Hospital equipment, sports markets

Challenges and lessons learned: UPTEC's reduced rental fees, as well as its location near FEUP has been important. UPIN expressed concern regarding intellectual property rights, i.e. contracts, and royalties. The company believes that the Portuguese system has yet to fully embrace the concept of technology-based start-ups, and still shows bias toward business creation in more traditional businesses with tangible assets. Moreover, the system seems excessively bureaucratic and is (currently) biased due to the distribution of EU community funds. The company would like to see greater transparency in all government-related processes, including technology transfer processes. It would like to see Portugal become more supportive of innovation, with technology transfer offices better prepared to move in this direction. It believes that incentives towards applied research would be valuable. By their observation, only fundamental research currently seems to receive recognition, which essentially penalizes researchers actively involved with industry partners. The company would like to see more academic recognition provided to curricula that embrace applied research which targets industry needs.

Portugal Spin-off Company Case Study

• PETsys Medical PET Imaging Systems SA (Tagus Park)

Sector: Medical devices

www.petsys.eu

PETsys SA was founded in 2008 to market PET (Positron Emission Tomography) detection technology developed by the PEM (Positron Emission Mammography) R&D Consortium. This technology allows early cancer detection through higher resolution (1-2 mm vs. 5-10 mm in standard devices) with higher sensitivity (x 10): features currently unmet in the international market.The company was incorporated by five institutions and fifteen individual project collaborators and a Belgium business angel. PETsys leverages the internationally patented intellectual property developed by the PEM consortium that vastly outperforms current PET imaging systems. This product facilitates:

- Medical imaging PET-mammography, and PET with ultrasound
- Preclinical research with animal PET/MR
- Technology based on fast crystals, to be integrated into new applications

The technology is based on fast crystals (LYSO) and avalanche photodiodes (APD) coupled to dedicated low-noise integrated electronics allowing very good resolution (~1.3 mm) in the whole FoV (DoI resolution of 2 mm), good time resolution (~5 ns), and good sensitivity (20 mm long crystals), allowing the highest integration density available today. High quality R&D initiated in 2003 has led to the realization of a prototype and patent registration. The technology's high resolution capacity provides a strong competitive advantage as the company explores niche markets such as cancer research. (Preclinical testing in animals is usually conducted in rats with induced cancer, which creates problems at the level of behavior replication of human metabolism; PETsys provides new research opportunities, since the equipment allows studies in medium-sized animals, closer to the human metabolism, with cancers that are not induced.)

Year of Commercialization: Pending

Sales Evolution: Market release pending; capital entries are based on financing linked to research activity: 75% of funding provided by the consortium and 25% provided by the company; grants obtained through QREN and AdI

Number of Employees: 2008 and 2009: 4
2010: 5

Workforce: 2008: 3 PhD; 1 MSc (CEO)
2009: 3 PhD; 1 MSc (CEO)
2010: 3 PhD; 1 MSc; 1 accounting (administrative)

Internationalization: Potential collaboration with entities present in the U.S. market for R&D and high resolution prototypes suitable for preclinical testing in animals of medium size in cancer field. This yields several direct benefits: a simpler certification process, partner as final customer, and exploitation of niche market of cancer research.

Funding: Shareholders include LIP - Laboratório de Instrumentação e Fisica Experimental de Partículas, INOV, INESC ID, Fundação da Faculdade de Ciências da Universidade e Lisboa, INEGI; participation of a Belgium business angel

Markets: Hospital equipment; veterinary equipment

Challenges and lessons learned: The relationship between PETsys and the technology transfer office at IST is focused on the connection of the entities that are part of the R&D consortium and IST and the fact that three of the five PETsys workers are or were teachers or former students at IST. PETsys has received recognition as *ISTspin-off*, and participated in the Vector E competition (www.vectore.com.pt); IST, through visits to Austin, Texas, established contacts with potential PETsys partners in new markets, leading to a change in the company's strategic direction and in focusing R&D efforts on preclinical testing in medium-sized animals, which is under negotiation with U.S. entities. The company would like to see an increased culture for innovation across Portugal. While research related to the patented technology began in 2003, the company was not founded until 2008. It was necessary to spend a significant amount of time to capture the interest of shareholders. It would help minimize capital risk to hire world-class experts to assess and help to define the most appropriate business model and prepare business plans; and that the most promising cases might receive help through the access of international risk capital. Portugal should not be dependent on technicians without experience in specific markets (since one person could never be prepared for all specific markets) and to evaluate all cases. The company believes that speed is crucial in technology businesses, and particularly the medical industry. It would like to see investors who are interested in helping "to do good, " rather than merely seeking "to do good business for my company." It also believes investors should be better informed on how to evaluate technology-based businesses.

Portugal Technology Spin-off Case Study

• MarSensing (SiPLAB, CRIA UAlg)

Sector: Energy/Environment/Sustainability

www.marsensing.com

MarSensing, founded in 2007, is a company that develops technologies and services in underwater acoustics. MarSensing was created as a spin-off project of the Underwater Acoustic Signal Processing Laboratory (SiPLAB) located at the University of the Algarve, Portugal. The team of scientists and engineers created the company after being accepted as a technological project by AdI, a nationwide financing initiative that is financed through national and European funds. MarSensing technologies are based on the team's experience gained through the development of various specialized equipment including the Acoustic Oceanographic Buoy (AOB). The company's services include field acquisition of underwater acoustic signals in scientific sea-trials, ocean noise measurements, and developing solutions in underwater acoustics. Its objective is to create quality specialized products tailored to customer specifications. Its continuing relationship with the scientific community enables it to maintain a line of innovation for the creation of new products and services.

One of the company's main products is AquaSOM (a product imported from the United States), which MarSensing adapts and implements to customer needs for underwater acoustics or noise measurement. AquaSOM is a solution for underwater sound in swimming pools, lakes, or the sea, based on underwater speakers from Lubell Labs, which integrate easily with standard audio equipment. The company recently sold its first unit of Digital Hydrophone, a product completely developed by MarSensing, and it is working on the development of the Underwater Microphone. Recently, the European Commission declared reducing underwater noise to be a priority, which should result in increased product demand. European competition in this field is low.

The MarSensing team exhibits high expertise with high integration in a specialized, niche market.

Year of Commercialization:	2007
Sales Evolution:	MarsSensing had a good start, signing a contract with Aquinova right after being founded. In the first year, it obtained between €5, 000 to €7, 000 in turnover, and sales have remained stable over the years.
Number of Employees:	2007-2010: 4 (the founders)
Workforce:	2 PhD and 2 MSc in engineering (computing systems, software, electronics)
Internationalization:	The company does not yet export products or services, but would like to secure sales in an anticipated increase in international market need.
Funding:	Public funding (NEOTEC)
Markets:	Academic and private industry R&D

Challenges and lessons learned: According to the founders, the existence of this TTO played an essential role in founding the company. A key motivator for the team to develop this entrepreneurial venture was due to non-existent employment perspectives for these highly qualified researchers. The Algarve Regional Center for Innovation (CRIA) was quite helpful in pre-development with logistics and the search for funding. CRIA helped MarSensing identify and develop the application for its current funding through the NEOTEC program. The TTO was very helpful as an information vehicle, with promotion of the company in entrepreneurship initiatives, and with legal issues. CRIA also helped MarSensing by providing affordable work facilities, although this was unexpectedly delayed for one year. This delay for workspace was the company's primary challenge, which would indicate that enlarged CRIA facilities might be helpful in the development of other new technology ventures.

Portugal Technology Spin-off Case Study

- **Simbiente Environmental Engineering & Management LTD** (TecMinho)
- **Simbiente Azores EEM LTD** (Univ. of Azores; AvePark)

Sector: Energy/Environment/Sustainability

www.simbiente.com

Simbiente Environmental Engineering and Management, LTD focuses on research, development, innovation, and services related to environmental engineering and biotechnology. Researchers from the Department of Biological Engineering founded Simbiente in 2004 as a spin-off company from the University of Minho. Simbiente Azores EEM ltd was founded in 2009 as a specific and contextualized structure to develop the company's activities and concepts in the autonomous region of Azores. Simbiente provides:

- *Sustainability and strategic planning*
  - » Products: environmental impact assessment studies, strategic environmental assessment, environmental audits, land planning, etc.
  - » Services: consultancy for climate change; policies, plans, programs, evaluation tools, etc.
- *Environmental and energy technology*
  - » Products: Bio4gas; Rescue4gas
  - » Services: Bio4consulting
- *Ecosystems management and valorization*
  - » Products: solutions for lagoon/river system valorization; market tools for natural resource management
  - » Services: consultancy on natural engineering and aquatic ecosystems management, developing/applying ecological modeling tools
- *Environmental training and communication*
  - » Products: advanced training courses; technical and scientific events organization; environmental information systems
  - » Services: consultancy on knowledge achievement processes, corporate responsibility, strategic communication, public participation.

Simbiente promoted its first technology transfer process with a patent from UMinho (Environmental Innovation National Prize 2007). Transversal platforms of knowledge, crossed with environmental and ecological competences, provide a holistic, integrated approach that enables the company to approach customer needs with a wide view to shape an innovative solution for each case. Products are designed with academic expertise submitted to pilot tests. The company holds patents and is developing two sensors with international (Sweden, England) partners.

Year of Commercialization: 2004

Sales Evolution:
2004: €13,780
2005: €101,246
2006: €75,901
2007: €74,047
2008: €178,300
2009: €198,016

Number of Employees:
2004: 2 (partners)
2010: Simbiente: 8 employees + 4 full time external consultants
2010: Simbiente Açores: 3 employees

Workforce: Environmental, civil, and biochemical engineering

Internationalization: Several international partners; negotiating the opening of a facility in Chile

Funding: Simbiente Azores: public support (Programa REDE)

Markets: Energy, environment

Challenges and lessons learned: At Simbiente's founding, TecMinho was a positive motivating factor and a source for information, although the company then followed a path independent from TecMinho. The company would like to see a platform for national and international company spin-offs. It would like to see TTOs create business plan models that are more oriented to the reality of spin-off companies. Through its own initiative and contacts, Simbiente uses the services of a management spin-off to manage the company's finances, and uses many international partners to carry through services with components-specific techniques. It would have been valuable for the TTO to provide introductions to other national and/or international spin-off companies, or if it had provided more help in terms of management competencies. Simbiente feels its success may be due to the fact that it was able, through its own contacts, to create good connections with other companies, and to having delegated some of their legal and administrative work to another Portuguese spin-off in the management sector.

Portugal Technology Spin-off Case Study

• selfTech (Lisbon's Institute for Systems & Robotics, IST)

Sector: Microelectronics/Robotics

www.selftech.pt

SelfTech was founded in 2008 to explore application opportunities in the emerging market of service robotics in order to bring state-of-the-art robot-based systems to everyday life. The company is built on a strong R&D base, with experience in the integration of diverse technologies from a variety of fundamental scientific domains. SelfTech designs and develops solutions within three main categories:

- *Mobile Autonomous Systems:* Providing robotic systems with the ability to make decisions based on real-time information, selfTech designs truly intelligent and autonomous products. SelfTech has experience in developing systems for unstructured environments, enabling manmade machines to operate without human intervention.
- *Distributed Systems for Robot Assisted Operations:* Developing high-level software architectures for distributed sensor networks combined with robotic and other complex actuator systems, selfTech makes it easier for operators to perform a reliable situation assessment while immediately acting upon it.
- *Human-machine Interaction:* Building intelligent mobile platforms that are capable of monitoring their environment and able to respond to human actions.

Whether to guide a lost tourist, or to circulate through a crowd (perhaps showing off the latest gadget to consumers), a robot can be designed to inform, entertain, and advertise. The company's competitive edge is based on expertise in the robotics area and the ability to design mobile robotic systems to solve specific problems. One current project in development is the GolMow, an autonomous lawn mower intended to ease grass maintenance overhead for golf courses. A small scale prototype has been tested on the Aroeira Golf Course and is in final stages of development before entering the market.

Technologies are unique, often at the international level. Sales revenue is invested in R&D at 100%.

Year of Commercialization: 2008

Sales Evolution: 2008: €4,500
2009: €25,500
First semester of 2010: €25,000

Number of Employees: 2008 and 2009: subcontracting for specific projects and partner assistance
2010: 3 permanent employees

Workforce: 3 MSc

Internationalization: The autonomous lawn mower prototype is targeted for the global market; when commercialization is launched, the company will pursue product placement with international distributors that specialize in placing golf course products.

Funding: Not disclosed

Markets: Undefined; each product will often address its own set of diverse markets.

Challenges and lessons learned: SelfTech perceives the role of the TTO is to help define the initial company strategy, determine the commercial value of the intellectual property, and develop and monitor the business plan. Specifically, selfTech enjoyed support from IST and ISCTE at the financing level: the initial information was provided by ISCTE, but the effort was taken by the company. In spite of this help, obtaining initial financing was very difficult for the company overall. Although the autonomous lawn mower design had been approved by the QREN, selfTech failed to find financing for months, via banks, business angels, or venture capital. Finally, it received funding through BPI after receiving the BPI Start award. In the long term, selfTech expects to encounter difficulty in recruiting skilled and experienced labor. It believes that universities need to acquire a culture of entrepreneurship and to increasingly promote ideas to the market; and that universities should generally be more proactive in seeking technologies for licensing, while firms need increased access to mechanisms and information about which technologies are most likely to be licensed by universities.

Portugal Technology Spin-off Case Study

• Science4you (INDEG/ISCTE with cooperation between ISCTE & FCUL)

Sector: Other (Scientific toys and training for children)

www.science4you.pt

Science4you, founded 2008, produces scientific toys and provides training for educational holiday camps and science workshops. It has seventeen toy products that help children learn about wind power, hydro power, fuel cells, physics of cranes, meteorology, physics of cars, and more. Products also include free passes to museums or educational science institutions. The company enjoys partnerships with the Faculty of Science, University of Lisbon; the Knowledge Pavilion, Lisbon; the Museum of Science, University of Coimbra; the Museum of Science, University of Lisbon; UPAJE; and Fábrica dos Brinquedos.

The company provides training such as that for summer camps in the Faculty of Science of the University of Lisbon, as well as for birthday parties, such as the science workshop at the Faculty of Science at UL; a mobile laboratory; and soap workshops. The company's competitiveness is based on good price, high quality, and educational value of its products.

The toys produced by Science4you feature innovative differentiation factors beyond the product's technical components.

Year of Commercialization:	2008: sales at Fnac, El Corte Ingles, Livraria Escolar, etc; contacts with points of sale initiated by company employees, without support of TTO or ISCTE
Sales Evolution:	2008: €50,000 2009: €200,000 2010: €300,000 (est.)
Number of Employees:	2008: 1 2009: 3 2010: 5 effective staff and 3 interns (areas of biology and design)
Workforce:	2008: 1 (Management MSc) 2009: 3 (Management MSc; Biology MSc; Professional Design) 2010: 5 effective staff and 3 interns (areas of biology and design)
Internationalization:	Export to Spain and Brazil; seeking partners in Brazil and conversations in Mexico and Italy; production: various components of toys are produced in Germany, but this year some production will be transferred to Portugal.
Funding:	The incubator ISCTE gave support; in 2008 Inovacapital held 80% of the capital. The capital increased and currently VC holds 45% of the capital.
Markets:	Education/children

Challenges and lessons learned: When the company was founded, 20% of the capital was held by the founder and a professor at ISCTE and FCUL, who was not part of the executive board. The business model was developed by the CEO as a student, and ISCTE took a passive role in this process. Science4you would like to see an increased commitment to training in universities, including the development of entrepreneurial capacities. It would like to see a more risk-friendly university culture that is not overly critical of failures, which encourages students to develop their own initiatives; and provides recognition of these accomplishments relative to curriculum vitae development.

3.6 ISCTE-MIT, A New International Competition

Within the scope of the MIT Portugal Innovation & Entrepreneurship initiative (MPP-IEI), this international venture competition, launched at the end of the first Quarter of 2010, is the result of a comprehensive research based on the existing entrepreneurship programs and business plan competitions in Portugal and the U.S..

This new program was named ISCTE-IUL MIT-Portugal Venture Competition and aims at providing unique support while it spotlights new ventures and teams with emerging technologies that may have considerable economic impact on the Portuguese economy and international growth prospects. The emphasis of the competition is to focus and educate select teams on Go-to-market optimum practices and leverage seasoned volunteers' (catalyst) experience and access to an international marketplace.

The unique features to the ISCTE-IUL MIT-Portugal Venture Competition can be attributed on the one hand to over 20 years of the MIT100k accumulated experience, and on the other to bottom-up research carried out with 1) CEO's of recent Portuguese tech start-ups, 2) existing competition finalists and 3) seasoned investors & entrepreneurs. The resulting unique features of the Venture Competition can be summarized as follows:

1. The largest to date in financial support (up to 1M€) and in-kind support to four finalist teams and four teams that gain honorable mention
2. Fosters the entrepreneurial attitude and *learning by doing*
3. Incentivizes with results—half of the financial support is earmarked *upon selection* (€500,000) and the other half *upon execution* by fulfillment of mutually agreed upon milestones, actions and time scales
4. Unique educational experience through hands-on boot camp for entrepreneurship teams (building on MIT i-Teams), provided by ISCTE and Sloan specialist staff
5. A unique catalyst program for semifinalists through the first 9 to 12 months of venture phase of lawyers and functional area managers from leading Portuguese companies, complemented by seasoned MIT/Boston entrepreneurs and investors for finalists
6. Network and industry linkages to MIT venture ecosystem through the invitation of finalists to participate in IdeaStream investor's presentation (scheduled April 2011).

Such uniqueness should contribute to the origination of success stories "made in Portugal" in entrepreneurial high tech start-ups or university spin-outs.

Selection Process

The venture competition received 95 submissions by the June 18th deadline, distributed across the competition's four tracks: Information Technology and the Web (36.8%), Products and Services (29.5%), Life Sciences (18.9%) and Sustainable Energy and Transportation (14.7%) (see table 9).

The breadth of technologies indicates entrepreneurial insight and critical translation of university-researched innovations that are needed to build a knowledge-based economy of products and services.

Three €1B business opportunities joined seventeen high tech entrepreneurial teams as semifinalists, and were chosen on the basis of team and innovation strength, clear path to revenue, international scope, and market opportunity. Seventy percent (14) of the semifinalists spring from university-developed technologies; fifty percent (10) are from educational partners of MIT-Portugal; and ten percent (2) are from FCT-funded collaborations that arose as a consequence of the MIT-Portugal and the CMU-Portugal programs. Forty-five percent(9) of the semifinalists already have market traction or key development partners (see table 10).

The submissions were pre-screened by the program directors and passed on to the jury for ranking. The jury included highly distinguished academic and professional members (see table 11). The 20 semifinalists attended a three-day ISCTE-IUL boot camp to ground all the selectees in the fundamentals of presenting their ideas succinctly, clarifying the problem solved, and organizing their business plan along a customer-focused method.

E-Teams Boot Camp Training

The five semifinalists in each track were announced on July 1, 2010. The ISCTE-IUL MIT Portugal's entrepreneurship teams (e-Teams) were invited to a boot camp held at ISCTE-IUL from July 5-7, 2010. The boot camp was attended by 43 out of 73 team members, and accounted for all 20 teams.

The syllabus was specially designed to the semifinalists entrepreneurship teams and consisted of three main areas, as follows:

1. Team-building (Oliver Rohrïch):

1.1 The definitions of the different roles of Belbin

1.2 Important rules of brainstorming

1.3 Concepts for new products to take advantage of the crisis situation

1.4 Basic presentation and non-verbal communication skills.

2. The value proposition process (Virgínia Trigo):

2.1 Entrepreneurship: from idea to market

2.2 Profiling the problem, mapping the opportunity & knowing the technical advantages

2.3 Preparation of elevator pitches

2.4 Chalk talk & poster preparation.

3. The Go-to-market plan (Gonçalo Amorim, Luis Martins, Walter Palma & José Paulo Esperança):

3.1 Competitors and differentiation, market Size & structure

3.2 Value creation & pricing strategy; business model & IP strategy

3.3 Technology roadmap and development; operations & commercialization strategies

3.4 Financial projections and funding.

Table 9. Submissions Distribution Across Tracks

Track	Number of Submissions	%
IT AND WEB	35	36.8%
PRODUCTS & SERVICES	28	29.5%
LIFE SCIENCES	18	18.9%
ENERGY & TRANSPORTATION	14	14.7%
TOTAL	95	100.0 %

Table 10. ISCTE Semifinalist Teams

Track	Semifinalist Teams
IT AND WEB	ABBAN, AIRES, BIPS, eunoia, Mumu.fm
PRODUCTS & SERVICES	BioEsters, Fytozimus, iFoodTech, Weadapt, Nano'nox
LIFE SCIENCES	Accelera Therapeutics, Cell2B, PLUX, Regenear, Smart Medicines
ENERGY & TRANSPORTATION	Critical Move, eMOVE, FeedZai, PV Solutions, Wayenergy

Table 11. Jury structure for Semi-finalists selection (end/June 10)

	Jury Structure	Judge Representative	Affiliation
Judge 1	MIT Judge 1	Charles Cooney	Director of Deshpande Center for Technology Innovation
Judge 2	MIT Judge 2	Luis Perez Breva	MIT Research Scientist; Lecturer, Sloan School of Mgmt
Judge 3	Award Partner	Jose Furtado	CEO Caixa Capital/CGD
Judge 4	Strategic Partner	Nuno Sousa	UMinho Director, School of Medicine
Judge 5	Expert 1 (Track 1)	Nuno Arantes de Oliveira	Founder & CEO of Alfama Pharmaceuticals
Judge 6	Expert 2 (Track 2)	Miguel Matias	Founder & CEO of Selfenergy
Judge 7	Expert 3 (Track 3)	António Murta	Former CEO of Enabler & CEO of Pathena Venture Capital
Judge 8	Expert 4 (Track 4)	Jorge Sales Gomes	CEO Brisa Inovação
Judge 9	ISCTE-IUL Dean	Gonçalo Amorim & Jose Estabil	MPP-IEI Project Directors

Luís Reto, Dean of ISCTE-IUL, convened the closing ceremony and introduced keynotes Jonathan Medved, noted serial entrepreneur and Israeli venture capitalist, and Carlos Zorrinho, Economy and Innovation Secretary of State. Mr. Medved emphasized the theme of *think big but start small* to the semifinalists.

Over 15 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.

For future consideration is to invite business school students from ISCTE-IUL and the recently launched Lisbon MBA program to afford an opportunity for the semifinalists to benefit from the possible volunteer contribution of students during the competition.

Track Finals

Off to an auspicious start, MPP-IEI attracted a very specific high quality group of innovators and technologists with strong international value propositions. The final phase of this competition accounted with 19 projects distributed in four technological areas. Table 12 provides a summary of these companies by technology area, and is followed by company descriptions.

The Four Finalists

The 19 finalists pitched their projects at the final ceremony, on September 30th, in a ceremony with the presence of the Secretary of State for Science, Technology and Higher Education, Manuel Heitor. The four best projects—one in each area—were selected by an independent jury and the four winners were announced. These were **PLUX** (Life Sciences), **Waynergy** (Sustainable Energy & Transportation Systems), **BIPS** (IT & Web), and **Weadapt** (Other Products and Services), who were each awarded a prize of €100,000.

Table 12. Final Competition Phase: 19 Projects in 4 Technology Areas

Technology Area	Start-up	Project (Winning Entries in Bold)
Life Sciences	Accelera Therapeutics	A cellular and biologic therapy for the treatment of immune mediated diseases
	Cell2B	A new line of healthcare therapies to solve organ rejection
	PLUX	**Creating innovative solutions for healthcare, sports and scientific research**
	Regenear	A pioneer company in tissue engineering field
	Treat U	A targeted lipid-based nanotechnology
Sustainable Energy & Transportation Systems	Critical Move	A new mobility concept
	Waynergy	**A technology-based company in renewable energy & energy efficiency markets**
	Emove	Technologies that aspire to generate electrical power from wave-power
	PV Solutions	New cost-effective technologies for the photovoltaic industry
IT & Web	ABBAN	Cloud ontact Center, effectively delivered on a pay-as-you-use basis
	AIRES	Advanced Intelligent Risk Evaluation System
	BIPS	**Bluetooth Indoor Positioning System**
	EUNOIA	Redefining value in media distribution system
	MUMU.fm	Where music meets free
Other Products & Services	Aromase	Natural biotech solutions to flavor & fragrance industry
	Fytozimus	Natural enzymes is our business
	iFoodTech	Innovative food ingredients
	Nano'nox	Auto-rechargeable antimicrobial for textiles
	Weadapt.eu	**The Inclusive fashion store**

Life Sciences

• Accelera Therapeutics

Acellera Therapeutics is a drug discovery and development start-up committed to developing treatments for serious unmet medical needs.

Our flagship therapeutic, ACE-1, reduces the risk of liver transplant rejection and death for the 70,000 people currently living with transplanted livers, without the severe adverse effects of current treatments.

ACE-1 will be priced at €21,000 and can lead to yearly savings of up to €19,000 per patient in post-surgical costs. Acellera Therapeutics' major assets, when entering this €1 Bn market, are: team expertise; technology and IP robustness; and a clear unmet medical need.

Investment opportunity

€125K (12 months); VC Funding: €8-13 M (at least 3 years); Biotech/Pharma partner: €27-76 M (6 years). NPV: €268M (5 years after market entry).

Team

David Cristina, PhD, Luís Graça, MD, PhD & Marta Monteiro, PhD.

Life Sciences
• Cell2B

We believe ImmuneSafe™ may prevent and halt multiple forms of immunological rejection.

Cell2B aims to establish itself as a biotechnology company dedicated to the development of a new line of healthcare therapies to prevent and treat organ rejection in patients undergoing organ or tissue transplants.

Our therapy has the potential to impact the lives of more than 175,000 patients per year in Europe and the United States. It will also have a major impact in every stakeholder: medical community, hospitals, health insurance companies, and national healthcare systems.

We have established clinical proof-of-concept for Cell2B therapies. It has shown to increase the success rates of the current standard of care in transplantation.

Investment opportunity

€5M (12 months); €1.2 Million in revenue (2013). Break-even point in the 5th fiscal year.

Team

David Braga Malta (Chairman); Daniela Couto (CEO); Francisco dos Santos (CSO); Pedro Andrade (COO).

Life Sciences
• PLUX **Winner in this category*

PLUX aims to bring the future of healthcare to people's homes and daily lives.

Every year one million people in Europe suffer from stroke, 41% of the population is affected by musculoskeletal disorders (MSDs) and one third of the women are affected by urinary incontinence after pregnancy. These are just a few examples of dysfunctions for which patients are assisted everyday in physiotherapy clinics. Our bioPLUX clinical system is a more efficient tool for physical therapy. The EU alone has 25,000 clinics, and through our 5 year business development plan we are targeting entry in Spain, France, Germany, Italy, and the UK.

Investment opportunity

Series A round of €1M between 2011 (€850k) and 2012 (€150k). Payback: 1 year; Net Present Value: €27.6M.

Team

Hugo Gamboa, PhD (CEO); Filipe Silva, MSc (CTO); Hugo Silva, MSc (CIO); Rui Falcão (CMO).

Life Sciences
• Regenear

Regenear mission is to develop and commercialize bio-kits to generate 3D cartilage structures grown from patient's own cells.

The resulting cartilage grafts will be implanted in:

- Patients who need reconstructive surgery due to birth defects or trauma
- Cosmetic surgeries where a cartilage graft is needed to augment or alter the shape of a patient's ear, nose or chin.

Regenear's unique technology proposes to culture, expand, and grow patient's own cartilage tissue in proprietary in vitro devices that provide the environment necessary for chondrocytes, or chondrocyte precursor cells to assemble and form cartilage tissue of a given size and shape to match a patient's needs.

Investment opportunity

€1.6M (2010-14) + €30M (2015-17). Payback: 2021.

Team

Agata Gelabertó (President); Albert Milé (Managing Partner); Mercedes Balcells, PhD (Scientific Director); R. Edelman, MD, PhD (MIT).

Life Sciences
• Treat U

Treat U develops an unique, novel, versatile, and profitable technological platform for cancer therapy.

Treat U is focused on the development of a nanotechnology-based platform for the specific delivery of agents with pharmacological interest for human health, with the Pharmaceutical Industry as its final customer. Treat U technological platform gathers a subset of features that distinguish it from any other technology in the market or in clinical trials, with higher therapeutic efficacy and lower incidence of adverse side effects in cancer treatment. This creates new therapeutic opportunities in personalized medicine and adds new value to drugs already owned by the pharmaceutical industry.

Investment opportunity

€1.71M (2011-15), payback of 8 to 10x investment (€52.5M, 2015).

Team

João Nuno Moreira, PhD; Vera Moura, PhD; Sérgio Simões, PhD.

Sustainable Energy & Transportation Systems

• Critical Move

Critical Move provides customized people transport solutions for hospitals, airports, resorts, industrial & university campuses, eco-towns and new urban developments based on unique and innovative green autonomous vehicles.

The Move system leads to significant operational cost reductions of 75%, when compared to a traditional application based on a diesel or electric vehicle operated with a driver available 24h/d.

For this application, the Move system, even considering the construction of a new dedicated road, has a return of investment less than 4 years (2 years when compared to an electric minibus and 4 when compared to a diesel minibus).

Additionally Move has a high potential as a marketing tool and may have a very positive social impact.

Investment opportunity

€400k (2011) + €1.6M (2012). €1M Acc. Cash-Flow (by 2014) with sales of €3.3M.

Team

Luisa Goulão, Msc (Founder); António Cunha, MSc (Founder); Pedro Serra, Msc (Founder).

Sustainable Energy & Transportation Systems

• Waynergy **Winner in this category*

Waynergy is a system that converts the linear motion of the surface to actuate an electromagnetic technology device that generates electricity.

Waynergy Systems reduces the electric energy costs by 50 to 80% in places with great affluence of people or vehicles, applying its energy generation system on the floor.

Our system has a payback of under 30 months, 3 times shorter than other renewable solutions and 10 to 12 times shorter than other floor generating systems. It also allows reducing carbon dioxide emissions and improving energy efficiency of national grids.

Investment opportunity

€150k (1 year) + €1.5M (over 2012); Payback: ~ 2 years; IRR ~ 400% (2015).

Team

Francisco Duarte, MSc (Founder); Filipe Casimiro, MSc (Founder).

Sustainable Energy & Transportation Systems
• Emove

Aims at developing and commercializing the first reliable, small, secure, resistant, effective, design attractive and price competitive wave power device BluSphere.

Emove Innovative Technologies, Ltd. developed an outstanding product, BluSphere, which will finally allow humankind to explore the unique potential hidden so far in the Wave Power, by guaranteeing a great resistance and adaptability to tough Ocean conditions, with a competitive price/energy produced ratio over the global renewable energy market.

The Blusphere will solve many of the existing problems linked to such a harsh environment as the ocean, which so far have been bedeviled several enterprises and solutions. Generating therefore more energy in the long run and with less maintenance/repair costs and consequently a better price/energy produced ratio.

Investment opportunity

€1.5M. Payback in less than 2 years.

Team

Miguel Caetano (CSO); Pedro Balas (CEO); Tiago Rodrigues (CFO); João Fernandes (CTO); Carlos Pacheco (COO); Diogo Cruz (CBO)

Sustainable Energy & Transportation Systems
• PV Solutions

We offer silicon wafers of upper end quality at a low price.

This is possible with our new process (patent pending) that bypasses three very expensive and material wasting steps of present technology.

The silicon wafer accounts for ~74% of the direct costs of a state-of-the-art solar cell company, our target customer, for whom wafer cost and quality are essential for competitiveness.

The dominant companies, based on silicon technology, know their prices must go down because of dwindling subsidies and fierce competition, creating a massive opportunity for our disruptive technology.

Solar photovoltaic industry sales are worth over €10 Bn and have been growing at ~30% a year.

Investment opportunity

€65M (2015)

Team

António Vallêra (CEO), Murteira Nabo (Strategic Advisor), João Serra (Scientific Officer), Jorge Alves (Operations & Logistics), Miguel Brito (Laboratory & HR), Nuno Silva (Marketing & Finance).

IT & Web

• ABBAN

Cloud Contact Center, effectively delivered on a pay-as-you-use basis.

Many organizations for the last five to ten years have considered expenditure on front-office communications systems as a low priority compared to investment in back-office solutions.

This view has led to the continued use of legacy technologies that are not suitable for the way in which consumers want to interact today.

To ensure that organizations focuses on all media types ensuring a consistent service approach regardless of the communications channel, ABBAN has developed a more flexible customer contact solution, offering a variety of contact channels, faster and better-directed handling.

They not only help improve the customer experience, with all the benefits that brings, but also help organizations invest wisely, improving efficiency and reducing costs.

Investment opportunity

€1M (700k€ non-refundable / QREN initiative). Turnover: ~ €50M (5th year). Break-even in 2012.

Team

Carlos Amorim (Founder & CEO), João Safara (CFO), Rui Aguiar (Chief Scientist).

IT & Web

• AIRES Advanced Intelligent Risk Evaluation System

A risk-free business is impossible. However, "risk-free" risk models may be not.

AIRES will boost the accuracy of credit risk methodologies, leading to considerable gains for banks and companies.

Our solution is built on a Software as a Service (SaaS) platform that easily and fully adapts to all kind of customers without interfering with their existing systems.

AIRES has a scalable business model which allows a smooth integration in international markets and different industries.

Investment opportunity

€200k (12 Months). Payback in 2 years.

Team

João Neves (Business Director), Armando Vieira (Director of Research), Bernardete Ribeiro (IT Researcher), Tiago Marques (Marketing).

IT & Web

• BIPS Bluetooth Indoor Positioning System **Winner in this category*

The core business of our company is mobile development, from mobile applications to software & hardware that interact with handheld devices.

There are great needs in measuring consumer behavior that may help businesses improve their operational efficiency and provide a better consumer experience. Around Knowledge has developed solutions that are able to track individual paths, retrieve times and trends automatically. It is up to 89% less expensive than traditional solutions, and being a tagless technology is able to preserve privacy. It provides higher confidence levels and data in real time. The first demonstration took place at Portugal Tecnológico where it was presented to the Prime Minister. The potential global market is US$33.9 billion; incubated by INSerralves.

Investment opportunity

€100k (12 months). Payback: 1 year. NPV €46M.

Team

Diana Almeida (Founder), Suzy Vasconcelos (Founder), Maria Ferraz (Founder), Roberto Colazingari (Founder).

IT & Web

• EUNOIA

We redefine the value chain of digital distribution by bringing the consumer into the value-chain as an active agent.

Our model is totally focused on the customer, enabling him to make money, via growth of digital content market whilst actively promoting the reduction of illegal copying, by giving the product a tangible value.

It eliminates 35% of the total cost and allows for a near "zero marginal cost" market. Eunoia has the additional benefit of reducing the barrier for the effective entry of new content providers.

The mobile platform that supports the model will be introduced into the market 5 months after start-up and the company will reach break-even in the beginning of the second year.

Investment opportunity

€2.5M (first year). Breakeven second year. Exit valuation (year 5): ~ €740M.

Team

Orlando Remédios (CEO), João Redol (CTO), Frederico Figueiredo (Creative Director)

IT & Web

• MUMU.fm

Through an innovative and sophisticated recommendation system it will be possible for the user to discover and download music in a free, gratuitous, and legal way.

Like in a Freemium business model, the freely available services will act to promote and bring users to the site while the paid services (enhanced recommendation, licensing, advanced features, music consulting services, advertising, event promotion, ticket selling) will bring the economic benefits to the Mumu.fm project.

Mumu.fm aims to be the reference system to recommend free music online launching in just six months. Like a "Google" of free music working worldwide in a $40B market.

Investment opportunity

~ €2.4M (over 6 years). Sales (Y6): ~ €9M.

Team

André Ricardo, MSc; André Guerreiro, MSc.

Other Products & Services

• Aromase

An alternative route for ester aroma compounds systems, based on enzyme preparations to assist bioconversion.

AROMASE offers a new biotechnological process for high quality aroma compounds production, at a competitive price and under environmentally friendly conditions.

Such compounds are classified as natural, highly benefiting the flavors and fragrances industry. The market is estimated near US$1 billion with an annual growth rate of 2.9%. In this market, AROMASE offers:

- A better quality when compared with the synthetic aroma compounds,
- Complements the natural extract with same quality at lower costs.

These compounds give the characteristic fruit flavor to the processed food, beverage, and other flavored products.

Investment opportunity

$1M (12 to 18 months). Break-even point: third year; NPV: $100M; IRR ~70%.

Team

Luís Fonseca (PostDoc) Verónica Romão (PhD), Nuno Lourenço (PhD), Dragana Barros (PhD student).

Other Products & Services
• Fytozimus

Fytozimus is uniquely positioned to offer a complete solution to supply new enzymes to the dairy industry.

Fytozimus Biotech is an Euro-Canadian biotech company, incorporated in 2006/07. It has developed and owns unique and patented enzyme solutions:

- CYNZIME, 100% of plant origin
- CYPROZIME, recombinant from plant origin.

Both of these enzymes are UNIQUE in clotting all kinds of milk, including camel milk, as well as low fat milks. Our enzymes yield cheeses of a superior and healthier quality. Fytozimus enzymes are potent substitutes of the existing enzymes in the market. These enable responding to consumer demands in an unprecedented way, in targets such as healthy food, low fat dairy products, vegans, vegetarians and koshers. The market of clotting enzymes is valued at €585 M for 2010 based mostly on recombinant chymosin & microbial enzymes.

Investment opportunity

€1M (1 year), Revenues of ~ €14M (year 5).

Team

Maria Salomé Pais (Founder & CEO), Aurélio Fernandes (Managing Director), Aladje Baldé (Senior Research Scientist), Pedro Sampaio (Research Scientist).

Other Products & Services
• iFoodTech

iFoodTech will produce food ingredients for the industry with health benefits at competitive prices.

The technology is ecologically clean and allows the use of low economical value products (i.e. food industry by products) to produce dietary fibres with beneficial effect on human health.

Dietary fibres from coffee and from red algae naturally abundant at "Ria de Aveiro" will be produced.

The search of food ingredients with nutraceutical properties, according to consumers demanding, confers a high potential of growth to this project.

The time-to-market is 1.5 years.

Investment opportunity

~ €460k. NPV: €2.9M Payback 3 years.

Team

Manuel Coimbra (PhD), Elisabete Coelho (Researcher), Cláudia Nunes (Researcher), Cláudia Passos (Researcher).

Other Products & Services

• Nano'nox

We have a promising (and ready-to-market) product called Nano'nox, which is an auto-rechargeable antimicrobial for textiles.

The increased prevalence of nosocomial diseases (HAIs) has placed a huge financial burden on hospitals. NANO'NOX is applied by conventional finishing methods on textile articles, giving them an antimicrobial effect of 99%. Each time the textile articles are laundered with conventional detergents, the product recovers the active substance (peroxide) it has naturally lost through usage and the antimicrobial effect is completely restored. This phenomenon, called auto-recharge, will make Nano'nox revolutionize the antimicrobial market and make the world safer from microbes, saving lives and resources. Nano'nox is a produce of Ecoticket, Lda, a spin-off company from Minho University, specializing in the ecological application of functional nanoparticles.

Investment opportunity

€100k (year 1); 300% income in the first 5 years

Team

João Gomes (Coordinator, Shaper), César Martins (Specialist; Implementer), Jaime Rocha Gomes (Plant), Pedro Aguiar (Monitor Evaluator) and Dr. Sandra Sampaio (Specialist).

Other Products & Services

• Weadapt.eu **Winner in this category*

Our goal is to contribute to the inclusion of people with special needs by increasing their self-esteem, comfort, autonomy, and quality of life.

Weadapt develops and sells inclusive products (garments, aesthetic prosthetics, and rehabilitation devices) resulting from ongoing research projects since 2005 aimed at people with special needs. We have been working closely with rehabilitation centers and disability institutions we identify needs/difficulties not properly addressed. We want to explore this real business opportunity, with a multidisciplinary and highly qualified team in R&D. We can have a significant contribution to the inclusion of the 600 million people with some type of disability by increasing their self-esteem, comfort, autonomy, and quality of life: rehabilitation goals with important impact in national health expenses.

Investment opportunity

€250k (2Y); NPV (6Y): ~€1M and an IRR ~135%.

Team

Miguel Carvalho (GM, R&D Team), Carla Lopes (CEO), Susana Ralha (Marketing & Commercial Director), Carla Lopes (Financing), Teresa Carvalho (Operations & Logistics).

4.

Specialized Training & Networking

"We have been present in most of the UTEN workshops in 2008 and 2009, which possibly was the most important source of learning (and formal knowledge) and international networking for us, particularly for the younger people that work at INOVISA."

Luís Mira, INOVISA Director

4.1 Training Events

UTEN Training Weeks and International Workshops are designed to enhance Portuguese TTO managers and staff capabilities for technology transfer and commercialization, as participants have the opportunity to:

- Deepen understanding of science and technology transfer and commercialization through case studies that build on the experience of leading institutions worldwide
- Foster working relationships, share tools and perspectives, and examine key challenges and issues facing key Portuguese stakeholders
- Contribute to a sustainable, critical mass of professional technology transfer talent to facilitate globally competitive technology commercialization
- Understand and access UTEN activities and networks ranging from international internships to on-the-job training.

Organized with the FCT, both types of events involve international experts from public and private organizations as well as select representatives from Portugal's international partners including The University of Texas at Austin, Carnegie Mellon University, Massachusetts Institute of Technology, the Fraunhofer Institute, Cambridge University, General Electric, and other world-class collaborators. From September 2009 through September 2010, UTEN conducted five training weeks and four international workshops (with attendance) as follows:

- Training Weeks
  - » *Licensing & Negotiation* (33)
  - » *Capital Sourcing* (32)
  - » *Technology Venturing & Spin-offs* (23)
  - » *University-Based Technology Business Incubation* (20)
  - » *Industrial Liaison Office Management* (22)
- International Workshops
  - » *Technology Transfer @ Cambridge University* (28)
  - » *Experiencing Technology Transfer: Collaborating with Carnegie Mellon* (22)
  - » *Commercialization & TT in Communications Security and Information Networking* (25)
  - » *Marine & Biosciences: International Research Collaboration & Network Building for Commercialization* (32)

Attendance at these events was intentionally restricted to encourage intense "learning by doing" exercises and to facilitate significant interaction among expert speakers and participants (see tables 13 and 14). One additional Training Week, *Patent Portfolio Strategic Management*, is planned for November 22-26, 2010, and an International Workshop, *Nanotechnology: Industry Involvement for Research & Valorization*. The UTEN Training Weeks are specifically planned to help bridge the gap between knowledge and its application, or between "hearing" and "doing." These workshops are followed by one-on-one sessions, to help integrate the lessons learned to specific needs of the technology transfer mangers, their offices, their colleagues within the university, and their partners in industry.

Universities are increasingly recognized as key sources of discovery and knowledge transfer and are playing ever increasing roles in how industry innovates. Change in regional and national innovation ecosystems worldwide highlight the need to effectively connect academic institutions with the business community in established firms and in entrepreneurial start-up activities. Global competition, rising R&D costs and the need to get creative and innovative products to the market fast are factors causing companies to reach out to research universities for new ideas, talent, and capabilities. Licensing, corporate sponsored research, consulting engagements, venture capital investment, gifts, and recruitment of graduate students are some of the ways used to build strategic relationships between industry and universities and are becoming a regular part of the open innovation environment. As universities become key sources of discovery and play an ever increasing role in how industry innovates, people and networks are being recognized as the foundation on which to effectively connect academic institutions with the business community.

4.2 Assessments

To aid in planning Training Weeks and International Workshops and to provide policymakers with objective data, online surveys were conducted immediately following each event. Evaluative information was obtained from approximately 80% of the 200+ participants of the events from September 2009 to July 2010.

Overall the evaluative data from participants indicates the series of Training Weeks and International Workshops was well designed and implemented, as feedback has been overwhelmingly positive.

- Approximately 70% of participants rated sessions "Extremely Useful" and "Very Useful", with an additional 23% rating them "Useful." Fewer than 10% said the sessions were "Somewhat Useful" or "Not At All Useful."
- More than one-third (37%) of participants indicated the events, on average, had "Far Exceeded" or "Exceeded" their expectations while an additional 53% said their expectations had been "Met."
- Approximately 91% of participants responded that the international workshops and training weeks on average had "Provided information new to me," and "Information they can use in their jobs," while 88% said the events "Will help me strengthen my technology transfer capabilities."
- Eight-two percent of all participants said they would recommend the training to a colleague, and 65 percent of attendees said they would like more advanced training on certain topics.

Some variation in the ratings across events occurred due to different presenters and content, different audiences in size and backgrounds. There was also diversity in workshop and training week objectives, program formats, and evaluation instruments. The pages following describe these events in more detail. Quotes highlighted in the following pages were provided from participants of these events, and are used with their permission.

Table 13. Training Weeks: September 2009 - July 2010

Dec. 14-15, 2009 Dec. 17-18, 2009	TW#1: Licensing & Negotiations	• University of Lisbon (UL) • Univ. of Porto Faculty of Engineering (FEUP) • OTC, UT Austin
Jan. 25-26, 2010 Jan. 28-29, 2010	TW#2: Capital Sourcing & Technology Venturing	• Lisbon Univ. Inst. (ISCTE-IUL) • Univ. of Porto Faculty of Engineering (FEUP) • IC² Institute, UT Austin
Mar. 15-17, 2010	TW#3: University Spin-off & Venture Creation	• New University of Lisbon (UNL) • Texas A&M University, College Station, Texas
May 24-26, 2010	TW#4: University-based Technology Business Incubation	• Avepark, Guimarães • Austin Technology Incubator, UT Austin • Research Valley Innovation Center, College Station, Texas
July 19-20, 2010	TW#5: Setting up & Managing an Industrial Liaison Office	• Porto Polytechnic Institute (IPP), Porto • Office of Sponsored Projects (OSP), UT Austin

Table 14. International Workshops: September 2009 - September 2010

Oct. 18-20, 2009	IW#1: Technology Transfer @ Cambridge University	• Univ. of Aveiro • Judge School of Management, Cambridge Univ.
Nov. 8-10, 2009	IW#2: Experiencing Technology Transfer: Collaborating with Carnegie Mellon	• Univ. of Coimbra • CTTEC, Carnegie Mellon Univ.
June 15-16, 2010	IW#3: Commercialization & Technology Transfer in Information and Communication Technology	• School of Economics & Management (FCEE), Catholic Univ. of Portugal • CTTEC and Cylab, Carnegie Mellon Univ.
Sep. 27-28, 2010	IW#4: Marine & Biosciences: Research Collaboration & Network Building for Commercialization	• Univ. of Algarve • Centre of Marine Sciences (CCMAR) • Univ. of Texas and Texas A&M Marine Science Inst. • Fraunhofer Institute

"I have become used to the high level of information obtained from UTEN sessions so the information and training I obtained was on par with my expectations."

Luís Remisio, University of Porto

Training Week #1

• Licensing & Negotiation

Dec. 14-15, 2009: University of Lisbon
Dec. 17-18, 2009: Univ. of Porto Fac. of Eng. (FEUP)
IC² Institute, The University of Texas at Austin

The two days of hands-on training was designed to help Portuguese university technology transfer officers to more effectively negotiate and close licensing agreements that advance their institutions' mission of building relationships with industry. The training program focused on effective communication skills, negotiation preparation methods, and specific strategies to provide participants with tools to make them more effective and confident negotiators. Learning objectives included:

- Fundamental negotiation concepts
  - » *Distributional* vs. *integrative* negotiation
  - » Negotiating *positions* vs. *interests*
  - » *Resistance* vs. *target* vs. *opening* prices
  - » Opening positions and concessions
  - » Closing the negotiation
- Identifying an organization's core licensing practices/policies & forming the negotiation team
- Defining favorable outcomes for a negotiation
- Managing the license from development of deal terms to execution of the agreement
- Identifying industry norms for use as objective benchmarks
- Researching and analyzing the licensee, marketplace, value chain and profit model
- Effective concepts for university spin-off companies

International Experts

Rick Friedman, *Associate Director for Licensing for the Office of Technology Commercialization at The University of Texas at Austin.* Rick has 18 years of experience structuring, negotiating, and managing complex intellectual property, financial, and commercial transactions for technology ventures. He has also served as an independent business development and legal consultant to several private technology companies.

Max Green, *Licensing Specialist for the Office of Technology Commercialization at The University of Texas at Austin.* Max specializes in the physical sciences, marketing technology to prospective partners, negotiating intellectual property licenses, and guiding investments in patent prosecution.

"Very interesting: gave me really good tips for licensing agreements and contracts."
Dina Pereira, R&D Coordination Institute, University of Beira Interior

"The sessions gave me the important elements to improve my skills. The information provided was very focused and targeted at real situations that we find in our TTOs."
Rafael Pedrosa, Polytechnic Institute of Porto

Training Week #2

• Capital Sourcing & Technology Venturing

Jan. 25-26, 2010: Lisbon Univ. Inst. (ISCTE-IUL)
Jan. 28-29, 2010: Univ. of Porto Fac. of Eng. (FEUP)
IC² Institute, The University of Texas at Austin

The workshop on capital sourcing for early-stage technology startups focused on fostering dialogue and constructive interaction between key stakeholder groups—including Portuguese venture capital and angel investors and associations, as well as Portuguese entrepreneurs—to align interests to successfully fund and launch emerging international technology companies.

Participants engaged in exercises and discussions to develop skills in:

- Deal terms and documents
- Norms and trends in the industry
- Dos and don'ts when pitching for capital
- How to manage investor relationships for success

Sixteen of the thirty-two participants represented key leading capital sources in Portugal, including venture funds and business angels.

International Experts

Laura Kilcrease, *Founder and Managing Director of Triton Ventures.* From 1992 to 1997, Laura served as executive director of the IC² Institute's Center for Commercialization and Enterprise (C2E), which developed commercialization strategies for universities, government laboratories, research consortia, and R&D departments of major corporations. In 1989, Laura launched the Austin Technology Incubator (ATI) and The Texas Capital Network, one of the largest "business angel" investor networks in the United States with over $150 million in completed transactions. She also helped launch the Austin Technology Council, a premier networking organization that cultivated technology-based growth in Austin.

Jamie Rhodes is a serial entrepreneur, as well as founder and chair of the Central Texas Angel Network. Jamie works with a variety of Texas-based universities and regions to help launch and grow business angel networks to fund technology-based growth. He also serves the State of Texas as a member of the Central Texas Regional Center of Innovation and Commercialization (CT-RCIC) as both an advisory board member and business plan reviewer.

"It was a very well structured workshop with practical information about capital sourcing and real market experiences. It also had a good assessment of U.S. and Portuguese realities."

Eduarda Camilo, OTIC | Technical University of Lisbon

Training Week #3

• University Spin-off & Venture Creation

Mar. 15-16, 2010: New University of Lisbon
IC² Institute, The University of Texas at Austin

The third UTEN training week focused on best practices for a technology transfer office to promote technology venturing and university spin-off companies. Main topics discussed were:

- Commercialization goals within university missions
- Models of university venture creation
- Steps in venture creation process
- Fostering spin-offs
- Business intelligence tools
- Paths to markets for technologies

Brett Cornwell facilitated interactive sessions to help participants consider their goals, impact, and role within the university ecosystem. He described the Texas A&M University's OTC philosophy and methodology to facilitate ventures along the path-to-market. As part of these sessions, participant-led discussion sessions focused on how these processes and management philosophies might be applied directly by their own TTOs.

International Expert

Brett Cornwell, *Associate Vice Chancellor for Commercialization for The Texas A&M University System*. He previously served as Texas A&M System's Director of Commercialization Services, which commercializes the intellectual property of the Texas A&M System and works to create companies that develop products and services focused on A&M system-developed technologies. The A&M OTC obtains intellectual property protection for system inventions to create licensing opportunities for industry partners. Services provided for spin-off companies from the OTC include market assessments, business plan development, and the development of venture pitches.

"I had moderate expectations relative to this session because it would treat a subject on which I have many questions and very few certainties. ...I felt I learned a lot... knowledge that, indeed, I will apply in my office."

Rafael Pedrosa, Polytechnic Institute of Porto

Training Week #4

• University-based Technology Business Incubation

May 24-26, 2010: AvePark, Guimarães
IC² Institute, The University of Texas at Austin

Training week number four focused on better understanding university-based incubation. Topics discussed included:

- Launching high-growth global companies
- Selecting and servicing companies for incubation success
- Leveraging international partnerships
- Supporting portfolio companies to go global
- Preparing ventures to form partnerships quickly and minimize international time-to-market

Expert speakers provided a range of perspectives and practical overviews of trends in incubation models and key tasks and responsibilities of incubators and TTOs regarding company growth and internationalization. Sessions created a framework for participants to receive targeted assistance on how to build university and community involvement for establishing incubator success. Portuguese entrepreneurs also attended one-on-one follow-on sessions to discuss individual entrepreneurial and internationalization strategies and challenges with incubation experts.

International Experts

Laura Kilcrease *co-developed and launched IC² Institute's Austin Technology Incubator (ATI) in 1989.* Under her leadership, ATI selected and established over 70 technology-based companies that created nearly 1,500 jobs and secured approximately $170 million in funding; ATI won awards for NBIA Incubator of the Year in 1994, the Justin Morill Technology Transfer Society in 1996, and the NBIA Company Graduate of the Year in 1996.

Aruni Gunasegaram, *serial entrepreneur, graduated the company Isochron (which later sold) through the Austin Technology Incubator.* She is currently ATI's operations and financial manager, responsible for internal operations as well as operational support of ATI member companies.

Omar Hakim, *experienced entrepreneur and General Manager of the Research Valley Innovation Center, an emerging-technology business incubator in Central Texas, which works closely with the Texas A&M University System.* Omar also founded the Aggie Angel Network, one of the nation's first alumni-based networks of accredited investors.

"It was nice to answer some questions about internationalization and U.S. market with Portuguese start-ups."

David Resende, University of Aveiro

Training Week #5

• Setting up & Managing an Industrial Liaison Office (ILO)

July 19-20, 2010: Porto Polytechnic Institute (IPP), Porto
IC² Institute, The University of Texas at Austin

The success of technology commercialization ecosystems relies on the alignment and exchange of knowledge and resources between a broad range of partners including the government, universities, and industry contacts. Increasingly, industrial liaison offices (ILOs) foster crucial relationships and align universities with industrial partners to increase research, joint development, and commercialization. Training Week #5 reviewed:

- Effective strategy for research collaboration and technology commercialization with industry
- Balancing interests of university and industry
- Leveraging core university missions of research and education while working with industry
- Industry partnerships that foster research and commercialization
- An overview of different types of university-industry research agreements and how they can contribute to meaningful collaboration
- Establishing an industrial affiliates program
- How R&D organizations can build industrial constituency
- Tools, techniques, and methods to manage IP, confidentiality, and commercialization while collaborating with industry

Training provided participants with real-world examples, including the structure and establishment of ILOs, leading-edge practices, proven frameworks, and an interactive forum to explore lessons learned. The workshop addressed the essentials needed to establish an ILO, including strategy, structure, programs, talent, and relationship building with industry.

International Experts

Bill Catlett, *Associate Director of Industrial Relations, Office of Sponsored Projects, and Acting Director of the Center for Emerging Technology Commercialization at The University of Texas at Austin.*

Anthony Boccanfuso, *Executive Director of University Industry Demonstration Partnership at the U.S. National Academy of Sciences.*

"I learned...1) What is an ILO; 2) Best ways to foster industry relationships; 3) What considerations you have to take into account when setting up an ILO."

Luis Remisio, University of Porto

International Workshop #1

• Technology Transfer @ Cambridge University

Oct. 18-20, 2009: University of Aveiro
Judge School of Management, Cambridge University

Hosted by the University of Aveiro, the University Technology Enterprise Network (UTEN) in collaboration with the Judge School of Management, University of Cambridge, and the International Partnerships Program of the Science and Technology Foundation (FCT) organized International Workshop: *Technology Transfer @ Cambridge,* October 18 - 20, 2009. The main topics included:

- *Technology clusters: The case study of Cambridge*
- *Technology transfer at Cambridge University*
- *International comparisons*

This workshop was held at the Sala de Senado (Senate Room) of the Dean's Office of the University of Aveiro October 18–20, 2009. Speakers presented the model and experience of the University of Cambridge on technology transfer and cluster development. Session one discussed *universities, cluster strategies, and regional development*; *the status of technology transfer in Portugal and the UTEN Portugal network*; and *the history of the development of the Cambridge cluster and the University of Cambridge's role in this development.* Another main theme during the first session was *the basis of fostering successful clusters and technology transfer.* Session two focused on the component parts of *technology transfer and clustering spin-offs*; *university research, patents, and intellectual property management.* The final session focused on *international comparisons*—what can be learned and how can such learning be applied.

International Experts

- **David Gill,** *Head of St. John's Innovation Centre, the largest and most important incubator in the United Kingdom.*
- **Richard Jennings,** *Director of Tech Transfer and member of Cambridge Enterprise.*
- **Peter Hiscocks,** *former Director of Cambridge Enterprise.*

"Our institute is now able to bear in mind different perspectives while defining new internal policies and procedures; basic mistakes and errors can be avoided."
André Fialho, Legal Advisor, Instituto de Medicinal Molecular

International Workshop #2

• Experiencing Technology Transfer: Collaborating with Carnegie Mellon

Nov. 8-10, 2009: UCoimbra, Instituto Pedro Nunes
CTTEC, Carnegie Mellon University

The main objectives of this workshop were to present the Carnegie Mellon University model for technology transfer and entrepreneurship development and to provide training to Portuguese technology transfer offices (TTOs) in licensing issues, technology transfer models, skill development, and metrics to measure success.

The first day, Carnegie Mellon experts presented the university's overall approach to regional economic development and provided an overview of the university's TTO, Office of General Counsel, and Office of Government Relations and the interface between those offices and other departments within the university. Portuguese corporate representatives addressed the importance of technology transfer from their perspective. Following the general sessions, in depth presentations focused on software licensing issues and start-up models and on TTO models, skill requirements and metrics to measure success. The second day was limited to a select group of TTO participants from within Portugal. It consisted of a presentation on Carnegie Mellon's standard license and spin-off license templates and a discussion of common licensing issues and concerns. In addition, the experts will guide the participants though case studies illustrating key points of deal valuation and structure and license negotiation.

International Experts

- **Tara Branstad, Associate Director,** Center for Technology Transfer and Enterprise Creation (CTTEC)
- **Timothy P. McNulty,** Associate Vice President for Government Relations
- **Mary Beth Shaw,** Assistant General Counsel, Office of General Counsel

"[I heard] about concepts, strategies, and models of cooperation between TTOs and industry. With the examples [I more easily understood] what we were talking about in the earliest sessions."

Rafael Pedrosa, Polytechnic Institute of Porto

International Workshop #3

• Commercialization & Technology Transfer in Information and Communication Technology

June 15-16 2010: Catholic Univ. of Portugal, Lisbon
Cylab and Carnegie Mellon University

Experts from Carnegie Mellon University discussed how a university can engage corporate partners in the process of innovation and technology commercialization. An overview of different functional offices was provided as well as strategies for working together to achieve the greatest benefits for the university, its faculty, and corporate partners.

Keynote speaker Hyong Kim presented challenges in collaborative research within communication security and information networking. Various examples of corporate partnering were introduced and discussed, including corporate gifts, sponsored research agreements, consortium agreements, licenses and the use of master agreements. In addition, discussion focused on cultivating corporate partnerships, alumni relationships, and efforts to attract key corporate partners to facilities on or near campus.

Participants were introduced to Carnegie Mellon's CyLab (cyber security) Consortium and Quality of Life ERC Consortium; and representatives discussed consortium structures, relationships with corporate members, member rights and privileges, and models for commercialization partnerships. Specific issues in corporate partnering were also addressed, including publication, intellectual property ownership, the use of university facilities, access to students, and faculty conflict of interest and consulting. Case Study sessions provided opportunity for interactive focus on the details of various types of agreements commonly entered into with corporate partners.

International Experts

Keynote Speaker Hyong Kim, *Carnegie Mellon University (CMU) Professor of Electrical and Computer Engineering.* Kim's research interests include Scalable QoS Switch Architecture Design and implementation of scalable switch architectures for large networks with varying quality of service. In addition to performance design metrics, implementation metrics such as power, space, and cost effectiveness are explored in the design of switch architectures. Additional CMU speakers included:

- **Gene Hambrick,** *Corporate Relations of CyLab*
- **Bill Swisher,** *Acting Senior Director, Corporate and Foundation Relations*
- **Curt Stone,** *Executive-in-Residence, Director of the QoLT Foundry and Industry Liaison*
- **Tara Brandstad,** *Associate Director, Center for Technology Transfer and Enterprise Creation (CTTEC)*
- **Mary Beth Shaw,** *Assistant General Counsel*
- **Amir Anwar,** *Director of International Alumni Relations*
- **Joanne Kyriacopoulos,** *Export Control Compliance Officer*

International Workshop #4

• Marine & Biosciences: International Research Collaboration & Network Building for Commercialization

Sep. 27-28, 2010: Univ. of Algarve, CCMAR
Univ. of Texas and Texas A&M Marine Science Institutes
Fraunhofer Institute

The seas are a challenge and an opportunity for science and industry alike. Portugal's historical role in finding new lands across the seas can now be materialized in a new era of scientific and economic exploration. The training focus for this workshop was to build international research networks and provide case examples of marine and bio sciences commercialization, collaborative research, and industrial affiliate programs, technology transfer and technology venturing (university spin-offs). Main research topics included:

- Fish nutrition and mariculture
- Aquaculture and drug discovery
- Deep sea exploration using advanced robotics and other technologies
- Algal biotech

A special session was presented on *Uncovering New Marine Resources: Task Group for the Extension of the Portuguese Continental Shelf (EMEPC) biological and geological resources.* Science and technology commercialization topics discussed include:

- Building strategic relationships between industry and universities
- Licensing corporate sponsored research and negotiation of research contracts
- Hands-on training for university technology transfer officers
- Case examples of successful university-industry partnerships for commercialization

International Experts

- **Adelino Canario,** *Workshop Chair, University Algarve and Head CCMAR*
- **João Tasso Sousa,** *Workshop Co-chair, University of Porto, FEUP*
- **Frank Pezold,** *Dean, College of Science and Technology, Texas A&M University, Corpus Christi*
- **Joan Holt,** *Associate Director, University of Texas Science Institute*
- **Christine Burke,** *South Texas Technology Management (STTM)*
- **Lorenz Kaiser,** *Fraunhofer-Gesellschaft, Division Director Legal Affairs and Contracts*
- **Sabine Krieg,** *Fraunhofer IGB, Business Development*

5.

Assessing UTEN's Impact Across Portugal

"There are few TTOs in Portugal that have the necessary experience on the issues that the UTEN program addresses. Even the more experienced Portuguese TTOs can benefit...

Jorge Figueira, TTO Director, UCoimbra

5.1 UTEN Impact across Portugal

Following are brief testimonials written by directors and managers of select Portuguese Technology Transfer Offices (TTOs). They present an overview of each TTO and, in their words, the impact of UTEN programs and activities. The reviews presented include:

1. Hugo Barros, Technology Transfer Officer, CRIA, UAlg.
2. Pedro Silva, Technology Transfer Officer, TecMinho, University of Minho
3. Jorge Figueira, TTO Director, U.Coimbra
4. Carla Mascarenhas, Technology Transfer Officer, UTAD, University Tras-os-montes e Alto Douro
5. Luís Mira, Director, INOVISA, Higher Institute of Agronomy
6. Maria Oliveira, Director UPIN, University of Porto
7. José Rainho, Director and Marlos Silva, UATEC, University of Aveiro.

Hugo Barros, Technology Transfer Officer, CRIA, UAlg

The participation of members Dr. Alexandra Marques, Dr. Hugo Barros and Dr. Sofia Vairinho from the University of Algarve (UAlg) in the UTEN Program was absolutely a major step for the licensing, commercialization procedures, and organization of this institution. The opportunity to participate in UTEN activities and programs allowed all UAlg TTO staff to more closely work together in the same direction: The promotion and the commercialization of University of Algarve results. As a result of UTEN training and programs, TTO staff is now better able to identify the commercial potential of university S&T and work toward successful conclusions in TT processes. Also important in the success of UAlg is the professional specialization within Algarve's TTO and CRIA (Division of Entrepreneurship and Technology Transfer) which employ:

- A PhD in marine science for assessing UAlg science and technologies
- An expert on TT commercialization with an economics background
- A lawyer for overseeing legal agreements and legal structures associated with TT licensing and spin-offs.

UTEN provided an important structural step for the University of Algarve with training and increased awareness of well-established, organized internal procedures from technology disclosures to licensing and spin-off creations. For example, as a result of participation in the UTEN program, the University of Algarve was able to support its first spin-off company, which is owned by the university, based on an international patent (Genogla Lda). During this process, UAlg provided the necessary knowledge and advice gained through UTEN—from the initial disclosure to the license agreement and the patent application.

Also through UTEN's professional development programs UAlg had the opportunity to establish contacts with new markets and new agents in the United States. During the professional development program that took place at the University of Texas in Austin, we were able to contact the right person in U.S. companies for a university technology that has since been successfully licensed to a Portuguese fertilizer company. UALG's Marine Science TT expert was able to participate in technology outreach meetings at the UT Marine Science Institute in Port Aransas and UT Pan American in the Rio Grande Valley as well as to develop technology and market assessments of Portuguese technologies using the UTEN tools of "RapidScreen" and "MarketLook." She was also able to establish commercial and research collaborations for a technology in aquaculture which is likely to bring an important innovation to the fish food industry.

In addition at CMU, through the UTEN program, the University of Algarve was able to develop and consolidate international contacts with global and innovative companies and world known researchers and research centers (like Alan W. Black and CyLab). Through these connections progress was made in commercializing technologies developed by UAlg researchers such as EASY VOICE, a technology developed for handicap persons. The UTEN Professional Development Program at CMU also allowed for the development and consolidation of first commercial contacts with specific entities like PLSG.

Pedro Silva, Technology Transfer Officer, TecMinho, UMinho

In my personal opinion, UTEN has proven to be a true capacity building program and prime networking catalyst for key staff in Portuguese technology transfer offices. As I pointed out in my internship report for 2009, the number one expectation for TecMinho from the UTEN Program was to ensure that solid steps towards a developing continuous professionalization of the technology transfer office were taken. An office where staff was given the proper attitude, skills sets, know-how and know-who to operate effectively as a TTO.

TecMinho has been widely recognized for both internal (meaning the organization itself and its main stakeholder, the University of Minho) and external achievements (partners, clients, funders). This enhanced credibility ensures promising opportunities for TecMinho to assume a stronger position in our focused regional development efforts. I cannot help but believe that our capabilities, both external and internal, have been both strengthened and consolidated not only through our long experience in the field and collective and individual efforts within the office, but also through the support and assistance of the UTEN program which has been integral to the reshaping of some of the technology transfer approaches and modus operandi within the office.

The changes underway are only happening because we took our stakeholders into consideration, or even better, because we know that these changes can only happen if we jointly work on them. We aspire to a strategic and continuous involvement of our present and future stakeholders, no matter who or where they may be, in our different endeavors as the basis of the renewed technology transfer function in a global open innovation setting. The vision that we are pursuing is also having impact upon new regional strategic partnerships, as it is the case of an innovative model that we have conceived for the creation and animation of what we expect to be a Euroregional competitiveness Pole on Nanotechnology. Other innovative projects are also being prepared for testing out new approaches of technology transfer based on complementarities found across institutions that share the same challenges, barriers and

motivations, so as to maximize the chances of translating research results into societal and economical benefits. The bottom line for all these approaches is that complexity and pace of change today, demand joint efforts to achieve critical mass, reduce risk, and get to meaningful results earlier than others. That is why we are more eager than ever to enlarge our networking capabilities so as to understand which synergies and win-win situations we might take through such active collaborations. This is also the philosophy over which the ongoing collaboration with the UT-Austin OTC is grounded.

The work with the OTC has seen recent increasing focus on analyzing possibilities for technology bundling, joint commercialization activities or even in-licensing and cross-licensing. Some good targets have already been identified among technologies, start-ups, and research lines, being now in a deeper analysis stage. The work with the OTC has also translated into joint development of strategies and methodologies targeting different operational stages, which are now being documented for follow-on implementation. The exchange of critical business information and other strategic insights on multiple files is being pursued constantly. The tight bonds of the long-term collaboration established with the OTC may also end in a short term opportunity for a reverse staff exchanged. Rosemary French (Junior Licensing Specialist) is appointed for interning soon at TecMinho, as a way of speeding up some of the leading joint activities that are taking place.

Other collaborations based on the same vision and on similar principles and ideas are being discussed with Emergent Technologies Fund (where I am spending my second US internship period), ATI, Incell, Texas A&M, UT Health OTC at Houston, University of Illinois at Chicago OTM (Office of Technology Management), among others. Our approach here has been first to get an overall understanding of the institution (in terms of strategies, approaches, models, operations, and portfolios), followed by a presentation of possible synergies and complementarities that may be exploited together. Of course that the immediate take away is the correlated set of ideas for improvement and knowledge capital that we keep accumulating through these cross-breeding processes.

It would be a really extensive list if I mentioned all the other institutions, people and information that I came across through UTEN, which might all contribute for the innovative character that we want to instill in our own organization. And it is widely known how cross-country and cross-sectoral interactions may feed the innovation process. It is our intention to furthering these contacts to multiply our opportunity windows and develop further our innovation process. In my opinion, innovation is for us the only way out to solve the multiple barriers that we face in our function, within the ultimate goal of a continuous improvement of our processes, operations, and resulting performance. There is a pipeline of new approaches for our processes, operations and procedures that are undergoing initial conception, documentation and testing.

The first outcome of the innovative character talked before is our unique assessment process, which was a result of several needs that we were feeling at the first

moments of the technology management process (right after the disclosure form and until the moment a business development strategy may be conceived). It was also a result of features that we took from different assessment processes that we were exposed too, some of them through the UTEN program. The assessment process is already in implementation phase, but it is still being further fine-tuned and condensed in terms of documented procedures. We expect to conduct an informal evaluation of this process with our target audience – the inventors, so as to understand how happy and comfortable are our first inventor users with the flow and the outcomes of the assessment process. It is important to state that the setup of the assessment process was completed with really satisfactory results and at an incredible pace due to the UTEN in-situation training with Heath Naquin that took place by the end of last year at TecMinho.

The science/technology/start-up management processes, strictly considered, are the actual "raw materials" of our venture, and results are already there. We are managing the different processes with an enhanced knowledge of all the critical stages and with improved processes, procedures, skills, and techniques, which are ultimately being performed with a better allocation of time and resources, leading to solid decision making at important milestones of the overall valorization process. It is never enough to state that this has also the direct contribution of the know-how and know-who acquired through the program. Furthermore, UTEN has employed all the available resources, under the restrictions of the Program Management in what regards operational technology commercialization, to help us out with our technology/start-up management processes, establishing innumerous links that have been intensively used for assessment, marketing, business development, negotiation and licensing diligences. For all the above mentioned achievements and many others that are still to come of even greater importance and impact, it is not hard for me to truly believe, even at such a short distance, that the UTEN program is changing the technology transfer landscape in Portugal forever.

Jorge Figueira, TTO Director, UCoimbra

Learning on-site in Austin, Texas with experts that have deep know-how in knowledge transfer and commercialization was a great opportunity for me to exchange experiences and approaches on how to better manage my TTO's problems and to avoid mistakes that others have experienced. The University of Coimbra's international internships with UTEN enabled us to:

- Identify U.S. commercialization practices that could be implemented in our university context
- Identify tools that could be adapted to our daily work
- Enhance networks with other TTO participants, including Portuguese TTOs as well as U.S. experts
- Understand and learn how best to develop a functioning "Technopolis" or regional innovation ecosystem.

The UTEN internships have already helped us change and improve some of our approaches such as:

- Revamping our technology evaluation procedures
- Applying new and very helpful insights on innovation ecosystem management, which changed the approach we had planned for the next few years.

These internships are very important as Portugal has a significant delay on technology transfer issues in relation to other external experiences. There are few TTOs in Portugal that have the necessary experience on the issues that the UTEN program addresses. Even the more experienced Portuguese TTOs can benefit from quick immersion in technology transfer and innovation tasks and international environments allowing for rapid training on-site on real cases while being mentored by experienced professionals that provide needed support.

Carla Mascarenhas, Technology Transfer Officer UTAD

Since its founding, UTAD has worked to establish effective procedures concerning portfolio management and licensing. However, after attending UTEN's training weeks and the International Internship in San Antonio, with John Fitzgerald at South Texas Technology Management (STTM) and Cliff Zintgraff, UTEN Program Manager, we decided to change key UTAD procedures. Some of the new and revised procedures include:

- How best to structure a one page summary that we are sending to companies that we believe could be interested in UTAD's technologies.
- Using UTEN's RapidScreen methodology to assess UTAD's portfolio of technologies.

The RapidScreen methodology helps us explain to university researchers a clear assessment of how their technology is considered in terms of a licensing possibility. It is also very useful to make the researchers understand that they need to work more resourcefully with the TTO in order to accomplish a successful licensing deal.

During the training weeks in Austin, Texas and internship at STTM in San Antonio, UTAD contacted U.S. companies that showed special interest in one UTAD technology, however due to the lack of important technical results we could not complete the license.

The UTEN program has motivated us to change some of our TT procedures, which have helped us become more effective in important tasks such as contacting companies, capital sourcing, and overall portfolio management. UTAD has already instituted some important changes and we are currently preparing a "good practices manual" for our researchers and students, focusing on of these changes.

Luís Mira, Director INOVISA

INOVISA is a technology business incubator and technology transfer office associated to the Instituto Superior de Agronomia Lisboa (Technical University of Lisbon). The focus on specific sectors has led us to develop several initiatives with the aim of increasing the scale and potential of technology transfer and entrepreneurship activities. One of the most important of these initiatives is the "INOVAR network," a national-based project linking four Portuguese universities and five major associations

within the agriculture, food and forestry sectors in Portugal. The objective of this project is to create four thematic interactive channels (olives and olive oil; vineyards and wine; horticulture and forest) to link producers and users of technology. This is also an opportunity to develop a single point of contact at both national and international levels in these sectors, improving the relationships between research and industry.

The "INOVAR network" is an important structure to develop new national, as well as international, projects and partnerships linking researchers and industry worldwide. A recent example of these activities tis the Horticultural Brokerage Event (www.ihc2010.org/bevent), organized by INOVISA in partnership with the International Horticultural Congress Lisbon 2010 (a congress with 3800 participants from more than 50 countries). The brokerage had 530 registered participants and more than 750 meeting requests, which took place in Lisbon between the 23rd and the 26th of August. These meetings led to new international partnerships as well as a potential global network to promote technology transfer in the horticultural sector.

INOVISA also works with public universities in Portuguese-speaking countries to set up technology business incubators and technology transfer offices. This process is particularly advanced in Angola. Since the beginning of 2010, INOVISA has been working in close collaboration with Universidade Agostinho Neto (Luanda) in the development of a Technology Transfer Office/Business Incubator/Technology Center. The main goal of this project is to promote the economical and social development of Angola based on the support of innovation, technology transfer, and entrepreneurship activities. This project led to the parallel creation of an Angolan Network of Technology Transfer, intended to promote the development of R&D in Angolan universities and public research institutes, as well as to develop skills and know-how and share experiences on innovation/technology transfer.

At the national level, in late 2008 the city of Torres Vedras (located 40 km from Lisbon) contacted INOVISA to develop a partnership to create a Technology Center/Business Incubator. A business plan was prepared and the project is currently waiting for public funds. In Ribatejo INOVISA has been working very closely with an agro-food cluster that was recently created to develop innovation partnerships, links between private companies and R&D institutions, and projects of high technological intensity. In this context, INOVISA was hired to undertake a benchmarking study of technology clusters in the agro-food sector at an international level. Finally, INOVISA has created a partnership with a regional Science and Technology Park (about 80 km from Lisbon) to develop a Technology Center to set up added value and high quality scientific and technology services and a business incubator.

The partnership with UTEN has been extremely important in all these projects, in three different and complementary

ways. First, Isabel Alte da Veiga, who is responsible for technology transfer at INOVISA, spent 12 weeks in Texas, working closely and getting strategic orientation from experts at Texas A&M University and with UTEN mentors at UTEN Austin. This allowed us to create a strong base for our projects. Second, INOVISA had extremely valuable discussions with specialists in diverse fields at UTEN events in Portugal and sometimes in visits and long debates at INOVISA. Finally, we have been present in most of the UTEN workshops in 2008 and 2009, which possibly was the most important source of learning (and formal knowledge) and international networking for us, and particularly for the younger people that work at INOVISA.

Maria Oliviera, Director UPIN

UTEN's Specialized International Internships in Technology Transfer were an excellent opportunity for UPIN to immerse University of Porto Innovation Office personnel in international TTO environments and to learn firsthand how different offices and professionals are managed in order to help UPIN optimize technology transfer efforts. UPIN has benefitted from international internship experiences by working with two distinct U.S. technology transfer offices, the OTC at The University of Texas at Austin and Boston University's Office of Technology Development (OTD). Both internship experiences were an excellent opportunity for enhanced skill and professional competency development to achieve better individual and organizational TT results for UPIN.

During Filipe Castro's internship at The University of Texas, Austin OTC, he worked with several entities of the University system while studying particular TT and commercialization methodologies and practices that could be benchmarked and adapted to the Portuguese reality and to UPIN's context. The defined working plan at UT Austin's OTC focused on the following topics:

- Developing skills in technology commercialization processes
- Relating technology commercialization issues with spin-off support activities
- Developing marketing efforts for U.Porto technologies
- Gathering information for organizational procedures and methodologies to be adapted to UPIN.

During his Internship, Filipe was also assisted by UTEN Austin Program Manager Heath Naquin on commercializing UPIN technologies. Filipe was mentored while he contacted U.S. experts to elicit market feedback focused on Portuguese technologies. In addition, he had the opportunity to participate in technology commercialization events such as "The World's Best Technology (WBT) Showcase" in Arlington, Texas where he met with U.S. private equity and venture capital professionals while observing entrepreneurial pitches of U.S.-based technology firms.

Maria's internship provided her with the opportunity to study the Office of Technology Development (OTD) at Boston University and to transfer this knowledge to UPIN. A key UPIN objective is to strengthen links to the University of Porto community as well as to increase the efficiency and diligence in screening and marketing U.Porto technologies.

By discussing technology transfer within UT Austin's OTC and Boston University's OTD, offices of different size and organizational structure, UPIN benefitted from the opportunity to benchmark a range of TT practices and to better understand which would be best for UPIN to implement. During these internships important international links were established that include:

- Maria Oliveira is working with The Institute for Technology Entrepreneurship & Commercialization (ITEC) at Boston University's School of Management, to collaborate in entrepreneurship training and to establish a platform for U.Porto spin-offs to enter Boston and the U.S. market. One U.Porto spin-off is already in contact with ITEC to analyze the possibility to spinning-out their first U.S. subsidiary.
- Filipe Castro continues to work on how best to continue to work with the University of Texas OTC concerning cross-licensing and technology bundling with the University of Porto.

In summary, UTEN's support of the implementation of new methodologies and in delivering on-the-job training to UPIN staff together with the international internships and training weeks and national workshops has certainly helped UPIN foster higher technology transfer efficiency at University of Porto.

José Rainho, Director UATEC and Marlos Silva, Technology Transfer Officer

UATEC has participated in UTEN's technology transfer networking, training and mentoring activities including Training Weeks, National Workshops, and international internships. One of the main benefits of the UTEN program for UATEC has been the on-site training in technology transfer and commercialization provided by international internships in prestigious institutions. UATEC has benefitted from four international internships:

1. **Marlos Silva**, The University of Texas at Austin, Office of Technology Commercialization (OTC), Summer 2009 and a second internship at Emergent Technologies, Inc., Austin, Texas, Summer 2010.
2. **Ana Rita Remígio**, South Texas Technology Management (STTM), San Antonio, Texas, Summer 2009
3. **Ana Teresa Pinto**, Carnegie Mellon University, Center for Technology Transfer and Enterprise Creation (CTTEC), Summer 2010
4. **José Paulo Rainho**, Carnegie Mellon University, Center for Technology Transfer and Enterprise Creation (CTTEC), Summer 2010.

Based on this on-the-job learning UATEC is applying this knowledge to refine and improve its commercialization processes to:

- Improve portfolio management and work distribution procedures
- Establish a well-defined pipeline and timelines
- Build improved relations with key TT functional areas including IP, entrepreneurship, and business development
- Develop procedures to more effectively employ University of Aveiro interns in UATEC's activities

Table 15. UATEC Technology Assessments under UTEN programs and related results

Technology	Field	Activity	Results
Combined Fixation Bone Implant	Biomedical	Assessment: Profile, Pitch, RapidScreen, Industry engagement and FDA path	• NDA and Licensing Negotiation with Portuguese biomedical company • Conversations with Texas institutions to run pre-clinical trials
High performance sealing system composed by nitrite silicon coated with diamond films	Materials	Assessment: Profile, RapidScreen and Industry engagement	• Negotiation with Portuguese metal mech company, for joint-venture (spin-off)
Household garbage compactor	Mechanical Engineering	Assessment: Profile, Pitch RapidScreen and Industry engagement	• Prototype development for demonstration to 1 Portuguese and 1 Dutch company interested
BlueTap - Mixing systems with water saving function	Mechanical Engineering	RapidScreen	• Licensed to a Portuguese metal mech company
System for liquefaction of biomass industrial waste for polyol production	Chemical	RapidScreen and industry engagement	• Licensed to a Portuguese chemical company
Production of Mixed-Metal-Oxide Inorganic Pigments From Industrial Wastes	Chemical	MarketLook: Performed by a MSTC group	• NDA with a Portuguese company
Ion-selective solid contact microelectrode and its production method	Materials	Assessment: Profile, pitch and RapidScreen (ongoing)	• NDA with U.S. expert in the field
Bacterial cellulose production	Materials	Industry engagement	• Conversations with U.S. company to collaborative R&D project: bundling IP and testing with their proprietary material
Water saving system for water or boiler heaters	Mechanical Engineering	Assessment: Profile, RapidScreen and Industry engagement (ongoing, MarketLook (ongoing)	• Conversations with two Portuguese companies interested in joint development and licensing • Technology simulation study (ongoing)
Ceramics produced out of incinerator bottom ash	Materials	Assessment: Profile, RapidScreen and Industry engagement (ongoing)	• NDA execution process with two Portuguese companies interested in joint development and licensing
New construction method for masonry arch bridges and passageways	Civil Engineering	Assessment: Profile, RapidScreen and Industry engagement (ongoing)	• NDA with a Portuguese Civil Engineering company • NDA execution process with a Portuguese Civil Engineering company • Conversations with EUA and UK stakeholders interested in the technology

- Internal marketing strategy to reach out and engage faculty members
- Develop inventor's, entrepreneur's and collaborative research manuals.

One key example of know-how transfer involves the use and continued development of a software-based technology assessment tool introduced by UTEN Austin. The "RapidScreen" methodology is being customized to UATEC's particular requirements while a beta version is being used by UATEC staff. When fully-customized this assessment methodology will provide real-time/web-based portfolio management of IP, commercialization, negotiation/licensing, and post-licensing activities.

In large part, due to the networking and training and mentoring through the UTEN program, UATEC is clearly more business and internationally-oriented than in the past. Table 15 provides examples or case studies of successful technology transfer and commercialization from UATEC including licensing, a spin-offs, or improved industry relationships with a focus on international markets.

6.

UTEN Organization & Partners

"UTEN has proved to be a true capacity building and prime networking catalyst..."

Pedro Silva, TecMinho Technology Transfer Officer & UTEN International Intern

6.1 The UTEN Organization

UTEN is an informal network of 14 Portuguese universities and their technology transfer offices, research centers, and incubators involved in S&T commercialization, as well as select S&T parks with relevant university research activities. UTEN was launched by the Portuguese Science and Technology Foundation (FCT)—with the support of the Portuguese Institute of Industrial Property (INPI) working with the IC² Institute at The University of Texas at Austin. UTEN was created to 1) facilitate, lead, and accelerate the commercialization of science and technology driven by the Portuguese research infrastructure, and 2) to stimulate the involvement of the Portuguese research community in new international joint ventures in science and technology and related economic activities for emerging markets worldwide.

UTEN strengthens international dialogue and provides new networking opportunities for Portuguese technology transfer and commercialization offices and technology-based companies and start-ups in close cooperation with the IC² Institute, The University of Texas at Austin, among other leading institutions worldwide. The involvement of international experts serves as a catalyst as they vigorously share knowledge and act as a sounding board for Portuguese participants.

UTEN Management

UTEN is run 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 project.

UTEN Portugal team:

- José Manuel Mendonça, *Director & President INESC Porto, School of Engineering, University of Porto*
- Maria José Francisco, *Program Manager & FCT Liaison*
- Sonia Pinto, *Assistant to the Director*
- Joana Ferreira, *Communications Coordinator*

UTEN Austin team:

- David V. Gibson, *Director and Associate Director, IC² Institute, The University of Texas at Austin*
- Ana Paula Amorim, *UTEN Liaison*
- Margaret Cotrofeld, *Publications*
- Meiling Guentzel, *Assistant to the Director*
- James Jarrett, *Senior Research Scientist, Observation & Assessment*
- Eli Mercer, *Program Manager Training and Internships*
- Heath Naquin, *Program Manager Technology Commercialization Training*
- Prentiss Riddle, *Head Web Development and Support*
- Cliff Zintgraff, *Program Manager Technology Commercialization Training*

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 started 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
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 presented by institutions, research teams or individuals in open calls, 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.

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.

Considering that universities and R&D Institutes are two of the most relevant users of the Industrial Property System in Portugal, it is INPI's intent to make available instruments and measures which will enable these institutions to safely introduce the results of their research into the market. This can only be achieved by applying the best practices of technology and knowledge transfer. INPI considers the UTEN Program an outstanding opportunity to foster the creation of a sustainable network of technology transfer offices within Portugal.

University and Institutional Partners across Portugal

In order for UTEN to succeed, it is essential for university and institutional partners across Portugal to move further into the international marketplace. Table 16 lists organizations that have joined in this effort and following the table are brief descriptions of some of these organizations.

Table 16. 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
Avepark (S&T Park)		Carlos Remísio
Spinpark (Technology-based Incubator)		Avelino Pinto
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)		Carmo Fonseca
New University of Lisbon	FCT (Unidade de Promoção do Empreend. e Transf. de Tecnología) Reitoria UNL (Gab. Empreendedorismo) ITQB UNL	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 Vítor 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)		António Nunes
Taguspark (Science & Technology Park)	GAPI (Office for the Promotion of Industrial Property)	Amaro Teixeira
ISA	INOVISA (Association for Innovation and Business Development, Higher Institute of Agronomy, ISA)	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		Víctor Cardial
PARKURBIS. Science & Technology Park of Covilhã		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)	Vasco Varela
INPI (Portuguese Institute of Industrial Property	Leonor Trindade Marco Diniz

• INESC Porto LA

Inst. de Eng. de Sistemas e Computadores do Porto
José Manuel Mendonça

From knowledge production to science-based innovation: INESC Porto is a private, non-profit, public interest institution. INESC Porto LA is an association of this institute with several autonomous research units under common research policy and management. It has been recognized by the Ministry of Science with the statute of Associated Laboratory classified as Excellent.

Porto LA is a center of excellence in several areas, from research in Optoelectronics to applications in Power Systems. Other areas of research include Telecommunications and Digital Media, Manufacturing Systems Engineering, Intelligent Systems, Machine Learning, Computer Science, Information Systems and Innovation Management.

For Porto LA, incubating and nursing new companies is as natural as creating knowledge. Research projects lead to scientific papers and academic training, but they may also lead to novel technology-based businesses. Researchers at INESC Porto LA find an environment that supports them in generating tech-based companies. Spin-off launching is a risky but thrilling activity and INESC Porto LA has successful venture capital partnerships in several new business projects. Since 2000, INESC Porto LA has incubated around 16 companies, in most cases addressing global markets.

The concept of science-based innovation permeates all the activities in INESC Porto LA. Transforming knowledge into innovation requires multidisciplinary teams and an effective relationship with economic agents, with patenting and technology licensing becoming increasingly important components of a process aimed at speeding up technology transfer to industry.

• UATEC

Unidade de Transf. de Tec., Universidade de Aveiro
José Paulo Rainho

The University of Aveiro serves as a public institution to intervene and develop graduate and post-graduate education, research, and society cooperation. Founded in 2006, UATEC provides technology transfer activities to the university including:

- R&D consortium promotion
- Technology-based companies creation support (spin-offs and start-ups)
- Technology-based entrepreneurship promotion
- Intellectual property promotion and valorization
- Technology licensing promotion and knowledge valorization
- Business innovation and university/company collaboration promotion.

• TecMinho

includes OTIC-Minho and GAPI, Universidade do Minho
Marta Catarino

TecMinho is the interface of the University of Minho (UMinho) for the management of 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 15 years, with a world-class track record of patent portfolio management and technology marketing. TecMinho was awarded in 2006 "Best Knowledge Transfer Plan from an Established TT Office" by ProTon Europe, the European Association of Tech Transfer Offices from Public Research Organizations.

At the national level, University of Minho ranks third in terms of scientific production, number of scientists and students (graduate, postgraduate), and ranks first in terms of collaborative research with industry. As the knowledge transfer office of University of Minho, TecMinho's mission is to maximize the valorization of the IP portfolio. With the aim to develop innovative dynamics in innovation and technology transfer, another central action line of TecMinho consists of promoting and participating in national and transnational projects. Finally, in its support services targeting companies, TecMinho offers solutions and consultancy services for companies R&D, innovation and IP needs through a unique access point to its internal services, the universe of knowledge of UMinho through its R&D centers of excellence and its academic spin-offs' network. Simultaneously supporting both researchers to exploit R&D results and companies to define their technology needs, TecMinho promotes the establishment of successful strategic partnerships.

• UPIN

Universidade de Porto Inovação, Universidade de Porto
Maria Oliveira

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 of U. Porto supports the link between the academic and private sectors, acting in the fields of intellectual property (IPR), technology transfer (TT), entrepreneurship and spin-off creation, and university-industry relations. UPIN is certified by the National Structural Funds Managing Authority to provide services in the areas of RTD, TT and IPR. It is engaged in national and international networks: OTIC (Portuguese Network of Technology and Knowledge Transfer Workshops); GAPI (Portuguese Network of Industrial Property Promotion Units); TII (Technology Transfer and Innovation Association); ProTon Europe (European Knowledge Transfer Association) 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 TT offices in Portugal.

• UPTEC

Associação de Transferência de Tecnologia da Asprela, University of Porto
Carla Gonçalves

The UPTEC is a structure that supports and stimulates the creation of advanced technology-based projects. Currently located in the University Campus of Asprela, Campo Alegre and Coronel Pacheco, the UPTEC leads technological entrepreneurship, enabling ideas that pave the way for big business. In UPTEC entrepreneurs can find support to realize their ideas, something that can stimulate the creation of technology-based start-ups. Moreover, existing enterprises can find mechanisms to perform their projects, in order to transfer knowledge and technology from the University of Porto. Currently, the Science Park is in the process of expansion and is expected to create more three associated centers dedicated to the sea, the creative industries and agriculture.

• OTIC UC

Oficina de Transferência de Tecnologia e de Conhecimento, Universidade da Coimbra
Jorge Figueira

Founded in 1290, the University of Coimbra has eight faculties with more than 2, 000 members and researchers, more than 150 R&D units, and 23, 000 students. The most international university in Portugal, UC also has 1, 572 students coming from 60 different countries. The university actively supports and invests in facilities and resources to promote innovation and the climate for spin-off company creation while it collaborates with other educational institutions and with business and industry institutions worldwide. IPN, a successful technology business incubator, was established in the early 1990s, and more recently, the Knowledge Transfer Office (GATS.UC) was established in 2003. GATS activities include:

- Technology scouting
- Public private partnerships
- IP management and licensing
- Funding opportunities
- Promoting conferences, seminars and training courses
- Promoting an entrepreneurial spirit within the community.

UC promoted the creation of Biocant, a biotechnology science park and R&D center to help serve the emerging biotechnology cluster in central Portugal, and more recently has invested in Coimbra i-Park to serve as technology park to Coimbra.

• IN+

Centre of Innovation, Technology and Policy Research, Instituto Superior Técnico
Paulo Ferrão

The multidisciplinary activities of IN+ 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 Valorização Económica de Ciência e Tecnologia e Organização de Empresas (VECTORe) since 2001—an annual "informal" non-degree program to promote the commercialization of science and technology and the launching of entrepreneurial ideas and projects. 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 IC^2 Institute, The University of Texas at Austin. Among other awards, in 2005 the center was named one of the "Top 50 global centres of research on Management of Technology," by the Int'l Association for the Management of Technology, IAMOT.

• OTIC-GAPI UTAD

Oficina de Transf. de Inovação e Conhecimento & Gabinete de Apoio à Promoção da Propriedade Industrial
Univ. de Trás-os-montes e Alto Douro, Carla Mascarenhas, Miguel Bacelar

Univ. de Trás-os-montes e Alto Douro has a mission of teaching (8,300 students), research, and extension. Research activities at UTAD are concentrated in eight research centres with 300 researchers. The technology transfer office has been established for only 3.5 years, but has provided strong university support in intellectual property and technology transfer. The different background studies, e.g., biology and engineering, of the technology transfer team results in a higher value for the office.

The Univ. de Trás-os-montes e Alto Douro has a wide portfolio of patents in several areas including ambient and renewable energy, chemistry, agriculture, mechanics, and engineering. One of these patents has been licensed by the technology transfer team, and six others are under negotiation.

• UBIACTIVA

Office of Technology and Knowledge Transfer, University of Beira Interior
Dina Pereira, Pedro Serrão

UBI is involved in many R&D projects and consortia in the following technology fields: aeronautics, computing, electromechanics, healthcare, mathematics, optics, telecommunications, textiles and paper materials. UBI helps to analyze new technologies for commercialization potential. UBI also promotes and supports university-company consortia that are necessary for the resolution of concrete company problems. UBI helps to identify key areas for the creation, development and commercialization of new technologies and innovative services, entrepreneurship and technology transfer including spin-offs at national and international levels.

• TECMU

Transf. de tecnologia e Conhecimento Madeira/Universidad, Universidade da Madeira
Carlos Lencastre

TeCMU facilitates interaction between scientific and technological units and the business world in order to help promote the development of new technology products or services that are adapted to the needs of the regional market. At the same time, the aim is not only to speed up these transfer processes to the entrepreneurial world and to technology-based start-ups or spin-offs, but also to consolidate initiatives for the dissemination of industrial and intellectual property. Some of its specific objectives include:

- Monitoring technologies developed within the University of Madeira (UMa) for technology transfer potential
- Identifying society's needs that can be met through technology innovation
- Facilitating partnerships and project development between UMa and the business sector
- Increasing communication with local businesses to increase the university's ability to provide viable workforce training, life long learning, and specialized training in innovative areas
- Protecting and managing the intellectual property (IP) developed at UMa, including its partnered projects
- Promoting the launch of technology-based companies that begin in the university laboratories (spin-offs)
- Elaborating technology transfer contracts (licensing and/or concession contracts) and confidentiality contracts during the technology transfer process.

• DPI Évora

Divisão de Projectos Informação, Univ. de Évora
Joaquim Duarte Silva

Our Mission is to effectively transfer university technologies to the market so as to generate benefits for the university, the community and the general public. Our team offers a full set of services to ensure effective knowledge and technology transfer:

- Management of University of Évora's Scientific Information System—composed by the digital repository of scientific publications; the researcher's CV management system; the projects management system, as well as the contracts and protocols management system
- The University of Évora Research Guide and the Annual of Scientific Publications Abstracts
- R&D and KTT Info—SCC-DPI provides information and supports the applications towards financing programs of researcher mobility, R&D projects and entrepreneurship
- Promote national and international TTO and LTO networks, fostering effective and efficient technology transfer and licensing; also focuses on the promotion of intellectual property and its management inside the university community
- Technological scanning—provide the faculty advice about potential knowledge and tech transfer issues during research activities and to assist in the invention disclosure process
- University to enterprise—regional economical actors count on university as a mean to access to potential opportunities for the creation and development of technologies and businesses.

• GAPI UNL

Gabinete de Apoio à Promoção da Propriedade Industrial, New University of Lisbon
Dina Chaves, Rita Gonçalves

UNIVERSIDADE NOVA DE LISBOA stands for creativity and innovation in Higher Education. NOVA´s research excels in many areas promoting synergies and inter-academic unit cohesion.

At the national level, NOVA is the most recent public institution for higher education and scientific research within the Lisbon metropolitan area. It counts 2 campuses, over 18,000 students, 1,400 faculty staff members and 800 non-academic staff. It consists of 9 Academic Units: 5 Faculties, 3 Public Institutes and 1 School.

NOVA offers 197 courses covering the 3 Bolonha Cycles: 31 graduate courses (first cycle), 81 masters (second cycle), three of which Erasmus Mundus—and 10 integrated master's programs, besides doctoral (third cycle) and post-graduate courses. Overall it has 1,000 Phds and 200 researchers.

It is our commitment to open NOVA to society and our responsibility to ensure the intellectual property is properly protected and commercialized for the benefit of research and the University.

The protection and commercialization of Intellectual Property Rights and the creation and the fostering of an entrepreneurship cultural are the two main areas of activity of GAPI UNL.

It is our mission to promote and facilitate the knowledge transfer process through the protection of ideas and technologies and develop the entrepreneurship ecosystem cross campus and within NOVA.

• OTIC|UTL

Oficina de Transf. de Tecnologia e de Conhecimento da UTL, Universidade Técnica de Lisboa
Maria do Céu Crespo

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.

Since 2006, OTIC|UTL has organized five courses in entrepreneurship and intellectual property protection, has helped patent two technologies, and has made two successful technology transfers. Currently OTIC|UTL is negotiating with Angola for technology and knowledge transfer in areas such as agriculture, economics, and entrepreneurship. Parallel to these activities, OTIC|UTL also promotes the Entrepreneurial Creativity Contest to stimulate entrepreneurial activities among UTL researchers and students.

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

• Polytechnic Institute of Porto

Centre of Creative and Applied Knowledge
Rafael Pedrosa

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

Gabinete de Apoio à Promoção da Propriedade Industrial, Madeira Tecnopólo
Pedro Mota

In recent years, GAPI Madeira has developed strategies for promoting applications for patent protection with the University. 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.

• INDEG/AUDAX

Empreendedorismo e Empresas Familiares, Instituto Superior de Ciências do Trabalho e da Empresa
Ana Fonseca, Rui Ferreira

Established in July 2005, the AUDAX Center is committed to supporting and promoting the entrepreneurial spirit, sustainable self-employment, potential entrepreneurs and family businesses that demonstrate an innovative capacity.

AUDAX serves three main objectives: 1) to create post graduate and specialized training courses on entrepreneurship, business start-ups, and family business management; 2) to promote investment vehicles for start-up projects and early-stage businesses that originate in universities and support technology transfer; 3) to provide specialized consultancy services in areas such as corporate finance, marketing, strategy, human resources, technology, and innovation; and 4) to develop and support research projects promoting entrepreneurship and family business management.

In association with FCUL/UTL–Science Faculty, AUDAX provides support across several stages of the technology transfer process: research to explore the idea and proof-of-market for new technologies (concept and partner contacts), market and technology development (product demonstration), product and business development (license agreements, product sales) and exit.

• IPN including GAPI

Instituto Pedro Nunes including Gabinete de Apoio à Promoção da Propriedade Industrial
Carlos Cerqueira

Instituto Pedro Nunes is Coimbra University's (UC) tech transfer organization, with the mission to leverage strong university/enterprise relationships for innovation and entrepreneurship, acting in R&D and consulting services; business incubation; specialized training; and science and technology promotion.

IPN has six R&D labs and a business incubator that promotes the creation of technology-based companies, supporting innovative ideas from its own labs, universities and entrepreneurs. As a transversal support, the Innovation Department (VCI IPN) provides services on intellectual property (IP), support to R&D projects, marketing and technology commercialization. With its four dedicated staff members, VCI IPN has a strong record on R&D project management, tech transfer, innovation and IP promotion.

IPN recently won second place in the "Best Science-based Incubator" competition, out of a total of 53 science-based incubators from 23 countries. The award was endorsed during the seventh annual Incubator Conference held in Paris on December 2008, based on performance indicators and the opinion of a jury. Some interesting figures are a total number of companies supported higher than 100 (80% still active), a 2008 joint annual turnover above €50M, and the creation of more than 1,000 jobs.

• INOVISA

Assoc. para Inov. e Desenv. Empresarial, Instituto Superior Agronomia
Luís Mira

INOVISA is a private non-profit institution aiming at promoting direct partnerships between the University (Institute of Agronomy/Technical University of Lisbon) and the private sector in the agro-forestry, food, environmental, and biotech areas. INOVISA offers two complementary levels of activities:

- *Entrepreneurship and Enterprise Development:* As a university campus integrated unit, INOVISA is committed to putting together abilities with the aim of creating start-ups and spin-offs based on high potential innovative processes or technologies. These activities include a space for the incubation of new technology-based firms.
- *Innovation and Technology Transfer:* INOVISA works as a platform to enhance synergies between the University and companies for the development of R&D joint venture projects that involve knowledge and technology transfer. INOVISA also promotes technology valorization of university R&D projects, in order to optimize the Institute of Agronomy's performance as a technology lead developer in its areas.

Regarding technology transfer processes, INOVISA is involved in establishing several university-enterprise partnerships, namely in the QREN I&DT Program. In 2009, INOVISA has launched an initiative in the AGROTEC exhibition (national exhibition of the Agro-forestry sector), promoting the most promising technologies of all Agriculture Schools of Portugal. INOVISA is also a partner of OTIC/UTL (the TTO of the Technical University of Lisbon) since the very beginning.

• AvePark

Science and Technology Park
Carlos Remísio

Situated 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 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
Daniela Marta

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. Parkurbis 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

Roberto de Souza

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 Setúbal (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

We are proud to be the first Tecnopole with a quality management team oriented toward its clients achieving an ISO 9001:2008 accreditation. We have met the criteria of the European Business Network in Brussels to attain the seal of BIC: a European Community Business Center. Our 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
António Nunes

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.

CPIN 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. The technology transfer team includes António Nunes and Rita Mendonça.

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.

6.3 Texas Partners

The International Collaboratory for Emerging Technologies (CoLab) was launched on March 2, 2007 as a five-year cooperative program between The University of Texas at Austin and the Portuguese Science and Technology Foundation (FCT), including select Portuguese universities, technology parks, and businesses nationwide.

CoLab's main academic objective is to enhance globally competitive excellence in research and graduate education through mutually beneficial partnerships in Digital Media, Advanced Computing, and Mathematics. In addition, CoLab's University Technology Enterprise Network (UTEN) is based at UT Austin in the IC² (Innovation, Creativity, Capital) Institute. UTEN has provided IC² Institute and Texas-based partners with exciting and important opportunities to work with leading Portuguese academic, business, and government sectors to help build within Portugal a knowledgeable, globally competitive, and sustainable S&T transfer and commercialization network of highly trained professionals.

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. The 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 United States 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 teams of entrepreneurs, 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 United States market. Teams of experts from IC² Institute work in coordination with TechBA's management team to support the Mexican companies in United States 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 United States market. Texas' Emerging Technology Fund was created as a tool to develop and diversify the Texas economy by expediting innovation and commercialization of research. UTEN Austin is actively working 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 U.S. 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.emergenttechnologies.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.

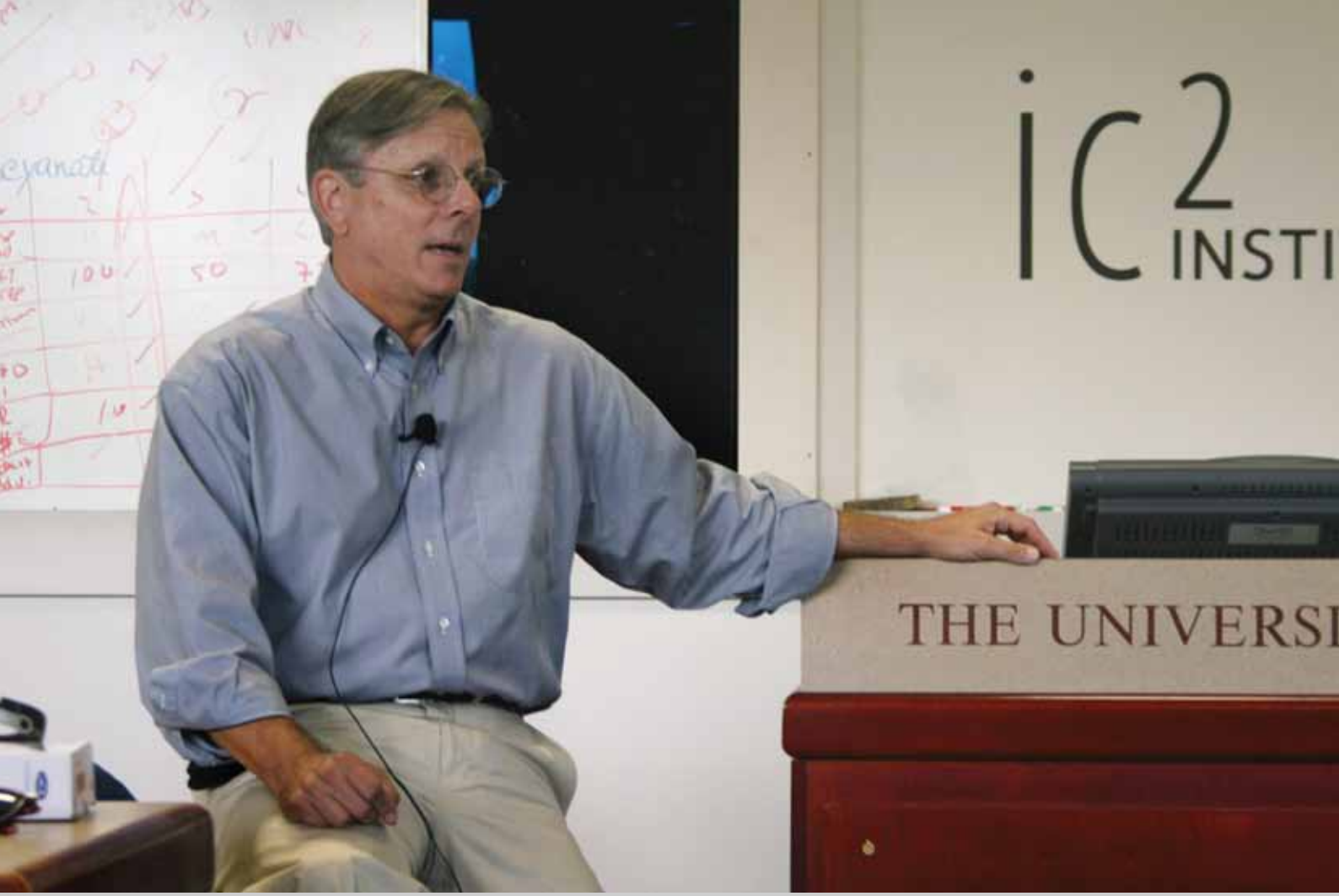
Office of Technology Commercialization, University of Texas at Dallas
www.utdallas.edu

Housed in the heart of the Texas Telecom Corridor, the University of Texas at Dallas' OTC 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.

Office of Technology Commercialization, Texas A&M University
http://otc.tamu.edu/index.jsp

The mission of the OTC 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 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.

University of Texas at San Antonio -CITE

www.utsa.edu

The Center for Innovation & Technology Entrepreneurship (CITE) is a joint venture between the Colleges of Business and Engineering at The University of Texas at San Antonio (UTSA). CITE serves students, faculty, and business entities through a process that helps establish a pipeline of technology entrepreneurs and is focused on accelerating the growth of new technology-based ventures. CITE is focused on four cornerstones of successful technology ventures: education, experience, resources, and support. CITE spearheads the study of entrepreneurship and entrepreneurial education. The intercollegiate effort studies the effects of entrepreneurial pedagogy and curriculum in a scientific manner in order to improve the quality of education and accelerate success of technology entrepreneurs.

INCELL, San Antonio

www.incell.com

INCELL Corporation, LLC is a products manufacturer and contract services biopharmaceutical 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 to bring high quality products and services to those who need them. TEKSA's Mission is to catalyze the commercialization and growth of biosciences and other technology-based startup and spin-off companies, facilitate technology transfer from academia and government research laboratories, and enhance economic development by creating jobs and new ventures.

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. The U.S. News & World Report annual survey ranks UT Austin among the top 15 public universities; the U.S. National Research Council's latest survey ranked seven UT Austin doctoral programs in the top ten nationally. The Times of London ranked UT Austin second among United States public universities and fifteenth overall in its ranking of the world's top 200 universities. 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 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. CoLab is based on collaborative partnerships between The University of Texas at Austin and select universities and laboratories in Portugal. 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 past the planned five years of CoLab. 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 interdisciplinary 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 1 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.

Portugal Editor: Marco Bravo
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Content was contributed by João Sentieiro, Robert Peterson, António Rendas, Marco Bravo, Maria José Francisco, Ana Paula Amorim, David Gibson, James Jarrett, Heath Naquin, Cliff Zintgraff, Margaret Cotrofeld, Aurora Teixeira, Claúdia Moutinho Brandão, Inês Santos Silva, Mafalda Carmo, Sara Fernandes, Filipe Castro, Dina Chaves, Alexandra Marques, Carla Mascarenhas, Ana Rita Remigio, Marlos Silva, Pedro Silva, Marta Catarino, Hugo Barros, Jorge Figueira, Luís Mira, Maria Oliveira, and José Rainho—as well as participants in the surveys of all training weeks, international workshops, international interns, international intern hosts, and university spin-out companies. Photographs were submitted by Sónia Pinto, Joana Ferreira, Janet Tucker, Heath Naquin, Cliff Zintgraff, Prentiss Riddle, David Gibson, Margaret Cotrofeld, and others. Our thanks goes out to all, as well as to you, the reader.

UTEN Portugal

University Technology Enterprise Network

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UTEN is an initiative developed under the FCT's International Partnerships Program with the The University of Texas at Austin and the following programs

UT Austin | Portugal
International Collaboratory for Emerging Technologies, CoLab

MIT Portugal

Information and Communication Technologies Institute
Carnegie Mellon | PORTUGAL
AN INTERNATIONAL PARTNERSHIP

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