University Business Cooperation

15 Institutional Case Studies on the Links Between Higher Education Institutions and Businesses

DG EDUCATION AND CULTURE

Case studies undertaken by **Technopolis**

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1 INTRODUCTION

Europe has a heterogeneous landscape of higher education, not least in respect of university business collaboration. While the last 10 years following the Bologna initiative have seen significant changes in cooperation between universities and business, the theme is still addressed unevenly across Member States, regions and indeed individually at the level of the institution. In many of the new Member States university business cooperation is a recent and inchoate phenomenon, while some of them share with several of the old Member States a degree of scepticism attached to engaging with business and the extent to which academia has the task of ensuring graduate employability. The debate continues, but there is nonetheless a growing acceptance, encouraged by the European Commission, that higher education institutions and businesses do benefit from working together; collaboration stimulates the transfer and sharing of knowledge, and helps create long-term partnerships and profitable opportunities, as well as boosting students' future employment prospects.

In 2006 a Commission Communication[1] set out an agenda encouraging universities to develop structured partnerships with the world of enterprise in order to "become significant players in the economy, able to respond better and faster to the demands of the market and to develop partnerships which harness scientific and technological knowledge". The Communication suggested that enterprises could help universities to reshape curricula, governance structures and could contribute to funding.

A further Communication in 2009, 'A new partnership for the modernisation of universities: the EU Forum for University Business Dialogue'[2], presented a set of measures to develop and strengthen co-operation between universities and businesses, as part of wider efforts to support the modernisation of higher education. This Communication identified six challenges to be addressed in relation to university-business collaboration at the European level. These included: new curricula for employability; fostering entrepreneurship; knowledge transfer; mobility across borders and between business and academia; opening up universities for lifelong learning; and better university governance.

More recently, the Commission has proposed to expand the role of the university-business forum, which has met regularly since 2008, to cover a wider range of issues including, for example, the regional development dimension and elements of the New Skills for New Jobs initiative. As part of this expansion, this report presents a series of 15 institutional case studies from around the European Union, giving diverse examples of particular types of university business cooperation (UBC) in a variety of contexts.

1 COM (2006) 208 final
2 COM (2009) 158 final

1.1 Methodology and the scope of the case studies

This study is in support of the University Business Forum (UBF), an initiative of DG Education and Culture (DG EAC) to support, develop and strengthen co-operation between universities and businesses, as part of wider efforts to support the modernisation of higher education.

The objective of the study is to undertake a selection of institutional in-depth case studies which reflect different approaches to university business cooperation across a selection of Member States.

The study took a mixed method approach to the construction of the case studies.

1.1.1 Desk research

In order to arrive at the selection, a desk research phase was completed:

1. The mapping of all previous speakers of the university business forums;
2. The collection of data from existing case studies performed at the European level (covering entrepreneurship, innovative regions etc);
3. The work of the previous contracts of the UBF in identifying examples for the background papers and the Staff Working Paper for the University Business Forum communication 2009;
4. An overview of European Regional Development Fund financed projects which include university business interactions.

This stage led to a short list of forty five institutions about which the following data was collected for the purpose of classification:

- Size: Student and staff number;
- Age of HEI;
- Ranking;
- University ranking – European;
- Evidence of national / regional drivers for improved UBC;
- Research / non-research university / vocational university;
- Rural area / capital city;
- International oriented / regionally embedded university;
- High / low employability in region;
- Placements embedded obligatory / optional;
- High level of entrepreneurship teaching;
- Lifelong learning oriented university;
- Evidence of new structures or focus to facilitate UBC;
- Types of cooperation in evidence: mobility, recognition of prior learning, widening participation, curriculum development, research, knowledge transfer.

On the principle that there is much to be learnt from an examination of existing interesting examples which are either long-standing (as in some UK universities) or new and emerging (for example in Spain, Portugal and Hungary), the cases have been chosen to reflect different

practices and processes, to give a flavour of the types of approaches, and to indicate successes achieved and barriers that have been overcome (or that are yet to be overcome).

A selection of twenty-five institutions was then put forward using the following selection criteria:

Figure 1 Selection of the case studies

Selection criteria		
Basic selection criteria	Geographical location	Country: Old vs New Member State Capital city / rural area
	Size of the institution	Number of students and number of staff
	Type of the institution	Multidisciplinary / focused on one subject field or group Research vs non-research intensive university/ Vocational International oriented university vs regionally embedded university
	Approach to university business cooperation	Bottom-up / top-down New change in structure to facilitate better links with business
Specific selection criteria	Curriculum development	Interdisciplinary approach in teaching Involvement of businesses in curriculum development
	Entrepreneurship education	Integrated approach / faculty level examples High levels of entrepreneurship teaching
	Employability	Excellent employability ratings / low level of graduate employability
	Placements / mobility (Staff or students)	Placements embedded obligatory vs optional across subjects and faculties
	Continuing education / LLL	Lifelong learning oriented university
	Research KT	Well developed research links and KT which link to education

In addition the cases cover contextual details in order to enable interested individuals to identify issues and practices which may be transferable to their own settings.

1.1.2 Field work

Once the universities were selected background research on the institutions was undertaken and interviews set up individuals at the institution including top management, senior staff and those involved specifically in university business interactions[3].

In addition, for each study the national/regional and institutional strategy was reviewed and university and wider literature consulted to highlight references to university business interactions in either education or research.

The case study structure covers:

- The national/ regional framework;
- The institutional framework;
- The approach taken to UBC in the institution;
  - Rationale behind the collaboration
  - The objectives/benefits of collaboration
  - The activities undertaken

[3] A list of people consulted is presented at the end of each case study.

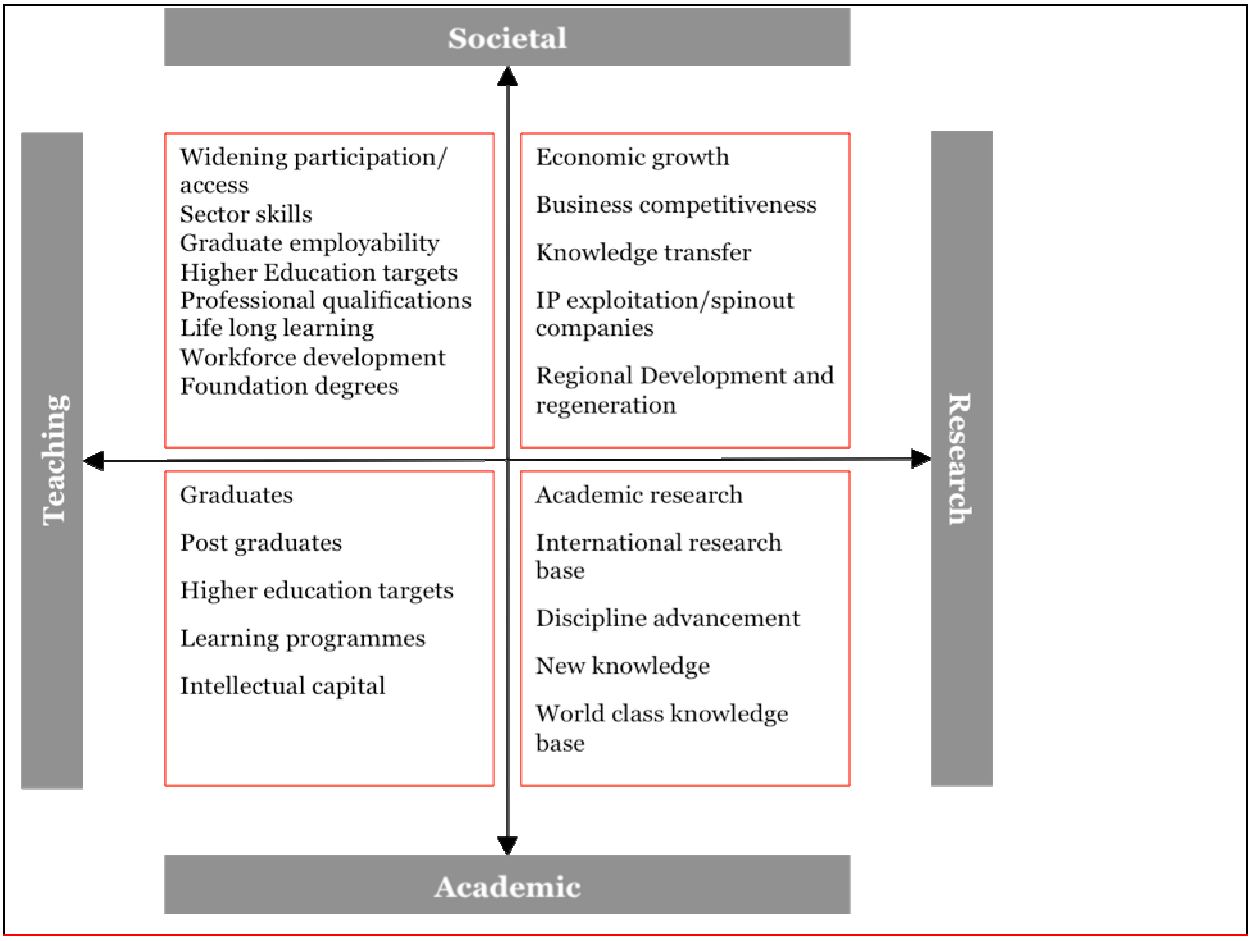
- The types of UBC found in the institution;
- Showcase of selected actions (one or two);
- The drivers for collaboration/barriers overcome;
- Benefits/impacts derived. Value for businesses, universities, students;
- Lessons to be learnt from the case study.

As university business interaction takes place in a number of different settings, the study team was briefed on the different approaches that might need to be taken when exploring governance, management, curriculum design and delivery, placements and so forth.

1.2 Typologies of University Business Collaboration

While there is no standard EU template for interactions between universities and enterprises, several studies, notably in the UK, have proposed systematic depictions of the rationale for, and the practice of, such cooperation and collaboration. On a broad plane, Dr Marilyn Wedgwood of Manchester Metropolitan University has designed a 'Diversity with Excellence' model of employer engagement with the wider higher education context[4], exemplified by one manifestation of the model as follows[5], combining a representative range of internal and external expectations of higher education :

Figure 2 Some agendas/expectations of Higher Education (HE)



4 Fitting Engagement The search for a workable Third Mission model http://oice.vu.edu.au/sitebuilder/resources/knowledge/asset/files/13/marilynwedgewood.pdf

5 Higher Education for the Workforce: Barriers and Facilitators to Employer Engagement. DIUS Research Report 08-04 ISBN 978 1 84478 992 4

Source: Dr Marilyn Wedgewood, Manchester Metropolitan University

These expectations are also present in a 2006 report[6] concerned with graduate recruitment, by the Institute for Employment Research at the University of Warwick and IFF Research. This work proposed that HEI can be seen to interact with employers (and their local community) in a number of different ways:

- Through graduate recruitment (as a supplier of labour);
- As a source of labour demand (many HEI being now amongst the largest employers in their city-regions);
- As a source of lifelong learning (LLL)/ continuous professional development and training (CPD);
- As a supplier of research and development (R&D); and
- As a player in a variety of economic development related networks and partnerships, typically publicly funded (by UK Government, EU, etc.).

Additionally, the report proposed a typology of HEI–employer engagement based around four factors:

- Geographical – local, regional, national, and/or international;
- Employer type – old/mature, new/growing industries, SMEs;
- Scope of links – labour supply, CPD, R&D, partnership/networks; and
- The extent to which links are systematic – formal links as opposed to more ad hoc arrangements.

Most employers in the IER/IFF study sample were engaged in some form of targeting for graduate recruitment purposes and this sometimes included a local dimension. Employers that had no specific links with a local HEI tended to be large firms that recruited nationally or SMEs which simply advertised for graduates without any direct engagement with HEIs.

CPD links tended to be local, because employees need to be close to the university at which they were studying. Where R&D links exist, these tend to be formal where the company had a specialist need, but informal and ad hoc for most companies.

Using an adapted version of the IFF Research typology above, the following figure provides an overview of the case studies presented in the next section.

6 Employer and University Engagement in the Use and Development of Graduate Level Skills. IFF Research 2007

Figure 3 Typology of UBC in case studies

Country	Name of university	Geography of business links	Types of business involved	Formality / types of links	Key features of UBC
Austria	**Upper Austria - University of Applied Sciences**	International/national/regional	Global corporates down to regional SMEs	Formal: R&D/TT; entrepreeurship education; strong departmental links	Practice-oriented teaching methods involving industry
Belgium	**Katholieke Universiteit Leuven**	Mainly regional/local	International high tech/chemical /life sciences etc; also SMEs	Formal R&D/TT links; also enterprise training and curriculum development	UBC decentralised , operating at departmental level
Czech Republic	**Charles University – Prague**	National/regional/local	Mainly public bodies	Formal in the CPPT (KT centre); less so in departmental arrangements; LLL	Relative autonomy for UBC at faculty level
Denmark	**Aalborg University**	Regional/local	Mainly SMEs	Formal: 'Matchmakers'; consultancy/mentoring for entrepreneurs	Distinctive Project Based Learning (PBL) approach fosters industry links
Finland	**University of Turku**	International/national/regional/local	Mainly High Tech and food-related SMEs	Formal: R&D/TT; Business & Innovation Development; entrepreneurship teaching and development	UBC plays strategic role in regional development
France	**Compiegne University of Technology (UTC)**	Regional/local	From international down to local SMEs	Formal: innovation centre; R&D/TT; bespoke training; departmental/business relationships	Dedicated UBC university, with compulsory industry placements
Greece	**National Technical University of Athens (NTUA)**	International and national (mostly research)	Mainly EU and national public bodies	Formal: research contracts; Technological Cultural Centre; sponsored research	UBC includes offer of sophisticated laboratory services for testing and development of products
Hungary	**Budapest Corvinus University**	Mainly regional	Mainly enterprises in the knowledge-based industries	Formal: development centres for SMEs and Innovation; sponsored chairs; departmental links with businesses	Multi-level UBC including strategic partnerships with industry
Ireland	**University of Limerick**	Regional/local (though also has National Technology Park)	From multi-national subsidiaries down to local SMEs	Formal: R&D/TT; professional development education; 'cooperative programme' links with 1,700 employers; CD/LLL	Dedicated UBC university, with compulsory placements in businesses
Portugal	**University of Porto**	National/regional/local	From major corporates to SMEs	Formal: R&D/TT; entrepreneurship education	UBC includes flagship Masters programme (MIETE) for managers and entrepreneurs
Romania	**University Babeş-Bolyai (UBB), Cluj-Napoca**	Mainly regional	Mainly SMEs	Formal: departmental links with SMEs; entrepreneurship education;	UBC makes significant contribution to regional development

Country	Name of university	Geography of business links	Types of business involved	Formality / types of links	Key features of UBC
				innovation	
Slovakia	**Slovak University of Technology, Bratislava**	National/regional	Variety of sizes in automotive/IT/biomedical sectors etc	Formal: business incubator; R&D/TT; entrepreneurship training /LLL	UBC is embedded at departmental level, including compulsory placements in businesses
Spain	**Autonomous University of Madrid (UAM)**	International/national/regional	Multinationals down to SMEs; also public institutions	Formal: e.g. work with employers' associations; TT/KT in Madrid Science Park	Multiple UBC relationships include industry-sponsored chairs
Sweden	**Uppsala University - The Baltic University Programme**	National and Baltic Sea region	Wide variety of firms and institutions involved in sustainable development of the region	Formal - Regional development partnerships and joint actions	Network of 250 HEIs supporting regional development
UK	**University of Surrey**	Regional/local	Enterprises large and small in the knowledge industries and the hospitality sector	Formal: KT/Science Park/Industrial doctorates/student placements/LLL	Variety of UBC actions at departmental level, including 'Professional Training Partnership' with employers.

1.3 Patterns emerging from the case studies

In the typology above, the case studies show that the geography of the business links varies from the (limited) international to the mainly local, with a recurrent incidence of involvement in regional development actions. EU regional development policies have long promoted the inclusion of universities as strategic partners with enterprises and public bodies in the development of local and regional economies, hence the preponderance of the this aspect in the figure above. In the regions, universities have traditionally played a dual role in the innovation system, enhancing stocks of knowledge through research and education and indirectly contributing to industry and economic growth. In the past decade many universities in Europe have formally incorporated regional economic development into their mission statements. Regional development agencies are also including policies which support partnerships between universities and industry in regional economic strategies. Although many are focused on technology transfer, a number include widening their role in linking industry to course development and delivery (although are not always explicitly stated). There are over 200 heterogeneous regions in the European Union representing very diverse technological and economic conditions. They have a variety of needs in terms of skills and human resources.

Universities and other higher education institutions (HEIs) can and do make a significant contribution to regional economic and social development, a role growing in importance in a globalised economy. Too often, however, the potential for synergy is thwarted by failures of communication between regional stakeholders and HEIs, weak or unclear policy signals, and conflicting agendas in institutions[7].

[7] Higher Education and Regions: Globally Competitive, Locally Engaged OECD 2007. In 2004-2007, IMHE, in collaboration with the OECD Public Governance and Territorial Development Directorate, conducted a comparative review of regional engagement of higher education institutions in 14 regions across 12 countries www.oecd.org/edu/imhe/regionaldevelopment

'Regions and HEIs are building partnerships based on shared interest which is principally economic. From the perspective of agencies promoting city and regional development, HEIs have become a key resource. They can help serve regional development most obviously by contributing to a region's comparative advantage in knowledge-based industries and to its human capital base, but also for example by helping to generate new businesses, by contributing to tax revenues and by providing content and audience for local cultural programmes. From the perspective of HEIs, regional involvement has a range of benefits. The local area brings business to institutions in a variety of forms, including student enrolments and payments for research, consultancy and training. At the same time, a thriving region creates an environment in which higher education can also thrive, helping institutions to attract and retain staff and students.' Source: Higher Education and Regions: Globally Competitive, Locally Engaged OECD 2007

Amongst the case studies, the University of Turku provides a particularly good example of an initiative to provide support and development services to enterprises within the context of a strategy for regional development, which was devised in collaboration with other higher education institutions. Equally, Aalborg University espouses a regional development approach with a sophisticated system of networking, while the experience of the Babeş-Bolyai University suggests that its educational programmes of continuous and distance learning can themselves play a key role in helping stimulate the regional economy.

With respect to the types of businesses involved in collaboration with universities, the case studies show a similar range as in the geography above, though some institutions, such as Charles University in Prague and the National Technical University of Athens work for the greater part with public, rather than private, bodies. For the others, at the high end of knowledge and technology transfer, there is an international dimension, usually through the presence of global corporates in the vicinity, sometimes in a science/business/research park, as in the examples of Leuven, Limerick, Madrid and Surrey. Enterprise development, perhaps by way of spin out or spin off, tends to produce new SMEs, while curriculum development activity and sponsored chairs usually engages the larger companies and institutions. At the 3rd University Business Forum, held in May 2010 the project manager of the UNICREDS Project[8] spoke of the relative ease with which universities can engage with larger enterprises, suggesting that the real challenge still remained the effective engagement of SMEs: "The links between universities and large businesses are important but can be relatively straightforward. However, building up partnerships with SMEs is more challenging. SMEs are an important part of the economy in peripheral regions such as those involved in UNICREDS, and it is vital that strong, innovative policy structures are in place to support them." At the same time, there needed to be recognition of the difficulties, such as higher transaction costs, and achievement of critical mass, involved in engaging SMEs in relationships with HEIs.

While the capitalisation of technology transfer knows no geographical boundaries, there is a practical pressure on institutions to engage local employers in all sectors in providing placement opportunities for students on courses which include mandatory work experience. For many institutions with a technical or vocational provenance (for example, Slovakia, Surrey, Limerick, and Compiègne), the relationship with businesses and employers is integral to the student experience in the form of industrial placements as a compulsory part of the course, so engaging substantial numbers of SMEs as collaborators. Again, apart from inward investment aspects of regional development, the major thrust of EU regional strategy is the generation, growth and maintenance of SMEs. In the case of the Babeş-Bolyai University for example, 98 per cent of the existing regional business community consists of SMEs, while in Denmark there is a similar percentage applying to the regional setting of Aalborg University.

[8] University Collaboration in Regional Development Spaces - http://www.unicreds.eu

One particular case study, Uppsala, highlights a unique collaboration within the ambit of a macro-regional strategy developed by the European Union, the first kind of this type of policy concept in the EU, and adopted by the European Council in October 2009. As part of this strategy the Baltic University Programme was appointed lead partner for a flagship project in inter-university collaboration. The aim of the project is to coordinate activities, including research, exchange of students and professional staff, and to encourage cooperation with businesses in the Baltic region.

Regarding the types of cooperation activities the case studies illustrate that even across a wide range of diverse practice in university business cooperation, the custom appears to be to have some level of formality in the arrangements between the institutions and businesses. This ranges from legally-constituted joint ventures in respect of knowledge/technology transfer and licensing, to programmed arrangements for staff mobility and student placements and curriculum development (Leuven gives an example of work with employers on the elaboration of learning outcomes).

Relationships with business and employers appear to work well at faculty/department level, enabling flexibility and innovation (e.g. Leuven, Slovakia, Corvinus, Charles), though Aalborg illustrates some advantages of centralised arrangements (an Limerick in terms of placements). With regards to employability of graduates, the University of Surrey gives an example of the effectiveness of its Professional Training Placements in partnership with employers, while Aalborg University provides an example of the distinctive project- and problem-based learning (PBL), an experiential model which gives many students placement opportunities in local industries. The Slovak University of Technology attributes its high performance in student employability to its UBC practices and business relationships.

1.4 Themes emerging from the case studies

Three of the main themes emerging from the case studies will be familiar to participants in the Commission's University Business Forum as recurrent discussion topics. The first theme is a general (but not universal) recognition of the variety of roles - as illustrated at Figure 1 earlier, now expected of universities. There is a broad acceptance that a triple helix relationship between universities, government and industry is replacing previous linear structures, engaging stakeholders in a model of interdependence and interaction. As several thematic forums have concluded, the advantages of cooperation between universities and business are very clear: it is not a case of "if" but of "how", accepting the centrality of the role of higher education in the knowledge economy as emphasised in the Commission Communication concerning the Innovation Union in the Europe 2020 Strategy:

'Higher education reform is equally urgent. Most European universities do not attract enough top global talent, with relatively few in leading positions in existing international rankings. European universities should be freed from over-regulation and micro-management in return for full institutional accountability. Universities also need more diversity in their missions and outlook, with smarter specialisation across different fields.'[9]

The spirit of the modern responsive university is exemplified by the innovation mission expressed in the Aalborg case study, which sees the university as a 'knowledge-generating and culture-bearing institution that contributes to technological, economic, social, and cultural innovation in the surrounding society through entrepreneurship and the communication and exchange of knowledge.'

There are several examples of universities as drivers in regional development strategies, adopting the crucial role of key suppliers in the dynamic knowledge economy envisaged in the Lisbon Treaty, while others have relationships with major industries ranging from the highest levels of technical innovation to the bespoke provision of management training.

[9] COM (2010) 546 final

Yet, as a second theme illustrates, there remains a consciousness in many institutions of the cultural differences which persist between academia and industry, presenting challenges to the realisation of higher education reform. The Charles University of Prague, for example, maintains that its role concentrates on delivering the highest quality of teaching and learning, with work-related education and training taking place elsewhere, after the completion of studies. The Leuven example suggests that even where an ancient and traditional university has made a successful transition to a modern technological university, cultural differences are perceived as a restraint on effective collaboration with the business world, though Leuven's own research suggests that scientific and entrepreneurial activities are complementary.

The Technical University of Compiègne case study notes the 'weight of cultural barriers' on both sides in the French context, while the Autonomous University of Madrid study indicates that cultural differences can have a greater effect when dealing with SMEs, particularly in the understanding of innovation: this could be a significant consideration, given the substantial role expected of the SME sector in new economic development. This theme underlies the acute difficulties also facing the University of Porto, where 'Despite the university's commitment, commercialisation of research results through patenting and licensing is challenging due to a number of factors primarily related to businesses, particularly SMEs constituting the bulk of the Portuguese business. The key factors are SMEs' lack of awareness about intellectual property rights (IPR) and collaboration with universities and their inability to invest in innovative R&D.' The Porto case study also notes the lack of finance available for proof-of-concept developments, and the consequent concentration by the university on a smaller number of like-minded SMEs. The other side of the coin of cultural differences inhibiting university-business collaboration is identified, for example in the University of Turku study, which notes: '…barriers such as the mind-set of the teaching staff, very strong theoretical focus and lack of business-minded attitude in some cases. Despite the heavy emphasis put on the universities' third task by the Ministry of Education there are no metrics put in place to measure and reward these activities yet.' There may be no easy solution to harmonising these cultural differences, but the University of Limerick, for example, appears to pay particularly close attention to the balance between the academic rubric and the needs of the business partners.

A third major theme concerns a growing convergence in the current wide variation in the extent to which institutions see themselves as having a duty, or at least a regard, towards the employability of their graduates. For some historically-distinguished institutions, the Charles University, for example, the reputation of the institution may be enough to enhance employability of graduates, in that the very name of the institution adds a cachet to its academic qualifications. This guarantee of quality has resulted, in one recent Charles University survey, in a level of graduate unemployment after 12 months of just over 1 per cent. Nonetheless, while the university authorities stress concentration on academic excellence, the reality is that some 60 per cent of students have involvement with their future employer while at the university, and this clearly helps job placement.

Another example is the Slovak University of Technology, where employability is promoted through a 'field practice' course involving each undergraduate in engagement with related industry in sessional placements. At the same time, the majority of post-graduate students are working on dissertations together with their prospective employers. The case studies of the universities of Surrey, Porto, Limerick, and Compiègne all include examples of mandatory placement in industry as part of undergraduate courses, while the universities of Upper Austria and Aalborg have practice-oriented contacts with industry at the heart of their teaching and learning methods. The University of Surrey appears unique in adding to its mandatory placements a 'Lifewide Learning Award scheme ' a pilot scheme awarding a 'Graduate Employability Certificate' intended to provide unemployed graduates an opportunity to demonstrate the employability skills they have gained through extra-curricular activities.

Overall there remain persistent challenges which are implicit and explicit in the case studies: as discussed above, given the importance of the role of indigenous SMEs in both the

innovation process and the regional development process, higher education institutions throughout Europe have the task of helping to resolve the cultural differences between the worlds of academia and business to enable fruitful relationships to prosper. HEIs also have the task of maintaining high quality teaching and learning in the face of severe economic constraints and changing skill demands, whilst sustaining the capacity for the world-class research and knowledge transfer that will help support Europe's future competitiveness. They must do all this whilst developing as more inclusive entities to support the growth of lifelong learning throughout the European Union.

The case studies in this document illustrate the dynamism and diversity of the European higher education sector in its relationships with the wider economy and with a panoply of industrial sectors and employer types. Each of the studies has been prepared in a similar, though not identical format, and has resulted from both desk research and face-to-face and telephone interviews with institutional personnel. The result is a rich, multi-layered and varied narrative of responses to the call to meet the challenge of modernising higher education in partnership with government and business across Europe.

1.5 Acknowledgements

Technopolis and the European Commission would like to thank all those who have contributed to these institutional case studies. The information has come from a variety of sources within the institutions and we hope to have reflected all contributions fairly.

2 AALBORG UNIVERSITY – AAU (DK)

Summary of key points

The University

- University Business Cooperation is embedded in the missions of the university. UBC is approached as a long-term goal. An innovative teaching and learning method, 'Problem and Project Based Learning' (PBL) fosters innovation and cooperation with industry.
- Several Danish evaluations show that Aalborg University, compared with other Danish institutions, has the highest retention rates and one of the highest percentages of students finalising their studies on time.
- A study by The Confederation of Danish Industry in 2008 revealed Aalborg University as the Danish corporate world's preferred business partner in research and development projects.
- The network model and regional development approach generates interaction between the business community and researchers through various institutions at AAU such as the Network Centre. There are about 30 networks with approximately 3000 members.

The Business Context

- Aalborg has historically adopted a regional development approach to growth.
- The number of innovative companies, the number of innovations, private sector research, and educational level are all below the national average. The industrial structure is dominated by small and medium enterprises, 97 per cent of the business community in Northern Jutland.
- A high technology environment is burgeoning around the university in the following sectors: information and communication technology, electronics, health science technology, biotechnology, nanotechnology and materials technology. The IT sector in particular forms the third largest industrial concentration in Denmark.

2.1 Introduction

Aalborg is the main city in the Northern Jutland region of Denmark. With some 200,000 inhabitants, it is the fourth largest city in Denmark. The region itself, with just under 600,000 inhabitants, is the smallest in Denmark. Aalborg University (AAU) was established in 1974 as the fifth university in Denmark, having gained widespread popular and political support, "The university repaid… by engaging itself in full cooperation in relation to regional activities". The regional metrics of Aalborg in terms of innovation are generally negative[10]. The number of innovative companies, the number of innovations, private sector research, and educational level are all below the national average. The industrial structure is dominated by small and medium enterprises, 97 per cent of the business community in Northern Jutland. The region is mainly dependent on traditional industries such as agriculture and fishing. Furthermore, the labour market is characterised by a limited demand for specialised and advanced labour, as there are few knowledge-based and high technology businesses, though recently there has been an active effort to change this.

A high technology environment is burgeoning around the university in several sectors: information and communication technology, electronics, health science technology, biotechnology, nanotechnology and materials technology. The IT sector in particular is the third largest industrial concentration in Denmark. Long-cycle educational programmes are helping to raise the educational level.

[10] OECD/IMHE project: Supporting the Contribution of Higher Education Institutions to Regional Development Subreport: Aalborg University Jutland-Funen, Denmark, Søren Kerndrup 2005

2.2 The university – facts and figures

Aalborg region has historically adopted a regional development approach to growth: for the university, there is little help from the national government for third stream activities. AAU has played a significant role in Aalborg's regional development by becoming embedded in the region as a driver of change. This entails collaboration with regional and Danish educational institutions as well as the creation of consortia and collaboration networks with national and international universities. It is AAU's aim to become the central institution for constructive collaboration with local institutions and business partners to enhance competence and business development. This is a difficult endeavour in a region that has a significant number of small businesses many of which are traditional and so do not seek university aid. AAU spends more on communication than any other university in Denmark. As a result, AAU participates in a great number of private and public, local, national and international collaborations, networks, associations, partnerships, etc. at different levels within various areas of education and research. In 2009 alone, the university entered into almost 500 co-operative agreements with external partners. A study performed by The Confederation of Danish Industry in 2008 reveals Aalborg University to be the Danish corporate world's preferred business partner in research and development projects.

Internationalisation also has a high priority at AAU as it is a driver of regional change. International resources and knowledge not only benefit the university, but the local businesses, such as the burgeoning IT sector, that have to compete at an international level. Ten per cent of the 14,400 students are international in over 60 different study programmes. AAU employs approximately 2000 faculty and 800 administrative and technical staff. About 25 per cent of its researchers come from abroad.

Several Danish evaluations show that AAU, compared with other Danish institutions, has the highest retention rates and one of the highest percentages of students finalising their studies on time. The problem based learning method is often cited as the reason for this high retention[11]. In general, in terms of the quality of teaching and learning, problem based learning institutions are often ranked higher by students and companies than traditional teaching institutions[12].

2.3 Approaches to university business cooperation

AAU has three missions[13]: problem-based learning, interdisciplinarity, and innovation. AAU's definition of all three missions mention the importance of an external approach. First, the problem based learning[14] (PBL) mission states there should be a close interaction between theory and practice, thus bridging the gap between the university and the surrounding society. Aalborg achieves this through implementation and development of the problem-based project work format. This format has been in place since the university started. The OECD describes it as an almost perfect learning method, and AAU has become synonymous with the method, widely known as the "Aalborg Model". In recent years, AAU has begun to "export" this model to other universities in Mexico, Australia and France. All students take part in problem-based learning in the form of projects. At any given time, about 50 per cent of student of student projects involve businesses.

Second, according to AAU's mission, interdisciplinarity generates new knowledge and understanding through interaction across professional and academic fields as well as across the fields of basic and applied research. Once again, the acknowledgement of professional interaction shows the importance of an external approach at AAU. According to interview

[11] Kolmos and Hoagland, 2010; Holgaard and Kolmos, 2009
[12] Ibid
[13] University Strategy, Vision and Mission, Aalborg University: http://www.en.aau.dk/About+Aalborg+University/Strategy,+vision+and+mission/
[14] The longer name is 'Problem and Project based learning'.

participants, real-world problems tend to be cross-disciplinary and specialised to begin with. Engaging with the real world is inherent in the interdisciplinary mission, as it becomes the main source for research avenues and teaching agendas. Such interdisciplinary agendas enable AAU to develop and focus on strongholds. Currently AAU has five cross-disciplinary action areas in addition to many interdisciplinary study programmes:

- Sustainable energy, the environment and construction;
- Global production, innovation, knowledge development and coherence;
- Information technology;
- Nanotechnology and nanoproduction;
- Experience technology and design.

Finally, in terms of its innovation mission, the university is to function as a knowledge-generating and culture-bearing institution that contributes to technological, economic, social, and cultural innovation in the surrounding society through entrepreneurship and the communication and exchange of knowledge. This mission is also externally oriented.

As can be seen from the descriptions of the missions, all three can potentially incorporate university business cooperation which is embedded in the institutional framework. Funding for university business cooperation comes primarily from the university and only partly from national and regional budgets. In some cases, obtaining funding for projects via industry is easier than obtaining funding via public resources. This provides another rationale to engage with industry and the majority of the university's staff is involved in some sort of business collaboration.

The university's approach is best described as a regional development approach. A network model generates interaction between the business community and researchers through various institutions at AAU such as the Network Centre. There are about 30 networks with approximately 3000 members. According to the university, collaborating with businesses creates positive internal competition. In order to compensate for the lack of national third stream funding the university provides internal incentives for such activities. The university establishes trust with local businesses in order to network with them. According to interview participants, the recession has not actually hurt the university business collaboration. When times were good, businesses stated that they are too busy too cooperate. When times are bad, they state they don't have enough money. AAU takes the approach that generating trust is the best means of consistently engaging with industry, and for this reason employs a long-term perspective and approach to university business cooperation.

2.4 Types of university business cooperation in the institution and their impacts

2.4.1 Project and Problem based learning

Project and Problem Based Learning (PBL) or the 'Aalborg model', although a teaching and learning method, is the largest source of business interaction at AAU. Projects as a working method constitute approximately 50 per cent of the total study that a student engages in and last half a year. The model begins with the formulation of a problem. Students define and analyse the problem within an articulated interdisciplinary or subject frame. Working in faculty-supervised groups, the students plan, manage and complete a project that addresses the stated problem. The university has 13,000 undergraduate students and there are 2-3,000 ongoing projects dealing with external project areas, that is, projects that are likely to engage outside parties such as businesses. The degree to which PBL projects are business related depends on the field of study. Within engineering and business educational programmes, several networks have been established which make project work in external businesses a norm rather than an exception. Within the humanities there are many projects providing

knowledge on businesses and organisations' communication and international relations, and in these fields the tendency to engage external partners is increasing. Consequently, companies end up with free, innovative solutions of a high academic standard. Hence Problem and Project Based Learning, while it is a teaching and learning method, is a substantial source of University Business Cooperation.

Within a specified framework, the students themselves determine the project's content and structure. The content must, however, be approved by the students' project supervisor in the initial phase of the project work before the students are allowed to proceed. The project is structured around a problem formulation, which is the students' description of a complex real-life problem or their questions about theoretical or practical topics of study to which they intend to find an academic answer. Using this pedagogic model of teaching, a large part of teaching and learning revolves around complex real-life problems or issues. The students use a combination of scientific methods and group work. These special characteristics mean that there is - potential for innovation, according to interview participants, the potential is higher than with normal teaching methods. According to the university, the students get a first-hand understanding of the changing challenges that the modern businesses constantly face in an ever-changing society. This understanding is impossible to reach by solely working with academic questions within the university's walls. Real-life problems are often of a more complex character than academic and require inter-disciplinary approaches. As a consequence, the students also learn to involve other professional disciplines in their project work, and this is an ability that the employers of the university's graduates commend them highly for. An interdisciplinary approach is a key factor of AAU's success.

The students do not necessarily work on the premises of a partner company to solve a problem, as a project may need as few as one or two meetings with the company. When companies do hire students, they get highly qualified workers capable of performing a variety of jobs. As the university is directly involved in the hiring process and terms of the employment, the company and the student determine the duration of the collaboration. Thus, the student can work in the company for an extended period of time, which means the company can involve the student in the day-to-day work to a larger degree than what is possible in connection with student projects or traineeships, and at the same time the student gets extensive insight into the company's work processes, products and projects. In this way, the student gets a taste of what the company is like in terms of employment.

The strength of cooperating through problem-based learning is that it is a method for continuous interaction with businesses. At any given time many students are completing a project in conjunction with a business and some businesses participate regularly. One obstacle of business collaboration is that the problems of the business are secondary to the academic issues that the student is using to resolve the problem and complete the project. Students have a very clear learning objective. This sometimes leads to a situation in which the students push the actual business problem into the background. However, continuous interaction is maintained because the university has centralised procedures, which engage businesses in a professional way, allowing the student to focus on their studies. One example of this professional and structured interaction is the forum, where once a year, businesses are invited to showcase potential problems to students about to choose a problem. Former students are invited to these events to create a network and to share their achievements and obstacles. As a result, both the business and the student are aware of mistakes made historically and how to potentially mitigate them. From these events the university makes a catalogue of projects from which students can select: for most students this tends to be more effective than finding their own business problems. This again shows how the centralised system of university interaction can create continuous, effective, and most importantly, professional interactions in a way that a decentralised system may not be able to.

Another key factor for Aalborg's success is its ability to balance a traditional model of education with the 'Aalborg model'. This differentiation can be seen in most university activities. For example, the university distinguishes two types of courses. One type is the

project unit course. These types of courses are organised in accordance with the general 'problem' for a given semester. The courses can e.g. introduce the methods or theories to be used in project work. In combination with the project work, the courses give a thorough insight in the subject matter as it relates to the 'problem'. The other type of course is the study unit course, which gives basic and general knowledge within a chosen field and ensures breadth in education. Another example of balancing the traditional with the 'Aalborg model' is the course evaluations. Aalborg University carries out internal as well as external evaluations. At the internal evaluations, Aalborg University's own academic staff participates as examiners, and at the external evaluations examiners from other universities and the business community participate in addition to the internal examiners. Some courses are directly relevant to the subject of the project work and are evaluated through the project evaluation. Other courses have a broader content and are usually evaluated by individual written or oral examinations. Finally, Aalborg carries out internal as well as external evaluations. Aalborg University carries out internal as well as external evaluations. At the internal evaluations, Aalborg University's own academic staff participates as examiners, and at the external evaluations examiners from other universities and the business community participate. A business representative often attends the student's final presentation and the student is able to get feedback from two sources with very different objectives. Further, businesses directly engage with academic functions, gaining an understanding of what AAU has to offer. The university is able to balance academia and labour market relevance by offering both traditional and externally oriented methods of learning. By differentiating the teaching curricula Aalborg can expand its potential range of activities and seek new opportunities for UBC. As a result, students gain the ability to integrate different forms of knowledge.

An obstacle that AAU plans to overcome is the development of an evaluation of PBL. The programme is quite complex and developing a set of indicators by which to evaluate it is an ongoing process. This is especially important because PBL is a long-term method of developing the labour market in Northern Jutland, through which businesses gain an idea of the potential of AAU students. This is especially important in an area where the vast majority of businesses do not traditionally employ academics. The project work also means that students gain insight into the various areas where they can use their qualifications, and they learn about opportunities they may otherwise have overlooked.

2.4.2 Matchmakers

In order to facilitate contact and collaboration between researchers and industry, AAU uses 'matchmakers', at several levels:

- Internal matchmakers: Each department at Aalborg University has appointed an internal matchmaker, whose job is to help industrial partners find the relevant researcher and/or research environment within the department;
- External matchmakers: Aalborg University collaborates with business promotion offices situated nationally and internationally. External matchmakers have been appointed to help business and industry in the local area gain information about collaborating with Aalborg University. External matchmakers can be people representing the municipality or sometimes, representatives from large firms;
- International matchmakers: These matchmakers are placed abroad and help to develop AAU as well as Aalborg businesses. For example, Aalborg participates in global research facilities and offers this resource to local companies.

The University facilitates these interactions by developing 'matchpoints', meeting points for discussion and obtaining promotional material about the university. This matchpoint can be a room at a municipality or a library. A key lesson from this approach, according to interviewees, is that face-to-face exchanges are better for the transfer of knowledge and to develop trust.

2.4.3 Nouhauz - Networking Centres

The University of Aalborg has established 'Nouhauz' centres within each of its programme departments focusing on creating networks with external actors. At its peak, Aalborg had 40 centres with links to over 3000 businesses. These networks develop clusters amongst businesses with the university acting as a broker. One way that the centres generate clusters is to develop forums for discussion, cooperation and contact between researchers, students and employees. The objective is that the industry becomes able to supply research with impulses, and research and cooperation with the students can supply businesses with impulses. The forum provides a setting for already existing and tested activities in relation to research projects, student projects, educational opportunities for the business sector, purpose directed courses, and Nouhauz researchers.

Recently completed evaluations showed that approximately 90 per cent of the businesses involved with Nouhauz expect that cooperation will strengthen their competitiveness – and one out of three businesses expect an increase in employment as a consequence of the projects in which they have participated.

2.4.4 Tailor Made Courses - CPD

AAU has a focus on developing educational programmes with industrial specialisation. If a company's employees need specialised knowledge in order to get a competence boost within a specific subject area, AAU's Continuing Professional Development office sets up a targeted course programme adapted to the company's needs in terms of content and duration. Within the humanities educational programmes aimed at businesses and organisations, the programmes combine traditional humanistic qualifications with, for example, IT and communication. In this way the humanities' educational profile is characterised by the fact that 75 per cent of the students study educational programmes directed at work functions outside the educational sector. In its effort to improve its educational programmes' quality, the university increasingly makes use of external user panels that are given the task of giving advice and counsel in relation to present as well as future needs. These user panels are especially widespread within the humanities where they contribute to a continuous development of the educational programmes.

The master's programmes targeted on industrial specialisation are primarily organised as part time studies and distance learning which makes it possible to follow the educational programme while also having a job and living in other parts of the country. A master's programme takes two years but the student effort corresponds to a one-year full time study, and for the most part the study activities are based on distance learning. For example[15], the programme ELITE that was initiated in 2001 and has been responsible for organising continuing educational programmes within IT and electronics, has played a pivotal role in the development of these new concepts, and has also been a driving force in the development of a model to identify the competence needs in businesses. Experience shows that many businesses have difficulties identifying their need for qualifications. Since 2004 ELITE has been in charge of organising and coordinating short-cycle continuing educational programmes within the entire area of technical science and by the end of 2005 it was decided that ELITE should cover the entire university. The ELITE programme aimed primarily at developing master's programmes, but AAU found demand for courses of short duration and was granted the right to develop these. ELITE has expertise within the area and is focused on a situation-specific concept for the courses based on "facilitated work-based learning". The concept has been developed through involvement with several EU projects under the

[15] OECD/IMHE project: Supporting the Contribution of Higher Education Institutions to Regional Development Subreport: Aalborg University Jutland-Funen, Denmark, Søren Kerndrup 2005

Leonardo programme. By establishing the user's concrete situation, in this case a business needing human capital, Aalborg has developed special competences to expand its market.

The university has thus been able to differentiate its supply of educational programmes in relation to the existing supply of educational programmes because it has historically specialised in inter-disciplinary, problem-oriented project studies combined with professional course. This differentiation has made it possible to develop educational programmes adjusted to the new societal needs as well as to offer educational programmes within fields that traditionally have difficulties obtaining a ministerial approval of new regional offers. Differentiating the teaching curricula allows Aalborg to expand its potential range of activities and seek new opportunities for UBC.

2.4.5 Laboratory Facilities

AAU shares laboratory facilities with businesses that cannot otherwise afford them, while also developing contracts to allow students and researchers use business-owned laboratory space. The growing cost of research infrastructure means that universities and businesses both gain an advantage through sharing laboratories. Additionally, both organisations can share competences. While universities are better at developing results from research infrastructure, they are not very adept at transferring these results to the end user. Working together in similar laboratory facilities speeds up the process of transferring knowledge to business. Thus by sharing laboratory facilities, universities and businesses aid one another by exchanging competences toward research. In one example of this the university has engaged with the private company NanoNord, which involves the establishment of the largest laboratory facilities in northern Europe. Through this strategic cooperation the university gets access to facilities that it does not have the funds to finance itself simultaneously with the company taking part in ensuring the operational conditions in relation to building up the facilities. The university is by virtue of the partnership able to focus on building up research competence skills within nanotechnology based on the professional environments including physics, material technology, biotechnology and health science technology[16].

Cooperation cann0t solely derive from the incentive to save money on research infrastructure: the incentive must come from an understanding of trust that both parties want to transfer knowledge to society. Clustering industries and university representatives through resources such as labs is one way of generating trust.

2.4.6 Entrepreneurship

The entrepreneurship programme is integrated across many faculties: all students take some sort of entrepreneurship course that they may then use in the PBL portion of their degree if they so choose.

The idea is that value from academia is not simply knowledge in and of itself, but that value can be gained when research is transferred to society.

In addition, The Knowledge Exchange Office administers many of the entrepreneurship activities at AAU which are not related to coursework. In general the main effort of the Knowledge Exchange Office is related to making project development and setting up businesses visible opportunities to students, researchers and other people within the knowledge based industries. Also, a number of services to these target groups are offered through courses, conferences, events and the like under the Kick-start project as well as coordination of entrepreneurship activities in relation to regional and national programmes and initiatives[17].

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[16] ibid.

[17] ibid

Finally, the university has launched a large number of initiatives within the area of entrepreneurship with the aim of promoting the graduates' interests and abilities to start up their own businesses. The university has taken the initiative to develop a new kind of incubator to help students and recent graduates with potential commercialisation possibilities in relation to their project work. The initiative is linked to the earlier stages in the commercialisation process in which there are well- considered and professionally reasoned ideas. The purpose of the project is primarily to support new students', recent graduates' and researchers' possibilities for transforming ideas from their very early stages into commercialised activities and develop the competence skills needed to set up their own businesses.

In relation to this, one of the interviewees stated that at "the Faculty of Social Sciences there are several hundred analyses of businesses' market potentials". A key lesson then, is that university business engagement can produce material for research activities but this should not be at the expense of academically oriented research projects. Where real-complex problems may provide potential research avenues, it may not be the case that the research avenues are academically important.

2.5 What are the key lessons that can be drawn out from this approach?

For AAU university business cooperation has to be embedded in the institution and beyond, in the organisations in the regions. The key lessons that can be derived from Aalborg's success are as follows:

- **Long-term perspective and goals**- it takes a cultural shift for all parties necessary to successfully engage in UBC. For that reason long-term goals and learning is necessary. One way that Aalborg does this is to create networks with alumni as well as having former students present their experiences;
- **Teaching and learning methods should foster innovation-** PBL is successful because it can adapt to a range of different parties, the university, businesses and students. This creates an environment with greater potential for innovation and for collaboration;
- **Interdisciplinary approach to tackle business problems**- AAU uses an interdisciplinary approach in most of its subject areas. This allows the university to address more complex problems;
- **Differentiation of teaching activities-** by integrating multiple approaches AAU is able to compete expand the range of potential activities that it is able to offer to students and to businesses. Further, by developing competences in a range of different activities, Aalborg is able to incorporate suggestions for external actors such as industry;
- **Professionalism and a formal dialogue-** By investing resources in intermediaries, such as Matchmakers, the university can translate opportunities better and businesses become more receptive to the various projects that AAU may offer;
- **Customising programmes to the needs of business-** AAU is able to notice shifts in the wants and needs of the business community and offer their advanced services. As with the laboratory facilities the university is able to transfer its competences to industry. The university can identify and maximise competences for knowledge exchange;
- **Developing trust by clustering similar organisations and expanding networks**- According to interviewees, developing trust is the most important aspect of university business cooperation.

2.6 Contacts, references

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3 AUTONOMOUS UNIVERSITY OF MADRID (UNIVERSIDAD AUTÓNOMA DE MADRID) (ES)

Summary of key points

The University

- The Autonomous University of Madrid (UAM) has approximately 36,000 students and is one of the main universities in the capital city. The university is based around the Cantoblanco Campus, which is situated 15 km to the north of the capital. The university is organised into seven schools (facultades), which include: Philosophy and Arts, Psychology, Law, Science, Business and Economics, Education, and Biology.
- The UAM General Foundation (FGUAM) is the institutional channel established by the UAM to promote links between the world of science, university teaching staff and the corporate sphere. The aim is to provide the latter with the benefits of the university's scope for R&D, the results of research work and acquired knowledge.
- The Madrid Science Park acts as a Spin-off Industries incubator. This 2001 initiative by UAM and the Complutense University of Madrid promotes start-up of high-tech and knowledge-based companies by providing entrepreneurs with an array of targeted resources and services.

The Business Context

- Both the metropolitan area and the Autonomous Community of Madrid, are high economic performers, with key industries located in the Madrid region including a service sector generating nearly 80 per cent of both GDP and employment.
- The city of Madrid, for instance, hosts the headquarters of most Spanish companies, including a few of the world's largest companies, e.g. Banco Santander, Telefónica and Repsol YPF and SMEs, most of which are concentrated in the north of Madrid where most UAM facilities are located.

3.1 Introduction

The Autonomous University of Madrid (UAM) is located in the Madrid metropolitan area in the Autonomous Community of Madrid (Comunidad Autónoma de Madrid). The metropolitan area has a population of over 5.8 million[18], the equivalent of around 92 per cent of the total population of the Autonomous Community[19]. It is the largest metropolitan area in Spain (followed by Barcelona and Valencia) and the third largest in the EU after Greater London and the Paris metropolitan area.[20] The Madrid area represents around 1.7 of the Spanish territory (8,026 km^2 out of 505,987 km^2).

3.1.1 The economic context

Both the metropolitan area and the Autonomous Community of Madrid, have dynamic economies characterised by constant growth and low unemployment rates. The key industries located in the Madrid region include:

[18] Technopolis calculation based on data for 2010 from the Spanish Institute of Statistics (Instituto Nacional de Estadística).

[19] Estimate for Dec. 2010 obtained from the Spanish Institute of Statistics - INE (Instituto Nacional de Estadística) database.

[20] ESPON, Study on Urban Functions – Final Report, March 2007

- A strong service industry, primarily real estate, finance, commerce, transport, communication and hospitality, that generates over 78 per cent of the regional GDP and accounts for around 77 per cent of employment. The city of Madrid, for instance, hosts the headquarters of most Spanish companies, including a few of the world's largest companies, i.e., Banco Santander, Telefónica and Repsol YPF[21] and SMEs, most of which are concentrated in the north of Madrid where most UAM facilities are located;
- A broad range of primary industries, particularly paper and graphics, chemicals, energy and minerals, industrial machinery, electric and electronic equipment, basic metals and metal products and food.

This high concentration of economic activity in the Madrid metropolitan area (and the Autonomous Community) contributes to high economic growth and low unemployment. In 2006, for instance, the Madrid Community represented more than 17.7 per cent of Spain's GDP and achieved the highest economic growth (4.6 per cent) and employment creation (4.6 per cent)[22]. Similarly, in 2007, it had the highest GDP per capita (in PPS) in Spain, €34,100, well above the average of about €26,000 in NUTS 2 regions in Spain – and above the EU average. Unemployment has remained below the national average. The average unemployment rate in the Madrid area was 7.6 per cent during 2000-2008 and 14 per cent in 2009, which are lower than the national average of 10.5 and 18 per cent, respectively, and the rates in Catalonia and Valencia, for instance. However, unemployment in the Madrid area is slightly higher than in the Basque region, Navarra and Aragon.[23]

3.1.2 The Spanish system

The origins of the Spanish higher education system date back to the Middle Ages (around 1218) with the establishment of the Universities of Palencia and Salamanca in Castile and Leon and higher education institutions in Andalusia. The modern higher education system covers university education and advanced vocational education and training. Public spending on universities increased in absolute terms from €7.6 million in 2005 to €9.3 Million in 2007.[24] However, OECD evidence suggests that this increase has been lower than GDP growth and that public spending (as a proportion of GDP) ranged between 0.95 and 1.0 per cent in 2005 and 2007, respectively.[25]

University education is offered in university faculties as well as in higher technical schools (including polytechnic schools) and colleges. Over the last three decades, the number of universities and students has increased three-fold with the rates of female and male university graduates between 22 and 34 years of age reaching 30 and 22 per cent, respectively – amongst the highest rates of university education in Europe. In the 2009-2010 academic year, 1.4 million students were enrolled in the 73 Spanish universities, 50 public and 23 private – the latter including 7 universities affiliated with the Catholic Church. The overwhelming majority of students, around 89 per cent, attend public universities.[26]

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[21] Fortune, Global 500 2010: Annual ranking of the world's biggest companies. Accessed at http://money.cnn.com/magazines/fortune/global500/2010.

[22] INE data.

[23] The electronic version of Eurostat regional yearbook 2010 can be accessed at http://epp.eurostat.ec.europa.eu/portal/page/portal/publications/regional_yearbook

[24] INE, http://www.ine.es/inebmenu/mnu_educa.htm.

[25] OECD, Thematic review of tertiary education – Country background report for Spain, May 2008. And OECD, Education at a glance, 2010 Statistics.

[26] Spanish Government - Ministry of Education, Universities, Statistics for Students. http://www.educacion.es/educacion/universidades/estadisticas-informes/estadisticas/alumnado.html.

The Spanish university education has reformed over time to accommodate changes in the society and governance. During the late-1960s and early-1970s, for instance, the system of university departments (replacing the system of professorial chairs (Cátedras)) was introduced, the position of university professor was created and a number of Autonomous Universities, including UAM, were established. With the introduction of the University Reform Law in 1983, universities began to gain autonomy from the central government over university matters, including working conditions for university faculty, and there was a shift of power from the senior faculty (exercising control over university matters) to the university council, comprising rectors and representatives from both the Ministry of Education and the relevant departments within the governments of the Autonomous Communities. This law also focused on the modernisation of universities by introducing semesters and cycles in university education.

The Organic Law of Universities (LOU), was introduced 2001. The law sought to improve the quality of university education in Spain and its social context. To operationalise the LOU in the area of university business cooperation, the government facilitated the creation of Social Councils (Consejo Social), linking universities to their socio-economic context. These are important tools in the transfer of knowledge to the economy and society.

The Madrid region boasts a high concentration of Higher education and research institutions, including, inter alia, 15 public and private universities, 49 out of 133 research institutes of the Spanish National Research Council (Consejo Superior de Investigaciones Científicas – CSIC), regional research institutes (developed in cooperation with universities and companies) and technology centres both public (regional) and private (national). The 6 public universities[27], including UAM, with campuses situated in Madrid and surrounding municipalities, account for around 86 per cent of the university students in the region and constitute the strongest education agglomeration in Spain in terms of the scientific areas covered and the university degrees offered.[28]

3.1.3 Framework conditions for university business cooperation and research and technological innovation

Support for R&D and technological innovation at the regional level gained importance from the early-1990s initially in the context of the regional plans for research and technological innovation (PRICIT). Thus, the public funds allocated to R&D increased from €18.8M in 1990-1993 to €111.9 M in 2000-2003 and then to €220 M in 2004-2008.[29]

Furthermore, framework conditions have been put in place at the regional level to encourage university business cooperation in the metropolitan area and the Community of Madrid. These include:

- The Regional Law of 1998 on scientific research and technological innovation: seeking to stimulate research and innovation, stakeholder collaboration for research and technological innovation and to encourage the diffusion of RTD results. This law also outlines the regional plan and the instruments needed to promote research and technological innovation and define a longer-term strategy to promote an innovation culture and create the appropriate conditions to promote innovation and encourage R&I.30 Universities have an important role to play;
- Multi-annual Regional Plans of Scientific Research and Technological Innovation (PRICIT), introduced by the regional authority from 1990 onwards. Based on the

[27] The other five universities are: Complutense de Madrid, Politécnica de Madrid,Universidad de Alcalá, Carlos III and Rey Juan Carlos

[28] Fundación para el Conocimiento madri+d, Madrid Innovation and Research System, April 2008

[29] Fundación para el Conocimiento madri+d, Madrid Innovation and Research System, April 2008

[30] Ley de Fomento de la Investigación Científica y la Innovación Tecnológica, Ley 5/1998 of 7 May 1998

principles of the European Research Area, the 4th PRICIT for 2005-2008, for instance, placed emphasis on developing R&D activities in the fields of water, food, biomedicine, social sciences, energy, mathematics, materials, regenerative medicine, internet, software and nanotechnologies. These include some of the key research areas at UAM (e.g., biomedicine, nanosciences and materials);

- Fundamental Law of Universities (Ley Orgánica de Educación), of 2001 amended in 2007 to accommodate the Bologna guidelines – providing for the creation of the 'Social Council' (Consejo Social), linking university to its socio-economic context, and also emphasising the linkage between university research and the production system and businesses.

Various industry liaison bodies, including:

- The University-Business Foundation (Fundación Universidad-Empresa – FUE), set up by the Madrid Chamber of Commerce and Industry in the mid-1970s, to promote relations between the two communities and to encourage TT. FUE also seeks to promote graduate employability through programmes, developed in collaboration with regional universities, including Citius for university and the internship programme e-Start;
- The regional development agency (Instituto Madrileño de Desarrollo – IMADE) set up in 1984;
- The network of Technology Transfer Offices (Oficinas de Transferencia de Resultados de Investigación - OTRI) in Spanish Universities, set up at the end of 1980s to promote business innovation as provided for in the first National Plan for Innovation and Development by facilitating university-business collaboration and technology transfer;
- Fundación para el Conocimiento madri+d (FCm+d), set up in 2003 by the regional authority (DG Universities and Research) to manage and develop programmes included in the Regional R&D Plan with the view to stimulating technological innovation, scientific research and business collaboration, for instance:
    - FCM+d is a member of the regional innovation network madri+d, set up in 1997, to facilitate, and promote, academic and business communities as part of the global action under the Regional R&D Plan. The network members include Universities, RTD bodies, Trade and industry associations;
- 'Centres for Technology Transfer' (Centros de Difusión Tecnológica – CDT), a network of experts based in the territorial offices of Chambers of Commerce and business associations. The network was launched in 2004 to support company innovation through provision of information regarding participation in publicly funded R&D programmes (national, regional and EU).[31]

Another key defining condition is the new Strategy launched by the Spanish government in 2008: Strategy University 2015 (SU-2015), promoting the development of highly internationalised, well managed and well funded universities contributing to the global production of knowledge, and to the sustainable economic development and innovation of their territorial environments.

With a time horizon of 2015, the strategy has four main axes and 11 strategic lines: Missions: Education, Research, Knowledge Transfer, Social Dimension; People: Academics, Researchers, Students and Administrative Personnel; Institutions: Governance, Funding, Internationalisation and Quality; and Environment: Campus, University – City – Territory. One of its flagship programmes is

[31] Madri+d, Madrid Innovation and Research System, accessed at http://www.madrimasd.org/English/About-madrimasd/innovationandresearch/default.asp

the international campus of excellence which is highlighted later on in this case study in the context of Madrid.

3.2 The university – facts and figures

3.2.1 Introduction

The Autonomous University of Madrid (UAM) is a publicly funded education and research university established in 1968 (along with other Autonomous Universities of Barcelona and Bilbao) during a major reform of the Spanish education system in the late-1960s – early-1970s. This reform introduced the system of university departments that replaced the system of Cátedras (professorial chairs) and also created the position of University Professor. Following the enactment of the Spanish Constitution (in 1978), the creation of Autonomous Communities and, most importantly, the introduction of the Law on University Reform (in 1983), Spanish universities gained autonomy from the central government over university matters, including working conditions for university faculty, and there was a shift of power from the senior faculty (exercising great control over university matters) to university council.

The bulk of UAM's facilities (education and research, and the rectorate) and relevant services are found at the Cantoblanco campus, located around 15 kilometres north of Madrid. However, the faculty of Medicine and most university schools are located near the Medical Campus 'La Paz' in the northern part of Madrid.

UAM is placed in the rank range of 201-300 world universities, of 75-123 of European universities and of 1-4 Spanish universities according to the Academic Ranking of World Universities of 2010.[32] Similarly it ranked amongst the top 100 universities in Europe (87th place) and 7th in Spain in the SIR World Report of 2010. Furthermore, it is placed 10th in the SIR 2010 Ranking of 607 Ibero-American universities (including Latin-American, Spanish and Portuguese universities).[33]

3.2.2 A strong focus on education and research

UAM is a multi-disciplinary HE institution with a strong focus on both education and research. Its academic structure broadly reflects the typical 'tracks' of the Spanish HE system, notably the academic track, whereby students follow a four- to six-year programme in liberal education and professional programmes offered in faculties (e.g., Law, Business and Economics and Medicine); and, the University Schools, offering three-year programmes in teaching or nursing, for instance.

The academic structure of UAM consists of:

- 7 faculties, including Sciences; Law; Philosophy and Letters; Psychology; Medicine; Economic and Business Sciences; Teacher Training and Education, with a total of 66 departments;
- An Engineering School (Escuela Politécnica Superior), divided into 2 departments, Computer Science and Engineering; and, Telecommunication Engineering;
- 7 Associate University Schools, covering primarily nursing but also physiotherapy and Higher Education;
- 6 Associate University Hospitals.

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[32] Academic Ranking of World Universities – 2010. Available at http://www.arwu.org/ARWU2010.jsp.

[33] Scimago Institutions Ranking (SIR), SIR World Report 2010 and Scimago Institutions Ranking, Ranking Iberoamericano SIR 2010, available at http://www.scimagoir.com.

UAM offers a wealth of study programmes across its faculties and schools, ranging from 3 to 6 years, for bachelor's degrees, including EHEA degrees, as well as engineering degrees and higher education diplomas. It also provides opportunities for research training through postgraduate programmes, including master's and doctorate programmes. In the 2009-2010 academic year, UAM offered a total of:

- 70 master's degree programmes across its faculties and the Engineering School to graduates with a university degree;
- 78 doctorate programmes covering a broad range of areas across the 7 faculties as well as informatics and telecommunications.34

At UAM, basic and applied research activities are carried out across the faculties and the Engineering School by research groups that have been set up and are headed by professors. The intensity of research activities, however, varies, depending on the scientific area. Evidence suggests that the bulk of applied research at the faculty level is concentrated within the Faculty of Sciences, covering key research fields and sub-fields, i.e., physics, chemistry, biochemistry, molecular biology and nanosciences.[35]

A network of research institutes and centres operating with the UAM campuses (primarily the Cantoblanco campus) complement the research, and training, activities of the UAM faculties. These include:

- Five joint UAM-CSIC institutes, notably the Institute of Mathematical Sciences; the Centre for Molecular Biology 'Severo Ochoa'; the Institute of Biomedical Research 'Alberto Sols'; the Institute of Theoretical Physics; and, the Centre for Food Research;
- Thirteen UAM Research Institutes covering a broad range of scientific fields. Examples of these institutes include the Centre for Micro-Analysis of Materials; Material Science Institute; Institute for Economic Forecasting; Business Knowledge and Innovation Management; Medication R&D; Institute Molecular Biology; Education Sciences; Women's Studies; Migration, Ethnicity and Social Development; and Needs and Rights of Children and Adolescents;
- Three research institutes of the Madrid Institute of Advanced Studies (IMDEA) net, active in the areas of food, nanosciences and social sciences;
- Five health research institutes (IIS), set up jointly by UAM and other public, or private organisations, including the IISs University Hospitals La Paz, La Princesa and Ramón y Cajal and the IIS Jiménez Díaz Foundation.

In the context of its research function, UAM collaborates closely with leading Spanish research universities through bilateral agreements but also through the Alliance 4 Universities (A-4U). The latter initiative brings together the Madrid based UAM, and Carlos III University and two Barcelona based universities, the Autonomous University of Barcelona and University Pompeu Fabra. Their objective is to strengthen academic excellence via collaboration in research technology and innovation (inter alia).

3.2.3 UAM's Governance and Organisational Structure

UAM's governance structure is typical of a Spanish public university, consisting of:

- The *University Senate*, the key governance body responsible, inter alia, for drafting UAM's statutes and for electing the rector. It represents the entire UAM

[34] Universidad Autónoma de Madrid, Oficína de Análisis y Prospectíva, UAM en cifras – Curso Académico 2009-2010. Accessed at http://www.uam.es/presentacion/datos/anuarios.html

[35] Website of UAM and UAM faculties

community, including academic/research staff, students and administrative staff. The senate is chaired by the rector;

- The *rector* has the overall responsibility for the governance and the smooth functioning of the university and represents UAM externally. The rector is a chair professor elected every 4 years. The current rector José Mª Sanz Martínez was elected in July 2009 in replacement of Ángel Gabilondo Pujol, rector at UAM since 2002;
- The *Governing Board*, chaired by the rector and its management team, including the Secretary General and Vice-Rectors, as well as representatives of the university community. The Board sets the university's strategies and programmes regarding education, research, and resources, including personnel and budget;
- The *Management Team*, represented on the Governing Board and consisting of the Rector, 8 Vice-Rectors, the UAM Manager and a representative from the General Secretariat, is responsible for the efficient functioning of the university, including coordination of specific areas of UAM activities (e.g., education, research, technology transfer and innovation, personnel);
- The *Social Council*, consisting of members appointed by trade unions, employer organisations, the municipal authority, the regional assembly and the UAM Board of Governors. The Chair is appointed by the Madrid regional government. The Social Board ensures the involvement of society in UAM's activities. It also seeks to actively promote the UBC and the transfer of benefits from research and knowledge generated at UAM to the economy and the society.

UAM faculties and schools are governed by Boards, chaired by elected deans, or a head in the case of the engineering schools, which cover the key areas of the UAM activities, i.e., education, research, technology transfer/innovation, personnel issues and placement;

There exist a number of services (or offices) that underpin the work of the UAM governing bodies through analysis and planning, evaluation and legal advice. Furthermore, several offices are in place that support university activities in the areas of education/training, research and technology transfer.

3.3 Approaches to university business cooperation

University business cooperation in UAM takes place throughout the institution and at different levels – across faculties and research groups and centres.

At the university level, the services in relation to cooperation are headed by the vice-rector(s) who are responsible for strategic orientation and coordination – seeking to reduce the impact of fragmentation.

At the faculty and research centre level, the cooperation approach taken depends on the needs or opportunities. Tradition has an important role to play and there are long standing relationships with particular companies. These are typically concentrated in research.

Within the framework on the national strategy "Strategy University 2015", UAM applied to be an international campus of excellence and was successful. The programme started in 2009 with a budget of €203m (plus €150m advanced in 2008), awarding in a competitive process grants up to €53m and loans (€150m in 2009) to the Autonomous Communities where the selected campuses are placed, to implement their strategic plans to move towards international excellence.

The UAM and the CSIC (Spanish National Research Council), with a long history of successful joint projects, have joined forces to form this Campus of International Excellence.

The project is built on three main pillars: consolidated research prestige and talent of international relevance, a clear vocation for teaching excellence, and a strong commitment to the social, cultural and economic environment. The UAM chose the UAM+CSIC Campus, to focus on Nanoscience and Advanced Materials and in Life Science.

The regional policy and framework conditions of the region encourage university business cooperation. The governance structure is also important for collaboration (institutionally and regionally). In Spain there are Social Councils and the existence of these, plus other alliances have facilitated progress and new collaborations in particular with SMEs in the northern Madrid region[36].

Another key approach to collaboration is the General Foundation of the Autonomous Community of Madrid (FGUAM)[37]. This was set up to serve as a bridge between the Universidad Autónoma de Madrid and the region, placing the University's (university group) research, teaching and collaboration capacities at the disposal of the region/society. This foundation was put in place to ensure UAM's research, teaching and collaboration capacity is underpinned by an in-depth understanding of the regional needs. It facilitates the offering of services adapted to those needs and covering different spheres (academic-scientific, business, social, cultural and management, creative, innovative).

3.4 Types of university business cooperation in the institution and their impacts

3.4.1 UAM-Business interaction related to education and training

The explicit relationships in the area of education and training are less encompassing than those of technology transfer and knowledge transfer but are nevertheless well developed.

The placements in industry are well developed and UAM has numerous links. The role of the faculty is important in this. UAM graduates are highly employable. In a recent study in 2010 which surveyed the attitudes of more than 100 Spanish and international companies (including Microsoft, IBM, Philips, Gas Natural Fenosa, Cinfa and La Caixa), UAM students were highly rated. From a total of 77 Spanish universities (50 public and 27 private). UAM Business Administration graduates were in second place and law graduates in third place for recruiters.

UAM has a Centre for Entrepreneurship and it promotes entrepreneurship in a number of ways. This includes, information, training, seminars, access to ideas and awards.

In the context of continuous education and training, UAM provides a total of 17 one- and two-year programmes, combining studies and practical work, for professionals in the fields of education, business and economics, and, psychology. It has also developed the programme 'UAM for Mature Students' and offers language courses leading to qualifications. These initiatives stem from the realisation by the UAM Senate of the need to strengthen continuous education in order to expand the range of students attracted to the university and the recognition of the importance of lifelong learning for the knowledge society.

Another example of continuous education and training is Euroform[38] which provides professional training for industry in the area of microelectronics and the design and construction of digital systems. Those training on the programme come from many types of

[36] Additional examples of the Social Council's attempts to strengthen links –discussed in the subsection on research

[37] http://www.fuam.es/

[38] http://arantxa.ii.uam.es/~euroform/ Euroform was an UETP, University Enterprise Training Partnership composed of 14 active partners and more than 60 associated organizations (universities, research institutes and companies) in the professional field of Microelectronics and related technologies.

Spanish companies and R&D centres in areas like avionics, space, railways systems, industrial control, video processing, radar, astronomy, telecommunications.

Euroforum

Euroform was established with EU funding under the COMETT scheme in 1989 and the network at that time included France, Germany, Italy and Spain. Ireland joined in 1991 and a further expansion took place in 1996 with the participation of Austria and Portugal. Recently, new partners from Poland, Romania, and Cyprus joined Euroform.

The objective of Euroform initiative was to create a network of university laboratories specialized on different technologies to provide technical training to SMEs. Owing to its multinational nature, EUROFORM was in a position to provide a multidisciplinary approach to its main activities which include professional training for industry, student placement in industry and the provision of short, specialized courses covering a wide range of topics.

EUROFORM collaborates closely with industry to provide solutions to problems, mainly of a technical nature.

The Universidad Autónoma de Madrid jointed the project in the area of FPGA. After the end of the EC funding, the Spanish Pole have been operated independently, being now self-financed by course fees, technical consulting, and organizations of conferences and events related to FPGA technology.

3.4.2 UAM-Business interaction related to research activities

UAM has a long-standing policy in research collaboration with the industry. This takes place through a number of channels.

The joint research ventures, most notably:

- The Institute of Knowledge Engineering (IIC), a centre for research development and innovation based at the UAM campus, established in 1989 by the Association for the Development of Knowledge Engineering (ADIC), consisting of UAM and leading Spanish corporations including IBM-Spain, Renfe, Banco Hispano Americano and Union Electrica Fenosa at the time, and currently IBM-Spain, the Santander Group and Gas Natural Fenosa. There are links at the board level where leadership, including the UAM rector, participate.
- The IIC focuses on three technical areas: Information systems, management and the development of Human Resources and quantitative methods. There are also innovation activities focus on addressing issues related to energy and banking with the use of multidisciplinary research and expertise (psychology, computing and artificial intelligence, economic and business studies). UAM is a key source of expertise for the IIC – UAM researchers but also PhD students and advanced undergraduates. The collaboration has resulted in the development of software products and services used by leading banks and businesses and public entities.
- The ***Madrid Science Park*** (PCM) set up in 2001 by UAM and the Complutense University of Madrid is an initiative supported by CSIC as well as the Madrid regional government, the city Council and the Santander Banking Group. It includes an incubator based at the Cantoblanco campus and several technology development units based at the research laboratories of UAM, including those of the faculty of sciences. The objective of the PCM is to support knowledge transfer and technology transfer and the creation/development of technology based business.

Sponsored university research chairs

The UAM rates among the top 3 Spanish universities in terms of the total number of sponsored research chairs. In addition to the current number of chairs, several others are currently in the process of creation. UAM sponsored chairs cover a broad spectrum of

research fields, ranging from the most innovative industries in the fields of medicine and health, economy and real estate, to the environment and disability biopsychology Examples include:

- 3 university chairs within the EPS (the Polytechnic School at UAM) focusing on joint R&D, innovation, training and dissemination activities in areas related to the IIC activities, notably behaviour patterns analysis, machine learning in modelling, and, finally, psychometric models and applications;
- The Chair UAM-Roche Farma in the School of medicine – sponsored by Roche Farma since 2003;
- The Pfizer theory of medicine Chair established in 2007 and renewed in 2010;
- The Telefónica-sponsored Chair focusing on biometric recognition technologies, set up in 2010;
- The more recently established Chairs sponsored by key industries, including MundiPharma Pharmaceutical, Fundación PRODIS, Laboratorios SALVAT and RENFE-FEAPS.

The existence of the large number of sponsored chairs is an indication of UAM's focus on innovation and transfer of research results as well as the recognition of the importance of linking with industry.

Commercialisation of knowledge and technology generated within UAM

UAM has a long track record in technology transfer and it is part of the university's mission and culture. Around half of the activities carried out in the research laboratories, particularly in the areas of physics, biochemistry, engineering and computing are of interest to companies. Other important areas are telecoms, computer software and general chemistry. Technology transfer in Nanoscience is emerging.

In the areas of knowledge transfer, psychology, business administration, law and economics are the main areas in which the university provides a significant amount of consultancy services to firms, regarding, for instance strategic plans and advanced services in human resources.

Commercialisation is also important for UAM in terms of income. Around 62 per cent of competitive research projects of UAM (128 out of 274) provide an income of nearly €14 million (2010). (the total income is around €22 million). In 2009, this income was over €16 Million.[39] UAM is also active in commercialisation through patenting and licensing. This is quite successful but not as successful as other publicly funded research universities in Madrid.

During the period 2004-2010, 17 patent applications were submitted to OEPM and 5 patent to EPO (In addition, 7 spin-offs were created).

Figure 4 Formal Technology Transfer activities by public universities in the region – 2004-2007.

Universities	Number of Spanish Patent Applications	EPO Patent Applications	Number of Spin-offs created
Universidad Complutense de Madrid	51	9	9
Universidad Politécnica de Madrid	46	6	13
Universidad de Alcalá	18	0	7

[39] Servicio de Investigación de la UAM, Fondos externos de investigación en el año 2009. Accessed at Universidad Autónoma de Madrid, Oficína de Análisis y Prospectíva, Investigación, Proyectos de Investigación, 2009-2010, http://www.uam.es/presentacion/datos/uamencifras.html

Universidad Autónoma de Madrid	17	5	7
Universidad Carlos III	15	0	10
Universidad Rey Juan Carlos	3	1	6
Total	150	21	52

Source: Adapted from Madrid Innovation and Research System, 2008

There are significant numbers of relationships with businesses at UAM. The main partners in Technology Transfer are large corporations, including Telefónica, pharmaceutical companies, private hospitals and the chemical industry. There is also a growing number of links with SMEs who are based in the north area of Madrid as already highlighted. This progress has been facilitated by the employers associations in cooperation with the efforts of the relevant Vice-Rectors' offices and the UAM Social Council.

On the side of knowledge transfer, there are links with all sizes of companies and public institutions including regional parliaments and the Spanish Patent Office.

There are a number of barriers to technology transfer which can be highlighted. In relation to the university, there are finite resources of research professors for contract work; this is in the nature of UAM – it is a general university and it is also limited by its size and available resources (in comparison with other Madrid based universities e.g., Complutense). The university leadership and management structures are also not fully aware of the potential of the research and the opportunities for technology transfer. Therefore it can be difficult to promote outwardly if there is little support inwardly.

For businesses there are obstacles in relation to their capacity for R&D and innovation and for small companies in particular, in relation to culture and perception. The businesses do not always see universities in relation to innovation; it is mainly in relation to technology provision.

There is recognition within UAM of a need to do more work to promote the commercial aspect of the university's function. This falls to the professors with their competing priorities. There is an understanding this needs to be tackled sectorally and collectively. The Social Council also plays a role and is active in its initiatives and promotion of technology transfer to business.

3.5 What are the key lessons which can be drawn out from this approach

UAM has university cooperation embedded into its policy, governance and structures. It faces outwards and works within its region as well as internationally.

Its long history in the area of technology transfer has facilitated the universities transition towards supporting regional SMEs and although this could be further developed, it is an area which is being tackled by the university. They are supported by structures such as the Social Council and the General Foundation of the Autonomous Community of Madrid (FGUAM).

There are barriers to professors taking part in technology transfer activities but the university is aware of these and also business barriers. Frameworks are in place to minimise any of these issues and maximise resources devoted to third stream activities. The returns on investment are evident.

Related to 'cultural' differences between the academic/research world and the business world. These are more pronounced in SMEs.

3.6 Contacts, references

Prof. José Ramón Dorronsoro Ibero, Vice-Chancellor, Innovation and Technology Transfer

Prof. Antonio Álvarez-Ossorio Alvariño, Vice-Chancellor, responsible for CE, LLL, Placement & Careers

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4 BABEŞ-BOLYAI UNIVERSITY, CLUJ NAPOCA (RO)

Summary of key points

The University

- The Babeş-Bolyai University has the longest academic history among the institutes of higher education in Romania. Operating as an autonomous entity it is built around 21 faculties, departments, special units, centres and institutes. The high level of independence at faculty level is a key feature of the university.
- The university has some 53,000 students across all study programmes, of which 31,000 at bachelor level, 8,500 at master's level and 2,200 doctoral students. Distance and lifelong learning activities of the university are extensive, engaging more than 10,000 students in the various programmes. The university applies a multicultural approach and it offers education in five languages: Romanian, Hungarian, German, English and French across 248 different study programmes. In staff terms, the university has over 1700 teachers, 285 researchers, and 1125 administrative and technical staff.
- The university emphasises the institution's commitment to promote and support the local community and to contribute to regional, national and international development. The strategic plan of the university incorporated university-business collaboration related aspects, however the implementation of the strategy is largely influenced by the independence of the individual faculties.

The Business Context

- Services account for more than a third of employment and nearly half of regional GDP with industry and construction achieving lower levels. The regional economy is strongly oriented towards agriculture and on some traditional industries Other important economic sectors are ICT, tourism, and the food processing industry.
- A wide range of SMEs represent 98 per cent of the total number of enterprises within the region, while the rest of the industrial environment is made of large enterprises active mainly in manufacturing.
- Among the six regional counties, Cluj plays a key role as the most dynamic pole for regional development and it outperforms other counties in terms of economic indicators.

4.1 Introduction

The Babeş-Bolyai University (UBB) is located in the Romanian North-West region (Northern Transylvania). North-West is one of the eight development regions created in the country in 1998 to coordinate regional development projects and manage funds received from the EU. Development regions however have no administrative power or legislative structures.

The region contributed some 12 per cent of the total Romanian GDP in 2005. Services account for some 35.8 per cent of employment (45 per cent of regional GDP) while industry and construction reach a share of 29.2 per cent (31 per cent of regional GDP).[40] A highly rural region, its economy is strongly oriented towards agriculture (35 per cent of employment and 13 per cent of regional GDP) and on some traditional industries such as machine and equipment industry, furniture industry, and the plastic and rubber industry with Artplast in Cluj. Other important economic sectors are: ICT (most of enterprises in this sector are located in Cluj-Napoca), tourism, agriculture and food industry.

[40] Romania central website: Romania's Development Region North-West- Regiunea Nord West online: http://www.romania-central.com/economy-of-romania/the-economy-of-romania/33-development-regions-of-romania/336-north-west-region-regiunea-nord-vest/#ixzz1FROts400

Economic activities are driven by a wide range of SMEs, representing 98 per cent of the total number of enterprises within the North-West region in 2004.[41] The rest of the industrial environment is made of large enterprises active mainly in the manufacturing industry.

Among the six regional counties, Cluj plays a key role as the most dynamic pole for regional development and it outperforms other counties in terms of economic indicators. Cluj-Napoca, the fourth largest city in terms of population in Romania, is a strong university centre that gathered together 65,000 students in 2008[42] including the UBB and the nine other universities located in the city. It is also the cultural capital of Transylvania.

The employment rate in the North-West region was 55.2 per cent in 2009 (Eurostat), slightly under the national average (58.6 per cent in Romania and 64.6 per cent for the EU 27). The employment rate has decreased (was 63.2 per cent in 1999), partially due to the transformations generated by the economic restructuring, a phenomenon that rendered some professional specialisation useless whereas other specialisations highly appreciated. Additionally, 22.2 per cent of the population were employed in S&T activities in 2009 (Eurostat), which is far under the European average of 40.1 per cent (24.1 per cent for Romania). Cluj-Napoca had to face challenges as during the early '90s the city lost the momentum and had to reinvent itself to find a new approach. Industrialisation worked well for Timisoara but did not work for Cluj, resulting in a focus on the service sectors, on the health sector and also on education to foster development.

These evolutions have led to the strong emphasis put on research and higher education in the 2007-2013 Regional Development Plan (RDP) and the Regional Development Strategy (RIS), designed by the Regional Development Agency (RDA). The priorities listed in the RIS encompass[43]:

- Promoting the innovation culture and management capacities at regional level;
- Developing the regional innovation support infrastructures and the poles of excellence;
- Supporting the operational partnerships and developing infra/inter-regional co-operations;
- Supporting innovative entrepreneurship through the development of human resources;
- Developing innovative companies and increasing the competitiveness of the main economic sectors.

Alongside other regional stakeholders, representatives of chambers of commerce, universities, research centres, private sector associations, entrepreneurs and ministries, UBB was involved in the drafting and the monitoring of these documents. The priorities are therefore also reflected in the UBB's Strategic Plan for the 2008-2011 period, the main objectives focusing on different aspects listed in the RIS:

- The orientation towards entrepreneurial skills;
- The development of engineering studies on new niches to support innovation;
- The identification of strategic domains of research, for instance in the field of ICT identified as priority sectors at the regional level;

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[41] North-West Regional development Agency, Socio-economic analysis, Document elaborated within the REGIS-NW Project Regional Innovation Strategy for the North-West Region

[42] North-West Regional development Agency, Socio-economic analysis, Document elaborated within the REGIS-NW Project Regional Innovation Strategy for the North-West Region

[43] European Commission, DG Enterprise and Industry, Regional Innovation Monitor online, Region nord-Vest webpage: http://www.rim-europa.eu/index.cfm?q=p.policy&n=14467 (consulted March 2011).

- The development of continuous learning programmes, that goes hand in hand with the Regional Action Plan for the Development of Professional and Technical Education in the North-West Region 2006-2013.

4.2 The university – facts and figures

The national regulation has recently changed and a new higher education law entered into force in February 2011 aiming to significantly reform the higher education sector. Currently there are 54 public universities and 40 accredited private universities. The new law targets diversification of the HE system in Romania, by creating three main categories for universities: research intensive, teaching and research oriented and mainly teaching institutions. Furthermore the new higher education law aims to emphasise skills versus traditional knowledge and the need for multidisciplinary approach.

The Babeş-Bolyai University has the longest academic history among the institutes of higher education institutes in Romania. It operates as an autonomous entity with a hierarchical structure led by the rector and built around 21 faculties, departments, special units, centres and institutes. The high level of independence at faculty level is a key feature of the University. The University also hosts six museums, a botanical garden, and astronomical observatory and other different administrative and technical services. The University has about 53,000 students across all study programmes, of which 31,000 at bachelor level, 8,500 at master's level and 2,200 doctoral students. Distance and lifelong learning activities of the University are extensive, engaging more than 10,000 students in the various programmes. The University applies a multicultural approach and it offers education in five languages: Romanian, Hungarian, German, English and French across 248 different study programmes. There are 15 faculties providing both a Romanian and a Hungarian curriculum, with nine providing both a Romanian and a German curriculum and two faculties providing education only in Hungarian. In terms of number of staff, the university has over 1700 teachers, 285 researchers, and 1125 administrative and technical staff.

Figure 5 Study Statistics on the Babeş-Bolyai University (2005)

Line of study	Tenured teaching staff	Number of specializations			Doctoral fields	Number of students		Number of PhD students
		Bachelor studies	University extensions	Master studies		Bachelor studies	Master studies	
Romanian line of study	1000	88	9	72		34854	2857	
Hungarian line of study	230	50	6	22		6401	271	
German line of study	40	15	3	3		1023	726	
Jewish studies	4	1		1		92	15	
Languages of teaching: English, French, Russian, Italian	-	4	-	55		1010		
Total	**1270**	**157**	**18**	**152**	**23**	**43288**	**3854**	**3500**

Source: http://www.ubbcluj.ro/en/despre/misiune/caracter_multicultural.html

The main decision making bodies of the university include:

- The **Senate**, a 140 strong body, consisting of faculty representatives (teachers and students), representatives of university colleges, the leaders of the administration of the University, representatives of other university units (central library and the botanical gardens) and special units (e.g. Continuing Education and Distance Learning Centre), and representative of research units. The **University Senate** is divided into **Councils** and their subordinate **Committees.**
- The **Councils** are established to serve as regulatory bodies in a specific field. The following councils are operating at the university: Curriculum Council, Quality and

Competitiveness Council, Scientific Research Council, Non-traditional Learning Council, Reform Council, International Cooperation Council, Transatlantic Cooperation Council, Linguistic Policies Council

- The various **Committees** established by the Senate are decision making bodies in the following areas: Human and Financial Resources, Institutional Structure and Infrastructure Assurance, Ethics and Litigation, European Programmes, Juridical Examination and Decision Implementation Control Committee and Students Committees
- The **Academic Council** develops proposals, draft strategies and policies which are aimed to strengthen the institution's external relations both within the country and internationally and to improve competitiveness of the different activities of the University: education, research and services. The suggestions of the Academic Council have to be approved by the Senate.
- The faculties are supported by **Faculty Councils**, in which students are strongly represented in addition to the professors of the given faculties.

The different bodies of the University are organised taking into account the multicultural nature of the University. Furthermore, the most important business partners of the University are also represented in the various advisory bodies of the University.

4.3 Approaches to university business cooperation

The mission statement of the university emphasises the institution's commitment to promote and support the local community and to contribute to regional, national and international development. The strategic plan of the University incorporated university-business collaboration related aspects, however the implementation of the strategy is largely influenced by the independence of the individual faculties. The University has also a major effect on the region's economy through being one of the major employers and by attracting a large student population. In Cluj-Napoca the ratio of inhabitants and students in the city is the highest in Romania.

In terms of university-business relations the University faces many challenges including pressure from the economy and society for more engagement and provision of services; the need for quality assurance to train highly skilled graduates, while being responsive to the emerging demands at the same time; the problem that universities and businesses are different by nature and the communication between the two worlds requires common understanding and common language. To overcome the barriers of cooperating with businesses the University applies proactive methods in approaching businesses, especially SMEs, and it tries out innovative solutions and provides support through the central administration to increase the efficiency and effectiveness of UBB in business and community engagement. Introducing changes, reforming the thinking and mindset of the actors involved in university-business collaborations and community engagement is a very time consuming approach but it will be rewarding in longer-term. Meanwhile, the framework conditions for collaboration, such as elaborated interface with public administration, also need to be improved. There are additional regulations affecting collaborations, such as the law on sponsorship and on scholarships.

The University is a public higher education institution with more than half of its income (55 per cent) from public funding. The University itself has to generate the other 45 per cent, so relies heavily on tuition fees and on income generated from research carried out at the University. The Babeş-Bolyai University has a very strong research focus and a diverse research portfolio covering basic and applied research, development and innovation. The University occupies high positions in the national rankings, and in terms of international performance is among the leading universities from Central and Eastern Europe.

To facilitate and support the University's research activities the Institute of Technology was established in 2008. This institute brings together academics, researchers and technicians from across the various disciplines of the University with a strong focus on application-oriented research carried out with industrial partners. The activities carried out in the Institute are organised along nine key research areas including the development of a marketing and technology transfer strategy, which also incorporates aspects of spin-off company establishment.

The intensity of business relations varies between the various departments. Business and IT departments, together with chemical engineering, are leading in terms of university business cooperation. Motivations for the professors to engage in collaborative projects and activities with business include primarily the provision of external funding and the need to gain business experience to create more industry relevant curricula. Furthermore, university-business relations have special importance in increasing student employability. The University has numerous agreements with major companies to provide more tailor-made education based on the needs of industry. The Babeş-Bolyai University built extensive relations with the banking sector in Cluj-Napoca, as the sector provides employment for a large number of students. Although there is no special curriculum developed to target the needs of the banking sector, the curriculum of business studies has changed significantly during the past 20 years.

Structural Funds offer funding opportunities to carry out student, graduate and employer surveys on the perception and quality of the curricula. Survey results, including suggestions for improvements and modifications, are taken into account when designing future curricula. Survey responses show that the employment rate of the students after one year of graduation is about 72 per cent, while an additional 20 per cent of students pursue other studies. Survey results also revealed that most of the companies do not require too much subject related knowledge from graduates, e.g. an international company with a strong focus on accounting explained that there are rigorous internal procedures and training put in place at the company, therefore the company finds the soft-skills and language skills of the graduates more important. To address these requirements the University has been introducing different innovative learning methods to prepare the students for the future challenges and to provide them with a set of skills and knowledge most suited to the needs of the future employers. Now forms of learning include increased emphasis on presentation skills and teamwork, therefore students have to present various projects that were developed and carried out in different teams. These exercises are becoming part of the students' study programmes.

The specific requirement to undertake an internship or professional placement varies by the subject field and by degree, but almost all study programmes have such a provision. Placements take place usually during the June-July summer holiday time-period, sometimes stretching over two summer holidays. In general placements are about 6 weeks long. The University supports the students to find a suitable placement, but the students can also organise their own placements. In line with the overall strong emphasis on quality assurance at the university, UBB put quality assurance in place regarding placements as well.

International exposure is not compulsory for the students due to the related costs. The University however encourages students to engage in international mobility and it provides information and support regarding the various European funding schemes available such as Socrates or Erasmus. There is also a heavy emphasis on learning foreign languages. Students in general speak two foreign languages; at least one foreign language is required to obtain their degrees but a few study programmes require two.

Internationalisation is one of the key objectives among the UBB's strategic objectives for 2008-2012. The institution aims to transform UBB into an international university, which occupies a prestigious place among the top 500 universities around the world. The Formula "UBB 500" became a slogan that reflects the comprehensive efforts of the University to mobilise and improve national and international cooperation.

The University already has extensive international relations that are coordinated by the Centre for International Cooperation, which is led by the Vice-Rector in charge of international relations. The Centre for International Cooperation develops, facilitates and coordinates the University's international relations especially the activities based on bilateral agreement, trans-European and trans-Atlantic programmes, furthermore the Centre provides support to foreign students, teaching staff and student mobility, information exchange and it also contributes to building the University's image. The Centre promotes active participation in EU and non-EU programmes, and cooperation with international partners based on bilateral agreements. The Centre also helps incoming and outgoing students and staff with counselling and orientation. It is also in charge of promoting the University's educational programmes abroad; organising summer schools and various international events; promoting the joint degrees and joint research programmes. The Babeş-Bolyai University has inter-university agreements and partnerships with more than 200 higher education institutes from 36 countries across six continents. Furthermore, individual departments have additional contacts with foreign universities. The University has numerous joint degrees at different levels with its partner universities e.g. University of Graz in Austria, the University of Ljubljana in Slovenia, the University of Bordeaux and Toulouse in France. The international relations of the University are reported even to be stronger and more efficient in some cases than domestic relations.

Further tools to increase university-business relations include the promotion of the Alumni network. Although participation in the alumni is not as developed as in the US for example, the University strongly promotes the initiative and has recently started a mentoring programme within the Alumni network.

UBB Alumni Mentor program

The Babeş-Bolyai University Alumni Association is launching at the beginning of this year the first edition of the UBB Alumni Mentor program, supported by the UBB Fund Raising Office.

Alumni Mentor is a program designed to connect students and graduates of the Babeş-Bolyai University with shared academic and professional interests, in order to support the development of the student.

Through this program UBB students receive guidance in order to meet their most challenging professional goals and UBB graduates identify future collaborators, research partners or employees. So far over 60 mentors from 15 countries enrolled in the program.

Source: http://alumni.ubbcluj.ro/

4.4 Types of university business cooperation in the institution and their impacts

The lifelong learning and continuing education activities of the University are highly successful, engaging an increasing number of students every year. In the academic year 1997-1998, when the Centre for Continuing Education and Distance Learning of the University was set up, there were 200 students enrolled in the postgraduate level and in the academic year 2005-2006 there were 6,469 students engaged within the distance learning programmes.[44] In establishing the continuing education and distance learning activities of the institutions, the University adopted the international trends and looked at existing best practices. The University provides assistance, consultancy and flexible learning to help partners improve and up-date their skills, abilities and competences, in order to be competitive in the knowledge society. The main target population of the non-formal education activities of the university is the age group of 30-40 years, who due to the restrictions of the previous education system did not have the opportunity to participate in special training or education.

[44] Source: Information catalogue for the Babes-Bolyai University 2008-2009, http://www.ubbcluj.ro/ro/regulamente/UBB-Catalog-2008-2009.pdf

The main aims of the Centre include:

- To revitalise the labour market by providing a broad range of courses and therefore enabling people to get new profession and new skills which are more suitable for the changing needs of the labour market;
- To provide training possibilities for those who cannot enrol in the traditional higher education courses;
- To improve education of the rural areas with no access to HEIs in close proximity;
- Key activities of the University cover conversion and alternative professional training, vocational education, post-graduate specialisation and post-graduate training, organisation of workshops and summer schools. Since 1998 the Centre has been offering training courses and undergraduate education also in the form of distance learning. Distance learning programmes are accredited and therefore can be a basis of further education of an individual. In selecting the subjects and fields of education the Centre prioritises based on the needs of the regional economy with the key aim to increase effectiveness and foster regional development.

The university's role in regional development is also reflected in its close cooperation with the regional development agency. The universities of Cluj county are actively contributing to the development of the regional economic and development strategies and UBB is a member of Council of North West Region of Romania. The higher education institutes together with the agency aim to establish a regional development institute in the near future. They are also active in discussing, identifying and selecting projects of regional importance.

4.5 What are the key lessons which can be drawn out from this approach?

The Babeş-Bolyai University is very large, with 53,000 students across 21 faculties and a substantial number of study programmes. One of the main features of the university is its multicultural nature. The University provides education in five languages: Romanian, Hungarian, German English and French. In terms of its university-business relations, the high level of faculty independence has major effect, however there is a strong central coordination with supporting units and institutional strategy put in place to facilitate interaction with businesses and local and regional communities.

The University is very active in contributing to regional development through reaching out in a proactive way to way to businesses, local administration and even to rural areas. The University's distance and continuous learning activities play a key role in revitalising regional economies and provide the labour force with new skills and professions. International relations, student and staff mobility also play a very significant role in the Babeş-Bolyai University. It has more than 200 international collaboration partners centrally and individual faculties have additional contacts.

4.6 Contacts, references

Prof. dr. Andrei Marcus, Vice-Rector for Quality Assurance and Competitiveness

Prof. dr. Serban Agachi, Chairman of the Academic Council of BBU

Associate Prof. dr. Mircea Maniu, Member of the Academic Council

Information catalogue for the Babes-Bolyai University 2008-2009

North-West Regional development Agency, Socio-economic analysis, Document elaborated within the REGIS-NW Project Regional Innovation Strategy for the North-West Region

European Commission, DG Enterprise and Industry, Regional Innovation Monitor online, Region nord-Vest webpage: http://www.rim-europa.eu/index.cfm?q=p.policy&n=14467 (consulted March 2011).

Romania central website: Romania's Development Region North-West- Regiunea Nord West online

4.7 Statistics

Figure 6 Basic data: Babeş-Bolyai University

Type of information	Babeş-Bolyai University
Type of university	Multidisciplinary
Region/ capital city	Central Transylvania, in a regional capital city in Romania
Quacquarelli Symonds, World University Rankings Results 2010	601+ (http://www.topuniversities.com/institution/babes-bolyai-university/wur)
Number of students	53,000 students across all study programmes, 31,000 at BA level, 8,500 at MA level 2,200 doctoral students.
Training	More than 10,000 enrolled annually in training, distance and continuous learning activities
Staff	1700 teachers 285 researchers 1125 administrative and technical staff.
Facilities, organisational units	21 Faculties, and numerous addition organisational units and centres, including cultural institutes
International cooperation	Very extensive more than 200 interuniversity agreement

5 THE BALTIC UNIVERSITY (SE)

Summary of key points

This case study differs from the others in this document as it concerns a programme of combined effort between more than 200 HEIs from 14 countries focused on the maintenance and growth of environmental, rather than economic capital in the Baltic Sea region.

The original aim of the BUP network was to act as a (European) regional bridge from west to east and the main focus was at that time of initiation a growing environmental concern for the Baltic Sea.

The network is led by the Baltic University Programme Secretariat, which is part of Uppsala Centre for Sustainable Development at Uppsala University in Sweden. The BUP is also largely financed by the Swedish Ministry of Education, the Swedish Institute, the Swedish International Development Agency, and Uppsala University. Other important sources of funding are the Nordic Council of Ministers, Baltic Sea Region Programme, Interreg IIIB, the Finnish Ministry of Education, as well as the universities in the network.

The main activities arising from the BUP strategy are the development of university courses and teacher training tailored to the Baltic Sea region, and participation in educational and scientific projects in cooperation with both public and private partners.

The network is ultimately restricted by the amount of funds it can win competitively, which makes the networking aspect of the BUP very important – trusting partnering universities is fundamental. Other barriers – apart from funding – have mainly centred around language abilities, although these have been easing in the last years as English language levels are rising, even in the more peripheral countries where academic staff and students are less exposed to the English language.

Interaction with non-university partners is often motivated by a need for experts and to offer students a more realistic view of life outside of the studying environment. Contributions from policy makers and industry representatives in teaching are invaluable as they add to the discussion with students, who – being relatively inexperienced – may be somewhat unrealistic in their expectation of solving very complex and multifaceted problems, e.g. lowering CO2 emissions. Encouraging a dialogue and concrete activities in collaboration with local and regional authorities and businesses is a vital complement to the academic studies undertaken by the students.

A typical approach of the BUP network is to taking into account student development and regional conditions in order to come up with concrete solutions and feed back into teaching and development.

5.1 Introduction

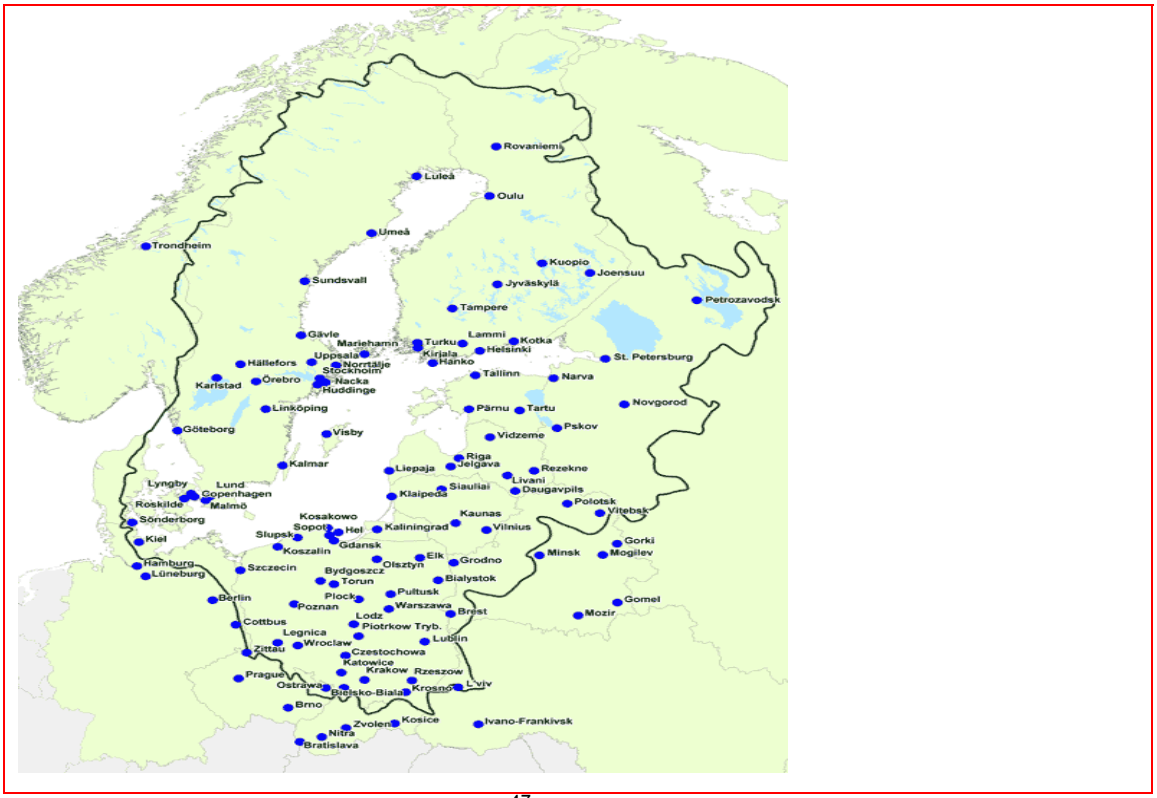
The Baltic University Programme (BUP) is a network comprising some 230 higher education institutions[45] around the Baltic Sea region. The network, celebrating its 20th anniversary this year, was initiated by Uppsala University (Sweden) in 1991.

The Baltic Sea region covers the drainage basin of the Baltic Sea. There are 14 countries completely or partially within the basin, including the Nordic and Baltic States, Russia, Poland, and Germany, but also Belarus, Ukraine, the Czech Republic and Slovakia. The region has 85 million inhabitants constituting 11 per cent of the population of Europe[46].

[45] A list of the higher education institutions can be found in Appendix of this case study

[46] www.ikzm-d.de/inhalt.php?page=40,273

Figure 7 The BUP network



BUP regions with at least one active institution[47].

Cooperation in the Baltic Sea region has a long tradition, due to a strong integration in trade and investment[48]. However, the countries in the region have also experienced very different histories post WW2, and the national economies and social infrastructures have varying characteristics.

Figure 8 Change in GDP in Baltic Sea region countries.

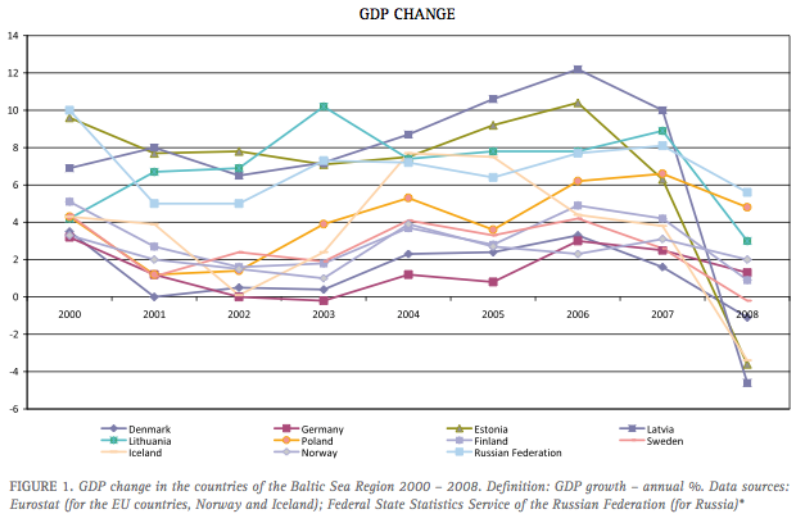


FIGURE 1. *GDP change in the countries of the Baltic Sea Region 2000 – 2008. Definition: GDP growth – annual %. Data sources: Eurostat (for the EU countries, Norway and Iceland); Federal State Statistics Service of the Russian Federation (for Russia)**

Source: Baltic 21 Triennial Report — A decade of experience for the benefit of the future, 2006-2008

[47] Image taken from BUP Rectors Conference,15-16 October 2009 PowerPoint presentation.

[48] Continuing and further education needs in the Baltic Gateway Cluster with special consideration of the maritime logistics sector www.balticgateway.se

The original aim of the BUP network was to act as a (European) regional bridge from west to east and the main focus was at that time of initiation a growing environmental concern for the Baltic Sea.

The programme was born just a few years after the fall of the Berlin Wall, the catalyst to extensive political, economic and life changing developments in Europe. As a result, the early and part continuing idea of the BUP was to encourage the development and strengthening of democracy and civil society in the former communist countries by engaging their universities. The idea was to facilitate environmental awareness and action by linking these to democracy and democratic rights. As such, the BUP developed into a rather cross-disciplinary and flexible network – it needs to be able to take on board and react to new ideas and developments.

Over the last two decades the network has expanded both physically and in a philosophical scope. The underlying objective of the network has evolved to encompass the idea of sustainable development, that is, a broader and more multidisciplinary approach. Indeed, the network today emphasises the broad questions of sustainable development, environmental protection and democracy in the Baltic Sea region. It adheres to the framework developed by Baltic 21, which is the regional expression of the global Agenda 21 adopted by the United Nations to promote sustainable development.

Not only facilitating the work of the United Nations, the Baltic Sea Region is also the focus of a macro-regional strategy developed by the European Union, the first kind of this type of policy concept in the EU, and adopted by the European Council in October 2009[49]. As part of this strategy the BUP has been appointed lead partner for the flagship project in education called “Enhance cooperation – on a voluntary basis – between the regional Universities of the Baltic Sea Region”[50]. The aim of this project is to coordinate activities, including research, exchange of students and professional staff, and to encourage cooperation with businesses.

5.2 Facts and figures

The network is led by the Baltic University Programme Secretariat, which is part of Uppsala Centre for Sustainable Development at Uppsala University in Sweden. The BUP is also largely financed by the Swedish Ministry of Education, the Swedish Institute, the Swedish International Development Agency, and Uppsala University. Other important sources of funding are the Nordic Council of Ministers, Baltic Sea Region Programme, Interreg IIIB, the Finnish Ministry of Education, as well as the universities in the network.

The Baltic University is centred around supporting the key role universities play in a democratic, peaceful and sustainable development. This also entails encouraging participation in projects in cooperation with authorities, municipalities and businesses.

In the network today there are around 1,500 teachers and researchers contributing to the network activities, and 9,500 students take part on an annual basis. Teachers and students stem from the participating universities, which range from classical universities, to universities of technology, agriculture, culture, economics, pedagogic etc.

As the financial support primarily stems from Sweden, Finland and European Union competitive funds, to a large extent the strategy also originates from the Scandinavian countries. Having said that, the board of the BUP is international – each of the national centres has a representative so that all members have some influence over the development of the central strategy.

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[49] Baltic Sea Region programme 2007-2013, Power of Cooperation: 46 Transnational projects contributing to the EU Strategy for the Baltic Sea region

[50] Baltic University Programme Annual Report 2009

The main activities arising from the BUP strategy are the development of university courses and teacher training tailored to the Baltic Sea region, and participation in educational and scientific projects in cooperation with both public and private partners.

5.3 Approaches to university business cooperation

The network is run top down from Uppsala, but there are also many ongoing decentralised activities. The BUP partners can initiate their own projects, independent of Uppsala. Central, activities are funded by the Uppsala Secretariat, while decentralised activities are more ad hoc and project specific. Having said that, the Secretariat often help the decentralised projects, provide advice and, for example, help locate experts, from the public or private sphere, to involve.

The centre directors, that is the national contacts, are very important links that help forge the network. There are 14 established national centres that lead or coordinate the work in the individual Baltic Sea states (with two centres in Germany and two in Russia). The offices are run as voluntary operations, that is, there is no external funding for operational day-to-day costs. Funding is instead sought on individual project bases.

The types of cooperation partner are very symptomatic of the nature of the activity. Very often there is more than one BUP university involved, and in addition projects involve government agencies – on a local or regional level, and NGOs, for example the WWF. Private businesses are also involved, they may take on the role of experts, share their experiences with teachers and students and are also interested in the results of various undergraduate projects that have taken place, which may be something they can use in their operations.

There are several types of key drivers. These could be viewed to be independent strategies pursued by the BUP partners, but they may also be interlinked to a certain extent.

One main driver for the universities is internationalisation. The network is an important instrument to meet new potential project partners to collaborate with and seek funding from funds benefitting Eastern European countries, funds from Interreg or FP7. The network also functions as a benchmark insofar as the interaction with other universities allow each individual institution to better understand their own strengths and weaknesses.

The emphasis has long been on sustainable development and undergraduate courses, as well as didactics and teaching courses (including English language). As courses are very practical and have been developed with the Baltic region specifically in mind, there is also an employability agenda visible. In addition to offering tailored courses, students and researchers also gain hands-on experience in additional projects that tie together the aims of public authorities and businesses alike.

Figure 9 Current courses developed and taught in the BUP network

Course	University	Country
Environmental Sciences	St Petersburg State University	Russia
Sustainable Water Management Distance course	Uppsala University	Sweden
A Sustainable Baltic Region	Åbo Akademi University	Finland
Product design and LCA	Ukrainian National Forestry University	Ukraine
Sustainable Water Management in the Baltic Sea Basin: Waterscape	Åbo Akademi University	Finland
Peoples of the Baltic	Slovak University of Agriculture in Nitra	Slovakia
Sustainable Water Management; River Basin Management	Åbo Akademi University	Finland

SAIL 2011	Uppsala University	Sweden
Baltic Sea Environment	Russian State Hydrometeorological University	Russia
Nordic Ecology	University of Gävle	Sweden
Sustainable Water Management	St Petersburg State University	Russia

Courses offered by the BUP. The materials used in the course have been developed by Baltic Sea region experts and specifically tailored to the cultural, economic, environmental and political circumstances of the region. Source: Baltic University Programme website.

Although a considerable effort is put on teaching and learning, the BUP network is also an important facilitator of the research and innovation agenda – the network functions as a forum for the participating universities where they can meet and develop partnerships for applications to European and cross border funds. The fact that many of the participating universities are from the Eastern regions of Europe may be both a help and a hindrance in obtaining finance.

The network is ultimately restricted by the amount of funds it can win competitively, which makes the networking aspect of the BUP very important – trusting partnering universities is fundamental. Other barriers – apart from funding – have mainly centred around language abilities, although these have been easing in the last years as English language levels are rising, even in the more peripheral countries where academic staff and students are less exposed to the English language.

Universities may also find it difficult to work effectively with municipalities – this type of collaboration can take a long time to develop. It is not given that local and regional authorities have the competence (language) nor ambition to work across borders and internationalise. Cooperation with public authorities is very dependent on the individual connections and commitments made. However, collaboration with municipalities can also be very rewarding once common goals and objectives can be made. In Lodz, in Poland, the regional authorities are supporting the BUP university through a 200,000 euro investment, an indication that the longer term relationships with public authorities are beginning to pay off.

Similarly, when working the private sector, universities in the Eastern part of Europe particularly experience some difficulties in more high-tech projects as their domestic businesses still import and apply technologies rather than conducting their own R&D.

Beyond the Baltic sea coastline

"The ability of the Baltic Sea region to reaffirm itself as a pilot region for sustainability in Europe attracts actors from other regions wishing to collaborate and learn. During the period Sweden was chairing Baltic 21 (2006-2008), a particular focus was put on cooperation with other regions. Specific funding (in form of project grants) was provided for this purpose by Sweden.

Cooperation Between the Baltic Sea region and Africa has shown that, despite many differences, the two regions easily find common ground when it comes to the alarming state of the environment and the necessity to build up institutional and human capacities. The Baltic University Programme will work together with the universities from East Africa to build up university cooperation and competence in education for sustainable development. Members of Baltic 21 and partners in the Lake Victoria Basin jointly organised a side event at the 16th session of the UN Commission on Sustainable Development focusing on actions towards sustainable development"[51].

[51] Baltic University Programme Annual Report 2009

5.4 Types of university business cooperation and their impacts

As the network itself is broad and flexible in its approach, the network also collaborates with businesses in a wide sense, and in addition, collaboration with *other* universities is of equal value to the Baltic University.

Interaction with non-university partners is often motivated by a need for experts and to offer students a more realistic view of life outside of the studying environment. Contributions from policy makers and industry representatives in teaching are invaluable as they add to the discussion with students, who – being relatively inexperienced – may be somewhat unrealistic in their expectation of solving very complex and multifaceted problems, e.g. lowering CO_2 emissions. Encouraging a dialogue and concrete activities in collaboration with local and regional authorities and businesses is a vital complement to the academic studies undertaken by the students.

The below table presents the number of students involved in BUP developed courses. The BUP network does not collect data or develop statistics of the employability levels of its students. As this would be valuable data to present in this report, this is unfortunate, however it would also be difficult to achieve as the BUP activities are extracurricular and therefore often attended by the most driven students.

Figure 10 The size of the student population in 2009

					Number of students on the different course sectors:							
Country	Universities	Teachers	Study groups	Students	BSE	POB	SBR	SWM	SCD	EE	EM	Others
Finland	3	6	12	442	41	0	26	34	0	0	0	341
Estonia	5	8	14	670	32	38	22	0	0	0	0	578
Latvia	8	21	33	1666	378	0	1129	70	0	0	89	0
Lithuania	14	26	20	397	132	44	180	0	0	0	15	26
NW Russia	10	27	26	467	169	35	130	32	10	46	45	0
Kaliningrad	3	10	?	439	0	11	128	0	0	0	0	300
Belarus	29	71	74	2429	828	135	1167	181	25	48	45	0
Ukraine	7	24	25	357	10	71	87	11	39	112	27	0
Slovak Rep.	2	5	4	122	27	0	10	5	0	0	0	80
Czech Rep.	1	9	12	426	0	0	0	0	0	0	157	269
Poland	57	64	53	1488	574	103	586	56	98	31	40	0
Germany	8	9	2	213	55	14	14	0	23	40	42	25
Norway	1	1	0	0	0	0	0	0	0	0	0	0
Denmark	3	?	0	2	0	0	2	0	0	0	0	0
Sweden	4	6	6	202	0	7	0	66	80	0	38	11
TOTAL	151	287	281	**9320**	2246	458	3481	455	275	277	498	1630

Source: Baltic University Programme Annual Report 2009

As previously indicated, BUP activities are not only broad ranging, but also varies with the universities and other partners involved, and are subject to financial constraints. In addition, the consultations done for this case study have not covered all 230 universities involved in BUP and can subsequently not be completely comprehensive when it comes to the decentralised projects undertaken[52]. Nevertheless, as a snapshot of the work of the BUP a number of projects and activities, all executed in the year 2009, are highlighted in this section (many of the activities of BUP are documented on the Baltic University channel on Youtube[53]). Examples of the activities are:

- In April 2009, Luleå University of Technology, Lund University and Lomonosov University implemented a pilot course on Education for Sustainable Development that was tailor-made and attended by officials working at the government offices in Moscow;

[52] This case study has involved consultations with the Secretariat and two participating institutions in two separate countries.

[53] http://www.youtube.com/user/Balticuniversity

- Participants in the BUP network organised and held a course in Poland on REACH (Registration, Evaluation, Authorisation and restriction of Chemicals) to highlight the new chemical policy in the EU;
- Over the year the BUP organised two student conferences and a seminar that were held with BrightClimateFuture (a pan-European student group) with the aim of marking the COP15 meeting the same year. The themes of the conferences were on Climate Change and Education for Sustainable Development and on Climate Change and Human Rights. The seminar was organised, discussing climate change, as a complementary event to the COP15 conference;
- In cooperation with the consultancy Alan AtKisson[54], the BUP organised several network courses on tools for sustainable development for teachers in cooperation;
- The BUP network in Poland Poznan held an Area Studies course for the Baltic Sea Region. Similarly, the German BUP network held a Summer course on Sustainability, River Basin Management and Climate Change.

Another good example of the collaborative activities undertaken is the WaterPraxis[55] project. This is an Interreg project that aims to improve the status of the Baltic Sea. This approach taken is very practical and focuses on the implementation of specific measures in River Basin Management projects in the region, involving universities and public authorities in Denmark, Finland, Germany, Latvia, Lithuania, Poland, Sweden and Russia.

5.4.1 Results and impacts of university business cooperation both at the university and at businesses

The Waterpraxis project is a showcase example of how the BUP network can work well, and where countries at different levels of infrastructural development and environmental protection can all gain from collaboration. The project, currently being undertaken, is expecting to produce the following results:

Examples and guidelines of best water management practices for river basin planning at several levels (official river basin districts, single river basins, local investments) based on previous experiences from different countries and lessons learned in pilot studies of the project (published as report and on web)

Practical examples of good investment projects (published as a report and on the web)

Training courses for planners on general river basin management focusing on environmental economy

Water protection action plans for pilot areas in some partner regions

Investment plans (including technical and financing plans) for water protection measures in pilot areas in Finland, Denmark, Poland and Lithuania. The investments will be realised during the extension stage to be proposed at the end of the project56

So far in the project, several country partners have achieved very concrete results and subsequent impacts. In Poland, the origin of the problems with water quality (algal blooms) has been identified for the Sulejów reservoir, which in the past supplied the cities of Łódź and Tomaszów Mazowiecki with drinking water. In collaboration with the regional authorities and university staff and students, concrete actions are now being taken with the regional waste management system to rectify the acidification with the help of neighbouring regional

[54] http://www.atkisson.com

[55] http://waterpraxis.net

[56] http://waterpraxis.net/en/expected-outputs.html

authorities' waste management capacity. The solution has been developed mainly by the academic staff and students involved in the project, but within the budgetary restrictions and capacity of the regional authorities.

This is a typical approach of the BUP network – taking into account student development and regional conditions in order to come up with concrete solutions. To add to this aspect, the network also tailors its teacher training schemes to fit into this practical approach.

Although it is not an articulated objective, many of the skills picked up by the BUP students are highly valuable soft skills, much valued by employers, but often overlooked in traditional curricula, such as language skills, teamwork, problem oriented approaches and project work. Although no participating private business have been approach in relation to this case study, there are several pieces of anecdotal evidence that support that the BUP courses and projects are well-tailored to both public and private needs, Particularly, businesses involved in the network have been very impressed by the high calibre of the students.

Indeed, the results seen in student competence have spurred on the network to expand their activities to more ambitious research projects (to a smaller extent it already does), and board meetings undertaken this year (2011) have discussed possible strategies and funding streams to realise this goal.

Many BUP universities are keen to continue to invest in further projects as the participations so far have raised the profiles of the institutes. This is central to fulfilling the very common objective of internationalisation, and is a fundamental reason for involvement in the BUP.

Related to this note, the networking within BUP has led to other collaborations. For example, Germany has initiated a lot of work with the Baltic States and Poland. In turn, increased networking often lead to other types of (European) funding.

5.5 What are the key lessons which can be drawn out from this approach?

This network has multifaceted objectives; it has both regional and educational dimensions, but simultaneously the participating universities emphasise the importance of internationalising and of using the network to further other – external and internal to the BUP – projects and networks. Encasing all these aims is the high level objective of striving for an environmentally sustainable Baltic Sea region.

The long term goal is to develop close cooperation with as many in the network as possible, but in the shorter term, the search for projects and funding opportunities is central. Subsequently the network consists of smaller groups that know each other's reputation and abilities well. Trust is central, as project based work cannot be executed if not all partners delivers as expected.

Funding is a real issue, in particular for the Secretariat. It has described the network to be "too educational for DG Regio, and too regional for DG EAC", but believes that the BUP has a central role to play in the Baltic Sea regional development in the coming decades, something which is illustrated in the network's central role in the EU's Baltic Sea Region Strategy.

5.6 Contacts, references

5.6.1 Contacts

Christine Jakobsson, Programme director

Walter Leal, Head of the Research and Transfer Centre Applications of Life Sciences at the Hamburg University of Applied Sciences

Ireneusz Zbicinski, Faculty of Process and Environmental Engineering, Technical University of Lodz

Baltic University Programme Annual Report 2009

Baltic Sea Region programme 2007-2013, Power of Cooperation: 46 Transnational projects contributing to the EU Strategy for the Baltic Sea region

The Baltic Region, http://www.

ikzm-d.de/inhalt.php?page=40,273

http://www.balticgateway.se

The Baltic University Programme website, http://www.balticuniv.uu.se

http://waterpraxis.net

5.7 Appendix A Participating Universities

- Academy of Business Administration, Minsk
- Belarusian National Technical University, Minsk
- Belarusian-Russian University, Mogilev
- Academy of Business Administration, Minsk
- Belarusian State Agricultural Academy, Gorki
- Belarusian State Economic University, Minsk
- Belarusian State Medical University, Minsk
- Belarusian State Pedagogical University, Minsk
- Belarusian State Technological University, Minsk
- Belarusian State University, Minsk
- Belarusian State University of Culture, Minsk
- Belarusian State University of Informatics and Radioelectronics, Minsk
- Belarusian State University of Transport, Gomel
- Belarusian Trade-Economical University, Gomel
- Brest State Technical University, Brest
- Brest State University, Brest
- Gomel State Technical University, Gomel
- Gomel State University, Gomel
- Grodno State Agricultural University, Grodno
- Grodno State Medical University, Grodno
- International Institute of Labor and Social Relations, Minsk
- International Sakharov Environmental University, Minsk
- Mogilev State Technological University, Mogilev
- Mogilev State University, Mogilev
- Moscow State University for Economics Statistics and Informatics (MESI), Minsk
- Mozir State Pedagogical University, Mozir
- Polotsk State University, Polotsk
- Vitebsk State Academy of Vetrinary Medicine, Vitebsk
- Vitebsk State University, Vitebsk
- Yanka Kupala State University of Grodno, Grodno
- Czech University of Life Sciences, Prague
- Brno University of Technology, Brno
- University of Ostrava, Ostrava
- VSB - Technical University of Ostrava, Ostrava
- Aalborg University, Aalborg
- Bornholm's Academy, Rønne
- Danish Institute for International Studies, Copenhagen
- Roskilde University Centre, Roskilde
- Technical University of Denmark, Lyngby
- University of Copenhagen, Copenhagen
- University of Southern Denmark, Sønderborg
- Audentes University, Tallinn
- Estonian Public Service Academy, Tallinn
- Estonian University of Life Sciences, Tartu
- EuroUniversity, Tallinn
- Pärnu College, Pärnu
- Rural Economy Research Centre, Lääne-Virumaa
- Tallinn University, Tallinn
- Tallinn University of Technology, Tallinn
- University Nord, Tallinn
- University of Tartu, Tartu
- Haaga-Helia University of Applied Sciences, Helsinki
- Helsinki University of Technology, Helsinki

- Institute for Fisheries and Environmental Care, Turku
- Joensuu University, Joensuu
- Kymenlaakso Polytechnic University of Applied Sciences, Kotka
- Lahti University of Applied Sciences, Lahti
- Laurea University of Applied Sciences, Vantaa
- Metropolia University of Applied Sciences, Helsinki
- Mikkeli University of Applied Sciences, Mikkeli
- North Karelia Polytechnic, Joensuu
- Novia University of Applied Sciences, Vaasa
- Savonia University of Applied Sciences, Iisalmi
- Tampere Polytechnic University of Applied Sciences, Tampere
- Turku School of Economics and Business Administration, Turku
- University of Helsinki, Helsinki
- University of Jyväskylä, Jyväskylä
- University of Kuopio, Kuopio
- University of Lapland, Rovaniemi
- University of Oulu, Oulu
- University of Tampere, Tampere
- University of Turku, Turku
- Åbo Akademi University, Turku
- Åland Polytechnic Open University, Mariehamn
- Berlin School of Economics, Berlin
- Christian-Albrechts-Universität, Kiel
- Fachhochschule Neubrandenburg, Neubrandenburg
- Free University of Berlin, Berlin
- Gaia University, Steyerberg
- Hamburg University of Applied Sciences, Hamburg
- Technical University of Cottbus, Cottbus
- University of Eberswalde, Eberswalde
- University of Hamburg, Hamburg
- University of Lüneburg, Lüneburg
- University of Wismar, Wismar
- Zittau/Görlitz University of Applied Sciences, Zittau
- AC Latvia, Riga
- Daugavpils University, Daugavpils
- Higher School of Economics and Culture, Riga
- Institute of Practical Psychology, Daugavpils
- Latvian Academy of Culture, Riga
- Latvian Academy of Medicine, Riga
- Latvian Maritime Academy, Riga
- Latvia University of Agriculture, Jelgava
- Liepaja Academy of Pedagogy, Liepaja
- Rezekne Higher Education Institution, Rezekne
- Riga Technical University, Riga
- University of Latvia, Riga
- Ventspils University College, Ventspils
- Vidzeme University College, Valmiera
- Kaunas College, Kaunas
- Kaunas University of Medicine, Kaunas
- Kaunas University of Technology, Kaunas
- Klaipeda University, Klaipeda
- Lithuanian Institute of Water Management (LIWM), Vilainiai
- Lithuanian University of Agriculture, Noreikiskes
- Lithuanian Veterinary Academy (LVA), Kaunas
- Mykolas Romeris University, Vilnius
- Siauliai University, Siauliai
- Vilnius Cooperative College, Vilnius
- Vilnius Gediminas Technical University, Vilnius
- Vilnius Pedagogical University, Vilnius
- Vilnius University, Vilnius
- Vytautas Magnus University, Kaunas
- Norwegian University of Science and Technology, Trondheim
- Adam Mickiewicz University, Poznan
- AGH University of Science and Technology, Krakow
- Baltic Humanistic University, Koszalin
- Bialystok Technical University, Bialystok
- Catholic University of Lublin, Lublin
- Collegium Polonicum UAM-Viadrina, Subic
- Eugeniusz Piasecki University School of Physical Education, Poznan
- Gdansk University of Technology, Gdansk
- Gdynia Maritime University, Gdynia
- Higher School of Administration, Bielsko-Biała
- Higher School of Banking, Gdansk
- Higher School of Environmental Education, Bydgoszcz
- Higher Vocational State School, Legnica
- Jagiellonian University, Krakow

- Jan Dlugosz University in Czestochowa, Czestochowa
- Jozef Tyszkiewicz Higher School of Bielsko-Biała, Bielsko-Biała
- Koszalin University of Technology, Koszalin
- Kwidzyn School of Management, Kwidzyn
- Li Secondary School in Lodz, Lodz
- Lublin University of Technology, Lublin
- Maria Curie-Sklodowska University, Lublin
- Maritime University of Szczecin, Szczecin
- Nicolaus Copernicus University, Torun
- Pawel Wlodkowic University College in Plock, Płock
- Pedagogical University of Krakow, Krakow
- Pedro Arrupe Leaders and Tutors Training Centre, Gdynia
- Polish Academy of Science, Krakow
- Pomeranian University, Slupsk
- Poznan University of Economics, Poznan
- Pultusk Academy of Humanities, Pultusk
- Radom University of Technology, Radom
- Rzeszow University of Technology, Rzeszow
- School of Occupational Safety of Katowice, Katowice
- Silesian University of Technology, Gliwice
- State Higher School of Vocational Education, Elblag
- Szczecin University of Technology, Szczecin
- Technical University of Lodz, Lodz
- University of Bielsko-Biala, Bielsko-Biala
- University of Bialystok, Bialystok
- University of Ecology and Management, Warsaw
- University of Economy in Bydgoszcz, Bydgoszcz
- University of Finances and Management, Bialystok
- University of Gdansk, Gdansk
- University of Life Sciences in Lublin, Lublin
- University of Life Sciences in Poznan, Poznan
- University of Lodz, Lodz
- University of Silesia, Katowice
- University of Szczecin , Szczecin
- University of Technology and Life Sciences, Bydgoszcz
- University of Warmia and Mazury, Olsztyn
- University of Warsaw, Warsaw
- University of Wroclaw, Wroclaw
- University of Zielona Gora, Zielona Gora
- Warsaw School of Economics, Warsaw
- Warsaw School of Real Estate Management, Warsaw
- Warsaw School of Social Sciences and Humanities - SWPS, Warsaw
- Warsaw University of Life Sciences - SGGW, Warsaw
- Warsaw University of Technology, Warsaw
- West Pomeranian Business School, Szczecin
- Witelon University of Applied Sciences, Legnica
- Wroclaw Medical University, Wroclaw
- Wroclaw University of Technology, Wroclaw
- Baltic Fishing Fleet State Academy, Kaliningrad
- Herzen State Pedagogical University of Russia, St. Petersburg
- Immanuel Kant State University of Russia , Kaliningrad
- Kaliningrad Institute for Retraining of Staff in Agribusiness, Kaliningrad
- Kaliningrad State Technical University, Kaliningrad
- Karelian State Pedagogical University, Petrozavodsk
- Moscow State Linguistic University, Moscow
- Moscow State University, Moscow
- Moscow State University for Economics, Statistics and Informatics (MESI), Moscow
- Novgorod State University, Novgorod
- Pskov Pedagogical Insitute, Pskov
- Russian Academy of Public Administration, Moscow
- Russian State Hydrometeorological University, St. Petersburg
- St. Petersburg Institute of Fine Mechaniccs and Optics, St. Petersburg
- St. Petersburg State Agrarian University, St. Petersburg
- St. Petersburg State Institute of Technology, St. Petersburg
- St Petersburg State Polytechnical University, St. Petersburg
- St. Petersburg State University, St. Petersburg
- St. Petersburg State University of Cinema and Television, St. Petersburg
- St. Petersburg State University of Refrigeration and Food Engineering, St. Petersburg

- Comenius University, Bratislava
- Slovak University of Agricultural in Nitra, Nitra
- Slovak University of Technology, Bratislava
- Technical University of Zvolen, Zvolen
- University of Constantine the Philosopher, Nitra
- University of Veterinary Medicine, Kosice
- Chalmers University of Technology, Göteborg
- Gotland University, Visby
- Linköping University, Linköping
- Luleå University of Technology, Luleå
- Lund University, Lund
- Malmö University, Malmö
- National Veterinary Institute, Uppsala
- Royal Institute of Technology, Stockholm
- Stockholm University, Stockholm
- Swedish Institute of Agriculture and Environmental Engineering JTI, Uppsala
- Swedish University of Agricultural Sciences, Uppsala
- Södertörn University College, Stockholm
- Umeå University, Umeå
- University College of Gävle - Sandviken, Gävle
- University of Kalmar (Linnaeus University), Kalmar
- University of Karlstad, Karlstad
- Uppsala University, Uppsala
- Örebro University, Örebro
- Bila Tserkva National Agrarian University, Bila Tserkva
- Chernihiv State Institute of Law, Social Technologies and Labour
- Dnipropetrovsk State University after Oles' Honchar, Dnipropetrovsk
- Ivan Franko National University of L'viv, L'viv
- Kherson State Agrarian University, Kherson
- National University of Kyiv-Mohyla Academy, Kiev
- Sumy State University, Sumy
- Ukrainian National University of Forestry, L'viv
- Ternopil Ivan Pul'uj National Technical University, Ternopil
- Vasyl Stefanyk Pre-Carpathian National University, Ivano-Frankivsk

6 CHARLES UNIVERSITY PRAGUE (CZ)

Summary of key points

The University

- The Charles University (CU) is a leading university in the Czech Republic educating around one seventh (14.5 per cent) of all students in higher education in the country. It achieves impressive scores in international rankings and is numbered amongst the top 100 European universities.
- The focus of its 17 faculties (of which 14 are located in Prague) is on non-technical academic fields such as education, medicine, humanities, natural and social sciences. CU is a very traditional institution with a strong research focus and a main mission to provide education of highest quality.
- A high demand for CU graduates serves as strong evidence of the quality of their education and results in unemployment rates below 2 per cent.
- From the institutional perspective research excellence, mobility and international cooperation, technology transfer and life-long learning are placed higher on the agenda than collaboration with business. Faculties have therefore a substantial degree of autonomy in incorporating university business cooperation into the educational process. Some faculties have implemented compulsory placements in future workplaces, however the majority of these are in the public organisations such as hospitals or schools.
- Within the organisational structure, there is a board of directors composed of representatives of stakeholder organisations which are also mainly from the public sphere.
- University business cooperation is supported through a university-wide Information and Advisory Centre and a private company CareerMarket which works closely with only two of the CU faculties: Faculty of Science and Faculty of Mathematics and Physics.
- Another UBC-relevant unit of the CU is the Centre for Technology and Knowledge Transfer that provides support to university researchers planning to commercialise their research results (and advisory services and training to those from other institutions).
- University-wide university business cooperation-relevant activities include a broad scale of LLL courses of which more than half are related to career development.

The Business Context

- The sectoral structure of Prague's economy – with a predominance of services – is now on a par with Western European cities. Prague's economy accounts for about a quarter of the Czech Republic's GDP making it the highest performing regional economy of the country. Eurostat figures confirm this high level of development and ranked Prague as the 5th highest performing EU region at 172 per cent of the EU-27 average.
- In terms of processing industries are the most dominant branches of the pharmaceutical industry, printing, food processing, manufacture of transport equipment, computer technology and electrical engineering.
- Prague's specific position within the Czech Republic shapes the need of the university to enter into a collaborative dialogue with industry. Prague has the lowest unemployment of all regions in the Czech Republic of 4.1 per cent compared to the national average of 9.6 per cent.
- National support for university business cooperation activities is ad hoc and limited in scope. There is no national regulation making the university business cooperation compulsory. One exception to this development is project EF-TRANS with a goal to set up and bring into effect knowledge transfer between R&D (research and development) institutions and industry.

6.1 Introduction

6.1.1 Location and economic context

The majority (14) of the faculties of the Charles University (CU) are located in Prague, the capital of the Czech Republic. Prague's economy accounts for about a quarter of the Czech Republic's GDP making it the highest performing regional economy of the country[57]. Eurostat figures confirm this high level of development and ranked Prague as the 5th highest performing EU region at 172 per cent of the EU-27 average[58].

The sectoral structure of Prague's economy – with a predominance of services – is now on a par with Western European cities. In terms of processing industries are the most dominant branches of the pharmaceutical industry, printing, food processing, manufacture of transport equipment, computer technology and electrical engineering. Industrial employment has stabilised after a significant drop and an increasing emphasis is being placed on the need to improve the quality of innovative co-operation between research groups and the implementation base. Technology parks, incubation centres for small/medium-sized businesses and other integrated capacities in this area are still at the initial stages. Construction firms have adapted to the new demands accordingly and, due to continued high interest from investors, have become a major part of the Prague economy. Within the trade sector, retail chains have made their presence felt in Prague: large commercial-social centres of citywide and regional importance are being built and the area is characterised by great competition. The distribution of goods, largely from abroad, has necessitated the construction of extensive logistical centres at the outskirts or near the border of the city. Another important feature of Prague's economy is tourism, which accounts to up to 50 per cent of total revenue from tourism in the Czech Republic. A stable core of international firms has been created within the corporate service sector. Consultancy services (legal, accountancy, advertising and marketing) have increased their capacities and Prague has succeeded in attracting major international companies active in the strategic services (information technology, management and software). The finance industry, which has completed its own transformation, is characterised by a highly competitive environment in which various companies offer their new products.

Prague's specific position within the Czech Republic shapes the need of the university to enter into university business cooperation. As described above, Prague is today a highly developed city comparable to Western European standards with the presence of many multinational companies. It has the lowest unemployment of all regions in the Czech Republic of 4.1 per cent compared to the national average of 9.6 per cent[59]. Moreover, in the Czech Republic, there is a large wage difference between graduates and non-graduates. All of these factors in combination with high demand for Charles University high-quality graduates reduce the need (and incentives) to implement institutional policies for university business cooperation.

6.1.2 Regional and national policies supporting university business cooperation

There are no binding national or regional regulations requiring universities to enter into University Business Cooperation.

In terms of national efforts, there is a project EF-TRANS with a goal to set up and bring into effect knowledge transfer between R&D (research and development) institutions and industry

[57] The 2008 update of Prague Strategic Plan, Prague Municipal Assembly, December 2008

[58] Regional GDP per inhabitant in 2007, Eurostat, February 2010

[59] December 2010 figures, http://www.mpsv.cz

Universities like Charles University are the main target group of the national project. Other than this project, the support of such activities is limited and ad hoc.

National policies in higher education mean that the state pays all the fees and social insurance for students up to age 26 and there have been talks to increase this limit to 30. These policies do not encourage students to leave higher education until relatively late, which can create both positive (e.g. low unemployment) and negative (e.g. financial) effect.

6.2 The university – facts and figures

6.2.1 Introduction

Charles University in Prague is one of the world's oldest universities (founded in 1348). Today it has 17 faculties (14 in Prague, 2 in Hradec Králové and 1 in Plzeň). The university has more than 7,500 employees, 4,000 of these being academic and research staff. In 2009, there were 52,842 students studying at CU (which is roughly a seventh of all students in the Czech Republic), in more than 300 accredited degree programmes and 660 study disciplines. More than 20,000 were studying in bachelor's programmes, 25,000 in master's programmes and more than 8,000 in doctoral programmes. Over 7,000 students are from abroad.

Charles University has a very specific position within the Czech Republic. With more than half of the departments in humanities, the third role of universities is in this case different from commercialisation. Being a very traditional institution its primary focus is providing top quality education resulting in top quality research.

6.2.2 Organisational Structure

A Rector heads Charles University, while an Academic Senate is its supreme self-regulating academic body including the representatives of academic staff/faculty and those of students (50:50). Its other organs include the Scientific Council, bursar, and the Board of Directors, which is responsible for the implementation of public interest in Charles University's policies. The Senate (rector's governing board) consisting of the vice-rectors, the bursar and the chancellor make up the advisory body of the rector. The deans are heads of faculties enjoying a large measure of independence. Other component parts of Charles University are managed by their directors.

The Board of Directors (also referred to as the Administrative Board) is the instrument that ensures that the University is serving the public and hence the economy in which its graduates end up. The members of this board are appointed by the Ministry of Education, Youth and Sport, after consultation with the rector. Currently the board comprises a president, 2 vice-presidents and 14 members representing the following institutions: Supreme Court in Prague, National Museum, DG Environment of the European Commission, Czech ministries (Interior, Finance), Factoring KB a.s. Archdiocese of Prague, Chamber of Deputies of Parliament of the Czech Republic, Fulbright Commission Czech Republic, Czech National Bank, State Fund of Housing Development. 4 members are not indicated as representatives of one particular institution, as they hold more than one position within several institutions (one of them is a former prime minister). The board reflects the traditional academic focus and indeed the mix of faculties of the Charles University whereas the members are from the major part from governmental organisations.

The Rector is a president of the scientific council, and appoints members in accordance with the Academic Senate of CU; at least one third of members must be "extra muros" (external to the academic community of CU). The majority of members are from research institutions.

In addition to its faculties, the university consists of 3 institutes, 6 further centres for educational, scientific, research, development and other activities or for provision of

information services, 5 university-wide special facilities and the Rectorate as the administrative centre of the whole university.

6.2.3 Position of the University within the system of Higher Education

Charles University is one of the world's top universities, a fact that has been confirmed repeatedly by the international university rankings. In the Shanghai University's Academic Ranking of World Universities, which evaluates 2,000 institutions, Charles University was placed at 259 out of the total of 17,000 universities and colleges. Charles University is therefore among the 2 per cent of the best universities and the 100 top European universities. It is the only Czech institution of higher education to be placed in the published list of 500 universities. The university fared just as successfully in The Times THES ranking, in which it placed 267th. These results are summarised in the table below.

Figure 11 International Rankings of Charles University

Ranking	Place achieved by Charles University
ARWU – tzv. Shangai ranking	259
Times Higher Education World University Rankings	267
QS Top Universities	267
SCIMAGO Institutions Ranking (SIR)	231
Taiwan HE Evaluation and Accreditation Council - Top 500	226 (89 in Europe)
CHE Excellence Ranking	Excellence in Mathematics

Source: Strategy Department of Charles University, 2010

With these results Charles University positions itself as a strong research-oriented university unmatched by any other higher education institution in the Czech Republic.

6.2.4 Employability of Charles University graduates

A recent survey found that only 1.1 per cent of Charles University graduates are unemployed 6-12 months after their graduation[60]. Therefore the rationale for working together with industry to reduce this number is not as relevant as other universities. Specific statistics on which sectors/companies do the students most often enter after the university are not available (apart from a survey of graduates of Faculty of Mathematics and Physics and Faculty of Science conducted by CareerMarket.

6.2.5 External funding

Charles University has an income of some 8 billion Czech crowns per year. Forty five per cent of this comes from educational funding, 29 per cent from competitive research grants, and 26 per cent is its own income.

Three of the university faculties are outside Prague region (two in Hradec Kralove and one in Plzen). They are relatively small but are eligible to receive money from the European Regionak Development Fund. As highlighted, these projects benefit the university but also cause additional issues due to bureaucratic complexity.

6.3 Approach to university business cooperation

Charles University has a somewhat decentralised approach to university business cooperation and delegates its faculties with great autonomy in decisions regarding the extent

[60] Annual report of Charles University 2009 (using 2008 data)

of support for such collaborations (except the Centre for Technology and Knowledge Transfer which has other Recommended rules in this domain). Charles University has therefore not taken an institutional (centralised) approach and it does not have any binding rules in place that would require every student to participate in a placement or work during their studies.

On the other hand several of its faculties include compulsory placements in organisations that are likely to become future employers of their graduates. These organisations would generally be public schools for students of pedagogy, public hospitals for students of medicine, but also organisation of student's choice approved by the professor for students of Social Work within the faculty of Philosophy.

> *"The strategic support of this type of collaboration is exclusively dependant on the faculty, ...because it is not directly applicable to all academic fields".*

6.3.1 A decentralised approach to university business cooperation at Charles University

These sections give an overview of the reasons for a decentralised approach to university business cooperation.

Size of institution and diversity of faculty portfolio

Charles University is a large institution with 17 diverse faculties, so implementing any such university-wide measure is not feasible due to complexity and the diversity of student base. This issue already arose regarding the work of the university Information and Advisory Centre. This centre is working with students and graduates of all faculties and so keeps the profile of activities broad so that they are helpful for everyone. Program Absolvent (Programme Graduate) that the centre annually organises, together with CareerMarket, at first included a "graduate fair", where companies presented themselves to the graduates by setting up a stand in a hall. In addition the event consisted of series of lectures on topics such as situation on labour markets, opportunities to work abroad etc. These lectures were highly regarded by the students and graduates, while the presentations of the companies were only found useful by the students with similar study focus as the firm. Therefore currently the event is organised as a series of lectures and courses on topics that are of interest to all students, regardless of their discipline. Presentations of firms to graduates were delegated to the faculties, which assure the relevance of the firm to the study programmes.

Tradition and mission of the university

Charles University has already been presented as a traditional, successful and high quality university. Its main mission is to provide high quality education to its students. This does not include educating students for one particular firm but providing them with knowledge that they can apply in various settings.

> *An employer can put the graduate on a training course in a particular software that they use. My job as a professor is to teach the student the theory and when he/she understands it, he/she can go to any of the firms and take on further training.*

Bottom up approach

Despite the lack of statistics on student employment during their studies, it is reported that some 60 per cent of students have involvement with their future employer during their time at the Charles University. Such strong statements are based on the fact that students of medicine work with doctors at hospitals, students of law work with Attorneys offices from their 4th year of study, while teacher training students sit in on sessions at schools.

Even if the faculty does not make such activity compulsory, students wishing to obtain experience within industry can initiate it themselves with the support of members of the faculty.

In this way, with university business cooperation as a broad term, it is compatible with the mission and objectives determined by the University.

> *The faculties themselves determine the extent of their involvement. We are not convinced that any other model is applicable in our case.*

6.3.2 Barriers to university business cooperation in Charles University

The university has identified some barriers in relation to cooperation with business:

- There are inevitable difficulties for academic and business collaborators in adjusting their organisational cultures to new relationships and methods of working, often with each partner needing to establish credibility with the other.
- Another challenge could arise from a view of businesses as competitors, rather than partners, trying to "steal their best students".
- University business cooperation partners may also have to overcome historical differences in knowledge-sharing versus commercial intelligence. Academics tend to publish as soon as possible; firms hide innovation in design and products/apply for IPR.
- Lecturers may see their role as concerned with teaching rather than whether and what kind of job a graduate gets after finishing a degree.
- Career Office (CareerMarket) may not be seen as an equal partner in discussions with the faculties (not academic). CareerMarket is also a private company and therefore has its own agenda. This can affect its legitimacy within the university environment. For example, graduate surveys performed by the CareerMarket have produced recommendations for improvement, and opinions of students on involvement of business in educational process, but they might not be acted upon by the faculties or university. An alternative to such an approach could be to have studies undertaken by a public project or body which might give it more authority.
- University bureaucracy can inhibit co-operation with outsiders, for example where each cooperation with a foreign entity has to be approved and signed by the rector himself (this can also protect the institution). This inhibitor can also apply to cooperation with Czech entities outside of Prague
- Another, more fundamental problem in collaboration with businesses may be a difference in priorities. Whereas a university's goals are generally long-term, industry usually has short-term specific needs. The large companies in the Czech Republic are mainly foreign and therefore have main R&D in home country. SMEs have more practical problems that they are trying to solve but they cooperate more with technical universities.

6.3.3 Entrepreneurship, Research and Innovation Agenda

Charles University has a Centre for Technology and Knowledge Transfer (CPPT founded in 2007).

One relevant method of collaboration in Charles University is the assistance provided to students and researchers in setting up spin offs Charles University has been involved in this activity only since 2004 and hence the results of activities are relatively modest.

The 2009 CU Annual Report states that the university is opening up to society by improving the conditions for innovation transfer, in which it will pay more attention to support of common R&D projects of university departments and private firms and also on signing mutually beneficial agreements with strong international partners in the field of innovation transfer. In 2009, CU has signed a total of 450 bilateral agreements and 190 international partnership agreements with foreign universities. Charles University has a substantial international

student base with 7,093 foreign students of which 2,169 studied in English and the rest in Czech.

6.4 Types of university business cooperation in the institution and their impacts

6.4.1 Information and Advisory Centre (IPC)

In 1996 Charles University in Prague opened an Information and Advisory Centre (IPC of CU). The centre services are available to Czech and international students and everybody else interested in CU in Prague. IPC is composed of three departments: the Department of Information Services, the Department of Advisory Services and the Office for students which special needs. The Centre provides information and arranges various seminars on the possibilities to study at CU (degree programmes, non-degree programmes, lifelong education, study abroad programmes, exchange programmes, Czech language courses), advisory services (careers, psychological, social and legal, services for students with special needs or for international students), the student ID cards are issued there, copying services and PCs (including the access to Internet) are available there as well. CU Point sells T-shirts with the logo of CU and other souvenirs.

IPC works with students and graduates of all CU faculties and collaborates with Career Market in the organisation of an event “Absolvent” (“meaning the Graduate”) that contains series of presentations on current topics that are of interest to students and graduates (situation on labour market, possibilities of working abroad, etc.).

IPC is however generally not involved in setting up placements for students. These activities are organised either by faculties (where the placement is compulsory), Career Market (for Faculty of Science, Faculty of Mathematics and Physics and partly for Faculty of Education), or by students themselves (sometimes with IPC’s assistance if the placement is abroad).

IPC does not collect any statistics on graduate employability or graduate/employer satisfaction.

6.4.2 CareerMarket

CareerMarket was initially started as a 2-year project funded by the European Social Fund with the following objectives:

- To establish systematic and constant cooperation between participating universities and industry in terms of utilisation of available human resources;
- To support regular exchange and flow of information between the educational institutions and industry through a shared database, lectures or presentations;
- To monitor the job market and create a system reflecting the availabilities both in work places and work force;
- To facilitate contact with promising and talented students as early as during their university studies;
- To create the methodology of Work Based Learning (learning based on work experience) for the Czech environment and to train future lecturers / trainers;
- To set up a consulting service for university students to facilitate their transition from the university to a work environment.

Since the beginning CareerMarket has worked closely with two faculties, the Faculty of Science and the Faculty of Mathematics and Physics, and several smaller Universities. There have been attempts to broaden the services also for humanities at CU, however in the end discussions failed for a number of reasons including questions from the university

management about whether it is necessary to help all students to find a job across all markets.

CareerMarket proactively contacts firms relevant for students at the Charles University and requests information for the type of preferred collaboration. It also:

- Provides advisory and counselling services;
- Organises workshops and seminars for students and graduates;
- Organises a day of firms for each of the faculties;
- Assists students with finding suitable dissertation topics in collaboration with the industry;
- Publishes a publication “Gate to the professional career”;
- Publishes a list of job and placement offers;
- Conducts surveys of graduates and applicants of the CU faculties and publishes results (some of these results were published by Hospodarske noviny).

Besides these activities has CareerMarket helped to establish the Alumni Club for the Faculty of Science.

6.4.3 Centre for Technology and Knowledge Transfer (CPPT)

The CPPT is a unit of the Charles University, which has been established by a programme funded by the EU Structural Funds. It consists of an office, which is elsewhere referred to as TTO (Technology Transfer Office) or the KTO (Knowledge Transfer Office) and is an internal part of most universities.

The office provides services to all faculties and institutes of the CU. Researchers interested in possibilities of commercialisation of their research results can consult this with the CPPT staff who collaborate with patent attorneys and marketing networks.

Furthermore, the CPPT assists with setting up of the spin-off companies in which it collaborates with strategic partners, marketing firms, investors, economic and financial advisors.

The CPPT runs training courses in technology transfer and IPR issues which broadly classify as courses for support of entrepreneurship. These courses are predominantly targeting researchers from research institutes but students are allowed to attend the lectures. In the years 2006-2008, within the educational programme “Innovation entrepreneurship of the Charles University”, the centre ran 3 consecutive courses that were highly regarded by the participants and by an international expert forum as well.

Progress has been however relatively slow, as the cultural change that is happening requires time. The CPPT has however made a difference in the perception of technology transfer education in the eyes of researchers at the CU. CPPT has increased researchers’ interest and initiated discussions on the topic.

CPPT is intensively involved in a project EU KTS which has the objective of developing a certification process for courses in knowledge transfer education. The basic level will be in Czech and the more advanced in English only. The involvement in EU KTS project is based on a follow up of the project Transnational Technology Transfer Manager – Application of European education model at the Charles University which was funded by the Operational Programme Praha-Adaptabilita.

6.4.4 Life-Long Learning (LLL)

Lifelong learning is an important part of CU’s educational activity. Faculties and other establishments offer lifelong learning programmes for various target groups: for university

applicants, graduates, older people, and for students and others who are interested. Courses focus on either obtaining skills for a profession or for the interested amateur. The courses may be taught face to face, by distance learning or through a combination of the two. All LLL courses are listed in an online database accessible on the university website. These courses are also promoted on Faculty websites, catalogues, and brochures and at Educational Fairs across the Czech Republic.

The future strategy of LLL at Charles University is still being formulated and the establishment of a LLL centre is one possible route which may be taken.

The Continuing Professional Development (CPD) is less well developed overall, although many faculties would say they deliver aspects of CPD. It has existed for some time for medical doctors and teachers though it is still regarded as novel. The faculties in which CPD courses are taught are the Faculty of Education (for existing teachers), Faculty of Law (through an organisation called Iuridicum), Faculty of Pharmacy and Faculty of Mathematics and Physics (Didactic education for secondary school teachers).

The various lifelong learning programmes organised by CU attract more than 15,000 people each year. In 2009 there were 392 courses with over 16,500 participants. The majority of participants studied Humanities and Social Sciences, followed by Education and Medical Sciences[61].

6.4.5 International Cooperation and Mobility

The university is dedicated to international co-operation with prestigious educational and research institutions. CU has signed a total of 450 bilateral agreements and 190 international partnership agreements with foreign universities[62].

Both inward and outward mobility of students is promoted. The university has a large amount of promotional literature on mobility, for example: Possibilities of study abroad, Freemovers – how to travel abroad on your own, Study in England, Czech language courses for foreigners at the Charles University, Recognition of Foreign Diploma, Admission Procedure to Degree Programmes in English at the Charles University, etc[63].

Mobility is supported via the Mobility Fund of the CU and by mobility programmes of the EU: LLP/Erasmus. Furthermore CU supports intensive cooperation with foreign universities and institutes, signing new agreements on inter-university cooperation. The possibility of undertaking doctoral studies under co-supervision from two institutions significantly contributes towards an increase in quality of research and education. It results in greater internationalisation of doctoral studies and creation of links with international institutions and experts, by that strengthening professional growth of individuals as well as the working groups at the CU. In 2009 15 contracts of co-supervising thesis (cotutelle) were signed with the following countries: France, Germany, Switzerland, Portugal, and Slovakia.

One of the members of the academic Committee Europea arranged collaborations with universities of Sorbonne, Oxford, Montpellier and Bologna to establish a joint postgraduate programme Master Programme in European History

6.5 What are the key lessons which can be drawn out from this approach?

In the very specific context of a highly successful traditional university with a non-technical focus the university takes a very democratic and decentralised approach to university business cooperation. Even though the university centrally does not work closely with

[61] Annual Report of the Charles University 2009

[62] ibid.

[63] ibid.

businesses and does not place any requirements for placements during their studies, knowledgeable graduates can pursue these activities themselves. Belief in the bottom up approach by these students, and the functioning of such a system is characterised by the high demand for graduates in an economy with very low unemployment rates.

Charles University is operating in such a context and its decentralised approach to university business cooperation allowing the faculties (and ultimately also the students), to decide whether and how they want to interact with businesses, appears to work relatively efficiently.

The message from the top management of the university is that their focus is to provide top quality education that results in top quality graduates who do well after their degrees. Work-related training can be done after a student joins the company.

> *Quality firms employ high quality educated people. We put the highest emphasis on quality of education. This provides our graduates with the ability to apply them in various firms, not just the one we would cooperate with otherwise.*

6.6 Contacts, references

Stanislav Štech, Vice-rector for development of Charles University

Jiří Linhart, Director of the Centre for Technology and Knowledge Transfer

Ivan Dvořák, Consultant of the Centre for Technology and Knowledge Transfer

Hana Urychová, Informační a poradenské centrum (Information and Advisory centre)

Karolina Šolcová, careermarket

A survey of recent graduates from Faculty of Mathematics and Physics of the CU in academic year 2008/2009.

A survey of recent graduates from Faculty of Science of the CU in academic year 2008/2009.

A survey of successful applicants to Faculty of Mathematics and Physics of the CU in academic year 2008/2009.

7 CORVINUS UNIVERSITY OF BUDAPEST (HU)

Summary of key points

The University

- There are 26 (19 public and seven private) universities in Hungary, 16 of which are located in the capital city. Geographic distribution of the 44 colleges shows the same pattern. With seven faculties and approximately 17,000 students the Corvinus University of Budapest is the seventh largest accredited higher education institute in the country. The seven faculties of the university are: Public Administration; Food Science; Horticultural Sciences; Landscape Architecture; Business Administration; Economics; Social Sciences. The Faculties are highly autonomous which is an important feature of the university.
- University-business relations at the Corvinus University take place at two different levels, at the organisational level as institutionalised relations that are prevalent also in the university's strategy and at individual level in the form of personal relations. There are many individual initiatives in addition to those centrally coordinated regarding how to develop more practice-oriented courses and educate entrepreneurship spirited students. Involvement of businesses in the education activities of the university covers a broad spectrum of activities.
- Employability of the graduates of the Corvinus University is very high, with a high proportion of the students finding a job already during the last academic year, and, according to a survey carried out in 2010, 98.1 per cent of the 2009 graduates have already secured a job by the time the survey was launched.
- The university has devised a 'professor chair' scheme providing the opportunity for establishing long-term strategic partnership between the university and businesses. Companies provide 5-year financial support for the research activities of professor in a subject field of their interest, selected on a competitive basis. Major companies engaged in the scheme include Alcoa Köfém Ltd., Hungarian Power Companies, Hungarian Telekom Group, Paks Nuclear Power Plant and System Consulting.

The Business Context

- Budapest, the largest and economically most developed city in Hungary, is the country's main economic, transportation and cultural centre. Budapest has some 1.7million inhabitants with a commuter area of about 3million, while the country's population slightly exceeds 10 million in total. Hungary's GDP per capita was 19,829 USD in PPP in 2008.
- The Central Hungarian region has the lowest unemployment rate and the highest GDP per capita in Hungary, while the capital city provides a favourable environment for a broad variety of economic sectors. More than half of the multinational corporations with operations in Hungary have their head offices located in Budapest, and a significant proportion of the service sector, including the banking sector and international finances, operates from the capital city.

7.1 Introduction

The Corvinus University of Budapest (formerly the Budapest University of Economic Sciences) is located in the capital city of Hungary. Budapest is the largest and economically most developed city in Hungary and it is the country's main economic, transportation and cultural centre. Budapest has about 1.7million inhabitants with a commuter area of about 3million, while the country's population slightly exceeds 10 million in total. Hungary's GDP per capita was 19,829 USD in PPP in 2008. The Central Hungarian region comprises Budapest and the surrounding Pest county. The region has the lowest unemployment rate and the highest GDP per capita in Hungary, while the capital city provides a favourable environment for a broad variety of economic sectors. More than half of the multinational corporations with operations in Hungary have their head offices located in Budapest, and a significant

proportion of the service sector, including the banking sector and international finances, operates from the capital city.

The Hungarian education system has a very long history; the first Hungarian university was founded in 1367. The modern Hungarian education system comprises two different types of HEIs: universities and colleges. A university is a higher education institution eligible to provide Master's courses in at least two fields of study, and to offer Doctorate course as well as to confer Doctoral degrees.[64] There have been significant changes in the Hungarian education system since the change of regime in 1989. In 1990 the number of students at universities ad colleges in total was 102,000. The following 15 years experienced a rapid expansion of the higher education with a peak in 2005 when the number of students in tertiary education reached 424,161 requiring the establishment of several new institutes and faculties. These trends have altered since 2005 and the number of students in tertiary education decreased from its 2005 peak by 50,000 to 370,331 by 2009, according to Hungary's Central Statistical Office. The number of students starting primary education (99,326 in 2009) barely exceeds the number of students entering into the higher education system (83,202 in 2009). This phenomenon reflects the demographic changes of Hungary: the shrinking population will have major effects on the Hungarian higher education system within a decade.

The current legal framework of the Hungarian higher education system was defined by the Law on Higher Education[65] in 2005. The act laid down the foundation of the modernisation of HEIs and ensured progress towards the Bologna targets. Higher education institutions are highly autonomous, state-recognised, state or non-state (church or private) institutions. The Ministry of National Resources (previously the Ministry of Education and Culture) provides financial resources to the majority of the state higher education institutes. There are 19 public and seven private universities in Hungary, of which 16 are located in the capital city. Geographic distribution of the colleges shows the same pattern. In total there are 44 colleges in Hungary (10 public and 34 private), and almost half of them are located in Budapest (three public and 17 private). The following table provides an overview of the number of students in tertiary education comparing statistics on the capital city and the country in total.

Figure 12 Statistics on the Hungarian student population

Geographic area	Year	Number of students in tertiary education	Number of female students in tertiary education	Number of foreign students	Number of students financed by the government
Budapest	2005	162,752	86,739	7,937	84,973
	2009	155,173	83,796	8,370	90,205
Hungary	2005	424.161	246,919	14,491	216,463
	2009	370.331	207,53	18,154	213,984

Source: Hungarian Central Statistical Office

The Act on Higher Education affects the governance of HEIs through reinforcing the position and role of the rectors; describing the senate as a strategic decision-making body and establishing a compulsory advisory body, the economic council. A new higher education act is under discussion in the Hungarian Parliament with some changes anticipated.

7.2 The university – facts and figures

The current structure of the Corvinus University of Budapest results from numerous previous mergers. Predecessors of the Corvinus University include the Faculty of Economics of the Royal Hungarian University, established in 1920 and renamed as Karl Marx in 1953. After the

[64] Source: Ministry of National Resources, Hungary; http://www.nefmi.gov.hu/english/the-hungarian-higher/the-bologna-system

[65] Law on Higher Education: Act 139 / 2005 (in Hungarian: 2005. évi CXXXIX. törvény a felsöoktatásról)

change of regime the university was renamed again as the Budapest University of Economic Sciences. With the integration of the College of Public Administration in 2000 and of three faculties of the Szent István University in 2003 the university reached its current operating structure and name. Nowadays, the University operates with seven faculties on three campuses in Budapest:

- Public Administration campus based on the former College of Public Administration
  - Faculty of Public Administration;
- Buda campus: the three faculties that were integrated from the Szent István University
  - Faculty of Food Science;
  - Faculty of Horticultural Sciences;
  - Faculty of Landscape Architecture
- Közgáz (Economics) Campus - based on the faculties of the former Budapest University of Economic Sciences
  - Faculty of Business Administration;
  - Faculty of Economics;
  - Faculty of Social Sciences;

With its seven faculties and approximately 17,000 students CUB is the seventh largest accredited higher education institute in Hungary. The average student–to-full-time academic staff ratio was 27.1 to 1 in 2007 although it varies from one unit to another, e.g. it is 46.8 to 1 in the Faculty of Public Administration while it is 15.5 to 1 in the Faculty of Food Science[66].

Employability of the graduates of the Corvinus University is very high. A high proportion of the students find their job already during the last academic year, and, according to a graduate survey carried out in 2010, 98.1 per cent of the 2009 graduates have already had a job by the time the survey was launched.

The rector is the leader of the institution, with overall responsibility for the operation of the university. The rector is the president of the senate, which is the main decision making body of the university, with responsibility for overseeing the execution of decisions. Each faculty is represented in the senate as well as the students and unions. The economic council of the university provides advice and strategic guidance on the efficient use of the funds administered by the university. The members of the council are distinguished professionals from both public and private sector. The economic council of the Corvinus University is undergoing changes as the previous council finished its operation at the end of January 2011 and the new council is yet to set up.

Efficient daily operation of the university is ensured by the Economic and Technology Department. Alongside very high levels of faculty autonomy, there are several central institutional units serving the whole university, such as the Career Development Office (CDO), the IT Centre, the Centre for Foreign Language Education and Research, a network of three libraries, the Technology Transfer Office, the Central Information and Study Office or the International Relations Office.

In terms of university-business relations, the highest-level authority at the institutional level is the vice-rector for development and communication. However, it is at the faculty and the individual level that the real university business collaborations are organised and implemented. The very high level of authority and autonomy exercised by the faculties is an important feature of the institution.

[66] Source: EUA Institutional Evaluation Programme, Corvinus University of Budapest, Hungary September 2008

7.3 Approaches to university business cooperation

There are many well-known mutual benefits of university-business collaboration. This chapter aims to describe the main motivations, activities, types of relations and organisational units at the Corvinus University of Budapest that promote university-business relations.

7.3.1 University business cooperation in the education related activities

CUB's main role is to provide high-quality education that represents stability and continuity and focuses on transferring knowledge. However, its education also has to be flexible and responsive to the changing requirements and needs of society, the labour market and the business world. University-business relations are very complex and take place at many areas of the university. Businesses are regarded as a reason or demand for change on one hand but also as a solution for challenges on the other. The practical knowledge generated by businesses is an important complement to an academic education and provides a significant added value when incorporated with the otherwise more theoretical curricula of university education. Furthermore, businesses (and public bodies) are the main employers of graduates, and they provide additional funding sources for the HEIs' activities. Universities and their students are also attractive as potential business partners for some companies, for example banks attracting students as banking customers.

Although there may be interactions between the business and academic world, staff mobility between the higher education and business sector is very low and mainly concentrated on professors leaving universities for a job outside the academic world. Obstacles are similar to the problems other European universities have to face including the differences in measuring the achievements in the academic and business world and the considerable differences in the wages. Furthermore, while publications and PhD diplomas are needed for academic advancement these are usually less important in the business world.

The current total annual budget of CUB is approximately HUF18billion[67], of which 54 per cent is funded by the state, based on teaching and research normative grants, various subsidies and programmes. The remaining 46 per cent has to be generated by the university. The income distribution varies significantly between the various faculties and departments. The proportion of the own resources is the highest at 63 per cent at the Business Administration Faculty. As described, funding from the businesses sector provides a significant proportion of the university's total income. There are two main channels businesses can use to provide funding for the universities:

- The Act of Vocational Training (2003) provides the legal framework for businesses to donate a portion of their vocational training contribution for the development of higher educational institutions;
- The Law on the Research and Technology Innovation Fund (XC Law from 2003 and its modification LXXXV Law from 2005) that enables medium and large businesses to pay their innovation levy to public research institutes in return for contract research activities.

In return for the funding received the university can offer a broad range of services including education, training and research activities, subject related knowledge such as accountancy and audit services, developing marketing, communication, PR or product development strategies, furthermore specific services such as participation and presentation in professional fairs and conferences.

University-business relations at the Corvinus University take place at two different levels, at the organisational level as institutionalised relations that figure also in the university's strategy and at individual level in the form of personal relationships. Interviews with the rector and the

[67] About €66.8milion

professors of the university revealed that there are many individual initiatives in addition to the centrally coordinated ones regarding how to develop more practice-oriented courses and educate entrepreneurship spirited students. Involvement of businesses in the education activities of the university covers a broad spectrum of activities including:

- Giving lectures as part of a course;
- Engaging students in project work, case studies and practical examples are also embedded in the exams to illustrate the understanding of the theory behind;
- Representation in the university's or a faculty's advisory board;
- Mutual participation and involvement in various events, diploma committees;
- Providing placement and internship opportunities for the students;
- Contribution to curriculum development through providing feedback;
- Provision of grants or sponsorships.

Decisions on the method of business involvement in the educational activities are taken by the individual departments and the faculties. Not only are businesses represented in the university's daily life, but the university is present in the businesses as a member of the various supervisory boards and advisory committees.

The Career Development Office at the university was established in 1996 as the first career office in Central and Eastern Europe. An important factor at the creation of CDU was to respond to the needs of the incoming multinational corporations (MNC). Multinational corporations arrived in Hungary with their own culture and expectations, which affected the higher education institutes and encouraged them to develop their business relations. There have been many changes in university-business relations, however this topic was always high on the agenda. Currently there are several ongoing developments at the university to improve university-business relations. In December 2010, a central decision was made to create one unit at the university to integrate business relations and communication activities with the tasks of the career services, to provide a unified platform towards businesses. The Career Development Office will be responsible for these integrated activities after resolving the operational issues and difficulties of the merger of the three previous units. CDO is also responsible for graduate tracking, maintaining the alumni of the university, providing help to the students in finding placements, internships and also workplaces after graduation e.g. through organising careers fairs.

Placements are compulsory at 16 departments of the university. Although the lengths of the placements vary from 6 to 15 weeks, all are embedded in, and are accredited parts of, the curricula with quality assurance procedures put in place. Placements can significantly contribute to the acquisition of the right mixture of skills and knowledge by graduates, therefore organising the placements is one of the most important tasks of the Career Development Office. Professors in the various departments also contribute in finding placement opportunities for their students, which requires extensive relations with businesses. Collaborations with SMEs are especially important when finding placements and first jobs.

Graduate tracking is usually carried out one, three and five years after graduation, with surveys funded from the Structural Funds, mainly from the dedicated funds of the Social Renewal Operational Programme. There are different surveys launched by the university covering employees, graduates, students and also educational staff, all aiming to provide feedback and to gather recommendations on how to improve university education, operations and activities. Survey questions aim not only to assess the employability and position of the graduates in the labour market, but also to explore the adequacy of the mixture of the skills and knowledge the students obtained during their studies. The results of the survey are in line

with the trends other European universities experience. A summary of the results of the 2007-08 employer survey is presented in the box below

Results of the 2007 / 08 employer survey

The university contacted 560 organisations to provide feedback on the university based on the graduates they employ or employed during the previous four years. 122 organisations provided valuable responses to the survey. The survey contained three different sets of questions that aimed to gain information on the performance of both whole university and the individual faculties separately.

In terms of expectations regarding skills and knowledge of the graduates survey respondents emphasised the need for IT skills above all, and found pedagogical knowledge the least important for a fresh graduate. Professional work experience is generally not a prerequisite by the employers, but an additional plus, however the lack of it is mentioned by may employers as a shortcoming.

Among the skills of the graduates, ability for teamwork was the most highly regarded by the employers, while foreign language knowledge, IT skills and general intelligence were also acknowledged. Suggestions for improvement included the improvement of communication, leadership skills and development of human interactions, while regarding the students' knowledge base employers would appreciate more practice-oriented knowledge. Expectations regarding sound subject related knowledge in a few crucial subject fields (e.g. accounting, finance or law) are very prevalent.

The majority of the respondents rated the fit of the graduates' skills and knowledge to the needs required to fulfil their position at the workplaces as acceptable (38.8 per cent) or mostly adequate (51.1 per cent). The overall satisfaction with the performance of the graduates at the workplaces is very high, 81 per cent of all respondents are mostly of fully satisfied with them.

Source: Corvinus University of Budapest, Analysis of the 2007/08 employer survey, Budapest, 2008

University teaching staff has access to the results of the surveys, however due to the high level of autonomy of the individual departments, they are taken into consideration to a greater or lesser degree.

Continuing education and lifelong learning are among the emerging areas at the university. Due to the lack of LLL culture in Hungary, it has not yet reached its full potential. Corvinus University runs also executive MBA courses, but companies are not keen on the two-year long commitments. The need for continuous education and training is not present yet in the Hungarian business culture. SMEs in general do not have the resources to participate in training, which is a major obstacle to overcome in improving their participation in LLL schemes and initiatives. There are many initiatives aiming to improve CUB's activities in continuing education e.g. maintaining close contacts with the alumni; offering courses from a continuously broadening portfolio; creating a flexible portfolio of tailor-made courses for individual companies based on ad-hoc needs and at the same time offering more general training for multiple customers.

7.3.2 University business cooperation in the university's research activities

Collaborative and contract research activities carried out by CUB form a significant part of the university's business relations. Research activities mainly concentrate on applied research, often based on long-term strategic partnerships. The more research-oriented faculties at the university are the Faculty of Food and the Faculty of Horticultural Sciences. The Faculty of Food Science is a leading research institute with many research collaborations (e.g. ongoing food safety research project with food retailer Tesco) and it also hosted one of the Regional University Knowledge Centres in Hungary. Due to the specific subject fields of the Business

Administration and Economics Faculties public and government authorities are also among the customers of the university's research activities.

University-business collaborations have major effects also on the research activities carried out by the university. In order to provide efficient framework conditions for research activities the university established a non-profit company, the Innovation Centre in 2006. The Centre aims at promoting innovation across the seven faculties, at the creation of a knowledge-based hub at the university that fosters collaborative research projects with external partners by concentrating the research potential and resources of the university.

The main research fields of the university are summarised in Figure 13.

Figure 13: Main research areas of the individual faculties at the Corvinus University of Budapest

Faculties	Main research fields
Business Administration	Company strategy and organisational design Logistics, operations management and corporate competitiveness Corporate finance, financial index systems Inter-company communication and e-business Environmental economics, regional competitiveness and regional development Knowledge management and business intelligence methods and techniques
Economics	Micro- and macroeconomics Mathematical economics and econometrics Comparative economics and international political economics Institutional economics Development economics Public institutional economics, public policy and public institutional management
Social Sciences	Society, economy and culture including social and cultural resources, information society, poverty, gender issues, ethnicity and social inequality Social and political conditions for international integration: Europeanisation of the Hungarian institution system, foreign affairs and international environment, contradictions of a globalizing international system
Public Administration	Constitutional basis and the legality of public administration Local government and EU management The history of public administration State budget and budget management Criminal jurisdiction in public administration Public communication, e-government

Faculties	Main research fields
Horticultural Science	Genetic and chemical diversity of horticultural species Biological resources, cultivars, molecular technologies supporting breeding and varieties rights Plant characteristics determining biotic and abiotic resistance, development of resistant cultivars, Hungarian ecological potential, modelling of climatic changes, optimisation of ecological factors, ecosystem- and nature protection, Sustainable and ecological technologies in horticultural production, post-harvest methods, quality assurance, quality control of horticultural products.
Landscape Architecture, Protection and Development	Wide range of topics from historical research to land ecology and land shaping history
Food Science	Healthy nutrition and production of healthy and functional food Risk analysis of genetically modified foodstuff and raw materials Non-thermal food preservation techniques Computer-aided image analysis for determination of physical and quality characters of foodstuff and raw materials Membrane separation techniques for food technological and environmental applications

Source: websites of the Innovation Centre Public Benefit Ltd and the Faculty of Social Sciences, Corvinus University of Budapest

The Innovation and Business Development Centre was established in 2008 with the aim to strengthen university-business relations and technological developments and also at the facilitation of technology-transfer and the exploitation of research results both for educational and for economic valorisation purposes. It is an independent organisational unit that operates on a project basis and it is under the direction of the rector. Currently due to personnel changes the Centre is under reorganisation.

7.4 Types of university business cooperation in the institution and their impacts

A proactive approach in engaging business by the university, individual professors and alumni returning with specific issues, requests and enquiries to the university, create lively collaborations between the university and businesses. Although there is no incentive system in place for university teaching staff to engage in university business cooperation, there are many ongoing projects and initiatives in the field of university-business collaboration at the Corvinus University of Budapest. This section aims to introduce briefly a number of successful university-level schemes and individual initiatives.

The university has successfully organised ‘Business Breakfasts’ as a way to engaging businesses in a dialogue with the university. These events are organised 2-3 times annually with the aim to provide a forum for the university to discuss recent, significant changes and issues with their most important partners. Recent topics included the practical consequences of the introduction of the Bologna system in education, importance and possibilities of the compulsory internship system at some of the departments, recent restructuring of CDO and the university-business relations.

The professor chair scheme provides the opportunity for establishing long-term strategic partnership between the university and businesses. Companies provide 5-year financial support for the research activities of a professor in a subject field of their interest, selected on

a competitive basis. In return the professors have to fulfil the reporting obligations of both the company and the university, submit annual reports to the supporting company, participate in the education activities of the company if agreed, and both parties ensure high-level representation at each other's relevant events. The professor chair scheme was introduced by a former rector of the university about ten years ago. There has been a decline in the number of companies providing financial support for the professor chair scheme recently. Nowadays there are 11 ongoing professor chair contracts at the university. Major companies that are engaged in the scheme include Alcoa Köfém Ltd., Hungarian Power Companies, Hungarian Telekom Group, Paks Nuclear Power Plant and System Consulting. Alcoa has been supporting the same professor for two consecutive periods, in total for 8 years, with an annual funding of $20k, however both the amount and the length of the funding is exceptional.

The scheme's funding enables the university to finance both the wage of the professor together with research activities. Earlier the funding could also be used to provide wage supplement to young researchers. An additional benefit of the strong relationship between the company and professor is that businesses tend to support the university with their vocational training levy, which is a significant income source of the university. Business partners can actively be engaged in the diploma works of the students at the department, in various student projects and also have the potential to become future employers. The cooperation has many advantages for all three parties. The university benefits from the additional financial support, while such a long-term commitment to collaborate also means recognition for the professor's work. Businesses benefit from the research results, the access to potential future employees and the close linkages with a university department. Business partners can provide assessment and guidance for the students to improve their performance and achievements and students could attend international competitions financed from the funding.

Suggestions for improvements and refinements regarding the curriculum can significantly contribute to the development of more suitable and high-added value curricula. A recent example includes the incorporation of a specific subject on international accounting systems in the curricula of the Accounting Department. Guest lecturers taught the subject during the introductory semester, while CUB's professors acquired the knowledge to run the consecutive courses themselves. Graduates with relevant knowledge on the international accounting systems possess considerable advantage when applying for a position at multinational companies. The professor chair scheme is open for all businesses, however due to the significant and long-term commitment required the ongoing partnerships are predominantly based on previous personal relations.

The lack of an incentive scheme for the professors to become engaged in university-business relations more actively is mainly balanced by the fact that that almost every department has established its own company, with active contribution from the professors of the given department. Teaching staff can take on multiple jobs and can be involved in different companies according the Hungarian law. These companies provide various services such as training courses in their specific subject fields e.g. professionals in accounting are required to participate in two-day long courses annually as part of their professional training. The university also benefits from these activities through the extensive relationship network obtained by the teaching staff.

Entrepreneurship education is widely promoted across the Business Administration Faculty of the university and it is highly popular among the students. The following box provides a short summary of the Teaching entrepreneurship in Hungary[68] paper.

Teaching Entrepreneurship in Hungary

[68] Krisztián Csapó and Attila Pethoe: Teaching Entrepreneurship in Hungary

'As many other Hungarian HEIs, the Corvinus University of Budapest had its entrepreneurship education system before 2006. The Small Business Research Group started its operation in 1989 at our university (former Budapest University of Economic Sciences). This organisational unit announced the establishment of the academic minor in entrepreneurship, which turned out to be very popular among students, as fresh graduates were almost always guaranteed to have good job prospects and to receive competitive salaries.

In August 2000 the Small Business Development Centre (SBDC) was established as the descendant of the Small Business Research Group. The Centre seeks to realize the original objectives at a higher level, and within this framework, an academic major in entrepreneurship was introduced during the 2002/2003 academic year.

In 2005 the SBDC and the Department of Corporate Finance established the Institute for Enterprise Development to widen their research and educational activity. During the same time SBDC reformed its entrepreneurship curriculum and converted it to "Bologna compatible".'

Source: Krisztián Csapó and Attila Pethoe: Teaching Entrepreneurship in Hungary

Currently entrepreneurship education consists of a broad range of activities and courses at CUB. Courses include small business management, business planning and also finances, and courses are also available on international entrepreneurship. The entrepreneurship related subjects are not just entrepreneurship oriented in their subject but also in the methods of teaching. The small business management course is attended by 40 students every semester who are chosen from more than 400 applicants across the various faculties. The classes comprise two halves. The first one is dedicated to a subject related presentation, while the second half is to explore practical examples and real world experiences of, for example, guest lecturers, former students who became entrepreneurs. Success factors of the scheme include the practice-oriented approach (problem-based action learning), time-to-time renewed course content, integration of student feedback in the course and the personal interest of the professors in creating a highly successful course. Furthermore, the courses incorporate international experiences gained from collaborative programmes with foreign universities including the Penn State University or the CEMS (Global Alliance for Management Education) Programme. Other faculties also include invited guest lecturers and case study examples to create more interactive and practice-oriented courses.

However, entrepreneurship cannot be learnt purely from textbooks therefore professors of the university contribute and organise many additional, extra-curricular activities and programmes. The Interuniversitas Spin-off Club was financed by the former Ministry of Economy and Transport. The initiative comprises an active and a passive programme. On Mondays there are presentations organised with invited guests and on Thursdays the audience gets activity involved and they learn business plan writing. The Club operates fully open; anyone can attend the events. There are also possibilities for the students to present their business plans in front of potential investors. Even though not all of the ideas and plans became successful, these schemes have been organised successfully during the past years and increased the responsiveness towards entrepreneurship among the students.

7.5 What are the key lessons which can be drawn out from this approach?

The Corvinus University of Budapest provides an example of a decentralised approach to university-business relations with high levels of faculty and department autonomy. Despite this fragmented approach, university-business cooperation is embedded in the university's everyday life and is of significant importance. Individual departments and professors have extensive business relations and there are also a number of central initiatives to strengthen collaboration with industry. Recent restructuring of the administration of business relations also reflects the importance of university business cooperation at the university.

There are many ongoing projects and schemes that foster university-business collaborations both in the university's educational and research activities. Methods and initiatives regarding how to engage students in business related activities such as placements, practice-oriented courses and entrepreneurship education are wide-ranging and diversified. However, not only

are businesses represented in the university's daily life, but also the university is present in the businesses as a member of the various supervisory boards and advisory committees. Interactions between university and businesses ensure high quality and up-to-date knowledge transfer to the students, and results in many benefits such as high employability and diversified set of skills and knowledge base for the students; additional funding for the university and access to highly skilled graduates and to expertise and broad knowledge base for businesses.

Despite the many ongoing initiatives, the highly decentralised and fragmented approach to university business relations may limit the organisation of central initiatives, and could also be a risk in succession planning. The university also has to face a number of obstacles similar to other universities' in different European countries such as the lack of mobility and the different measures of success and achievements between the academic and business world or regarding the lifelong learning activities of the university, which is an emerging area in Hungary with room for improvement.

7.6 Contacts, references

Dr. Tamás Mészáros, Rector of the Corvinus University of Budapest

Ms. Monika Andrási, Director of the Career Development Office

Dr. János Lukács, Associate Professor at the Financial Accounting Department

Dr. Péter Szirmai, Associate Professor at the Department of Small Business Development Center

Dr. Nóra Gyurcsik, Innovation and Entrepreneurship Development Centre

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7.7 Appendix 1: Statistics

Figure 14 Basic data: Corvinus University of Budapest

Type of information	Corvinus University of Budapest
Type of university	Research university oriented towards education
Region/ capital city	Capital city of Hungary
Quacquarelli Symonds, World University Rankings Results 2010	Not ranked in the top-200 universities
Webometrics Ranking of World Universities 2010	Not ranked in the top-500 universities
Economics schools ranking	Financial Times Ranking: 2005: MSc in Business Administration received 23rd place on the TOP 25 list of European Master in Management programmes 2006: MSc Programme of the Faculty of Business Administration

Type of information	Corvinus University of Budapest
	was ranked 25th on the list of the 35 leading business schools. From this year on the university is ranked every year in that list of Financial Times.
Number of students	17,134, the share of full-time student in about 60 per cent
Degrees awarded in 2010	BA: 1,563 and college degree: 126 MA: 353 and university degree: 1,434 PhD: 50 Professional education: 709 In total: 4,235
Staff	Number of professors: 827 Number of researchers: 87
Facilities, organisational units	Career Development Office IT Centre Centre for Foreign Language Education and Research Network of three libraries Innovation Centre Ltd - Technology Transfer Office Central Information and Study Office International Relations Office
International cooperation	Joint programmes - joint degrees: 2 Double degree programmes: 5 Agreements: 440 Partners: 367 Proportion of international students: 8.6 per cent Erasmus internship programme: 116 student participated in it during the last academic year (2009/2010)
Number of internships in enterprises each year	Internships are required at 16 departments as part of the curricula
Average job searching period	The majority of the students of Corvinus University of Budapest find their job during the last academic year. According to the survey carried out in 2010, the 98,1 per cent of the 2009 graduates has already had a job by the time the survey was launched.
Description of the first job	One year after the graduation 80 per cent of the graduates work as employee, 8,6 per cent of the graduates already work in a middle management position. Two years after the graduation 6,8 per cent of the graduates work abroad, after five years 11 per cent.

Source: Corvinus University of Budapest, Career Office and the website of the university: http://www.uni-corvinus.hu/index.php?id=474

8 KATHOLIEKE UNIVERSITEIT LEUVEN (KUL) (BE)

Summary of key points

The University

- KUL has carried out a leading and successful research-oriented approach to university business cooperation since the early 1970s.
- This approach is based on K.U. Leuven Research and Development (LRD), an independent TTO with a professional team of 50 staff.
- The LRD has progressively shifted towards a decentralised and diffuse approach to university business cooperation, embedded in all the University's units and structures, thanks to its interdisciplinary research divisions and to the progressive inclusion of technology transfer goals in researchers' culture.
- Subsequent cooperation with industry in technology transfer activities has progressively spread to the whole academic spectrum and to teaching activities. Within the region, one main focus is the development of learning outcomes in association with industry, trade unions and other external stakeholders (e.g. development of generic descriptors for study programmes in Flanders, development of a competence profile for doctoral candidates in KUL doctoral schools)
- This approach has had very strong impacts in terms of University R&D outputs (patenting, licensing, spin-offs, scientific publications, etc)

The Business Context

- Broadly speaking, Flanders is a very active economy with number of SMEs and major international groups specialising in the automotive industry, chemical and petrochemical production, life sciences and a number of high-tech ICT fields.
- Many research-based companies (spin-offs or international groups) have established themselves in Leuven and the surroundings with focus on the following fields: Life sciences, Nanotechnology, Mechatronics & smart systems, and Cleantech.
- KUL is strongly embedded within the regional economy (both at the level of Flanders and at the level of Leuven) and has strongly contributed to the economic and technological development of the regional economy. This was reinforced by the extension of the TTO's activities to other 12 HEIs across Flanders in 2006.

8.1 Introduction

The Catholic University of Leuven is situated in the **Flanders**, the Dutch-speaking Northern part of Belgium which accounts for about 60 per cent of Belgian enterprises. Flanders has traditionally been very active in the textile and carpet industry. Other sectors include:

- The automotive industry (with major automotive firms such as Ford, Opel (GM), Audi and Volvo);
- Chemical and petrochemical production in Antwerp;
- Life sciences industries mainly around Leuven (with major international pharmaceutical, biomedical, medical device and imaging groups);
- A number of high-tech ICT fields with spin-offs and international firms (British Telecom, Philips, ST Microelectronics) situated all around Leuven.

Flanders is also an important logistic hub with large companies such as Caterpillar logistics, Deutsche post, NYK and a number of SMEs acting as suppliers. The region benefits from a central location and a dense and integrated multimodal transport infrastructure composed of ports, inland waterway system, rail, and airport freight. Flanders is characterised as an open

economy and the region produces more than 80 per cent of Belgian exports, mainly going towards the European market.[69]

Flanders' expenditures on R&D reached 2.03 per cent of its GDP in 2007 (of which 1.5 per cent privately financed, 0.53 per cent publicly), slightly above the Belgian (1.9 per cent) and EU (1.83 per cent) averages. Flanders has six universities (incl. two in Brussels), four large research centres (IBBT for ICT, IMEC for micro-electronics, VIB for biotechnology, VITO for sustainable development) and a number of smaller competence poles for specific (mainly sectoral) knowledge development. The business sector accounted for 73 per cent of Flanders' R&D spending (69.5 per cent in Belgium). Business R&D spending in Flanders are mainly situated in high-tech sectors such as chemistry, pharmaceuticals, ICT, mechatronics, which together represent almost 80 per cent of the total R&D cost. The chemical and life sciences industry in Flanders alone represents half of total private R&D expenditure in Belgium (€2.7b in 2007).[70]

While the Flemish context is interesting, so is **Leuven** itself when looking at the University's socio-economic environment. KUL is strongly embedded in Leuven city and has been over the years a major factor of the city economic development. Leuven is characterised by the concentration of knowledge-generating institutions and companies. Much of the city's economy consists of spin-offs from academic research at KUL and IMEC and presents in four main technological fields, as follows[71]:

- Life sciences with a number of biomedical spin-offs (ThromboGenics, TiGenix, reMYND) and big firms such as Johnson & Johnson, Pfizer;
- Nanotechnology, stimulated by IMEC and the presence of big international companies (e.g. Philips Innovative Applications and Resonext communications) and spin-offs from IMEC (e.g. Septentrio, Target);
- Mechatronics and smart systems: the first spin-off of KUL was LMS International, which is now the world leader in the field of computer aided dynamic analysis;
- Cleantech: a great number of spin-offs ranging from solar cell manufacturing through power electronics, to the development of lightweight structures (e.g. Waterleau which is one of the few global players with a complete portfolio of water, waste, air treatment, as well as energy recovery; Bluways; IPCOS).

8.2 The university – facts and figures

KUL, created in 1425, is the oldest existing Catholic university in the world and one of the oldest universities in Europe. It is also the largest university in Belgium, comprising almost 37,000 students and more than 9,000 staff. In 1968 The University was divided into the Dutch-speaking KUL in Flanders at Leuven and the French-speaking UCL at Louvain-la-Neuve in Wallonia.

Ranked among the top universities in Europe, KUL provides research and training activities, with a strong commitment to excellence in research activities and training through research. The SIR institutions rankings report 2010 shows that the Catholic University Leuven is at 8th place in terms of research among Western European Universities, and at first place in Belgium.[72] KUL encompasses a considerable number of excellent research groups which are internationally recognised leaders in fields such as cardiovascular research, human genetics,

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[69] European Commission, Regional Innovation Monitor, Flanders profile online: http://www.rim-europa.eu (consulted February 2011)

[70] *Ibidem*

[71] LRD and the City of Leuven, Brochure, *Leuven, knowledge pearl. Fostering high-tech entrepreneurship in the heart of Europe,* 2010

[72] Scimago Institutions Rankings (SIR), Worl report 2010: Global ranking, *available online:* www.scimagoir.com

signal processing, materials research, archaeology, nanotechnology, yeast and plant research, virology, experimental psychology, theology, governance and many others. Many of these research groups are involved in European research projects.[73]

> *"KUL produces more than 42 per cent of Flemish academic publications and almost half the citations in the fields in which a bibliometric approach applies. Thus, KUL performs considerably better than might be expected given its share of Flemish research funds."*[74]

As far as education is concerned, the University offers a wide range of Bachelor (62) and Master's (125) study programmes. 60 per cent of the Master's programmes (77) are international study programmes offered in English targeting both Belgian and international students.

Though a private institution, KUL offers low tuition fees for normal Bachelor and Masters programmes (€313.5 for part-time registration or €564.3 for full-time registration) thanks to the government-supported funding mechanisms in Flanders and in Belgium. However advanced Master's programmes and some specific international programmes are subject to higher fees, from €1,000 to €5,600 - up to €8,000 for non EEA students.

KUL is a comprehensive multidisciplinary institution with 50 departments and 14 faculties organised in 3 campuses:

- Humanities and Social Sciences (in centre of Leuven): Faculties of Theology; Canon Law; Philosophy; Law; Business and Economics; Social Sciences; Arts; Psychology and Educational Sciences;
- Science, Technology and Engineering (in Heverlee-Arenberg): Faculties of Science; Engineering; Bioscience Engineering;
- Biomedical Sciences (in Gasthuisberg): Faculties of Medicine Pharmaceutical Sciences; Kinesiology and Rehabilitation Sciences.

A fourth and decentralised campus situated in Kotrijk in West-Flanders offers only Bachelor degrees. KUL also supports five hospitals and three affiliated hospitals.

Research is conducted in each one of the Departments and in the six inter-university or inter-group institutes. Additionally, three doctoral schools, one for each group, train PhD candidates: the Doctoral school for Humanities and Arts; the Arenberg doctoral school (Science, Engineering and Technology); and the Doctoral school for Biomedical Sciences. Doctoral programmes are offered in all disciplines, both in English and Dutch.

KUL collaborates actively with other HEIs, mainly through regional channels (e.g. cooperation through the KUL Association with 12 other HEIs across Flanders that represent altogether 80,000 students) and international channels (e.g. League of European Research Universities (LERU); the Coimbra Group, a co-operative network of historical, multidisciplinary universities of high international standards).

8.3 Approaches to university business cooperation

Since the early 1990s, science and innovation matters have been the responsibility of the three Belgian communities (Flanders, Wallonia, Brussels-capital) and no longer under a national umbrella. The Flemish community added in 1995 the transfer of R&D results to enterprises and to society as a third mission of Flemish universities, together with research and teaching.

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[73] Technopolis Group, Four Case Studies in University Modernisation: KU Leuven, Twente, Manchester and Loughborough, 2006

[74] KU Leuven, Brochure KU Leuven in brief 2010-2011

8.3.1 From a traditional research University to an "entrepreneurial University": the focus put on promotion and knowledge transfer related activities since the 1970s

Over the last 40 years, KUL has shifted from a long-established traditional university towards the "entrepreneurial university"[75] model that refers to the increasing tendency to run the university as a quasi-business. While the University did not commit itself to the "third mission" until 1995, the focus was already on research valorisation and knowledge transfer activities in 1972 with the creation of the Technology Transfer Office K.U. Leuven Research and Development (LRD).

LRD is officially in charge of managing the industry component of the KUL's R&D portfolio and offers advice, coordination, administrative and legal support towards KUL researchers. It encompasses four areas of activities:

- **Contract research**: legal, administrative, financial and personnel advice to determine opportunities and to negotiate and elaborate research agreements with enterprises;
- **IPR management**: very active patent and licensing policy implemented through the internal intellectual property liaison office (composed of 5 staff) and a network of formal collaborations with `European and American patent attorneys;
- **Establishment of spin-offs**: professional support to business development and raising venture capital, along with a large portfolio of educational and coaching activities;
- **Promotion and creation of open innovative platforms**: dedicated to create the link between the lab and the market, through support for the demonstration and proof of concept. They help to mitigate exploitation risks for industrials. They are developed in core fields of research such as innovative drug design (CD3), materials development, translational medicine, medical technology and devices development.

LRD was one of the first university technology transfer offices in the EU and the first one in Flanders. From the early days, the KUL has therefore developed a pro-active strategy in stimulating and supporting knowledge and technology transfer and fostering cooperation with business in the domain of research.

8.3.2 A decentralised approach to university business cooperation, led by a central technology transfer office

The structure of KUL is multi-layered and divided into different areas: Educational policy, Research policy, and several Faculties. Each entity has its own board and develops its own strategy. There is no formal hierarchical structure, with each professor free to design his or her own research agenda. The research management structure consists of the Research Policy Council, in charge of preparing the research policy; and the Research Council charged with advising and stimulating actions. The Research Council is also responsible for evaluating the proposals from KUL researchers who apply for funding from the University Research Fund. At the operational level, LRD is in charge of the exploitation of research and the management of industrial research projects, while the Research Co-ordination office (DOC) takes care of the daily management activities of the Research Council and designs the basic science policy for the whole University.

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[75] 'Entrepreneurial universities is used by Etzkowitz among others: Henry Etzkowitz, Research groups as 'quasi-firms': the invention of the entrepreneurial university, Research Policy 32 (2003) 109–121. It was also used in reference to the KUL in one article of Bart Van Looy, Julie Callaert, Koenraad Debackere, Publication and patent behavior of academic researchers: Conflicting, reinforcing or merely co-existing? Research Policy 35 (2006) 596-608.

LRD was founded as an entity separate from the rest of the University. Its large budgetary and human resources autonomy provides the TTO with the necessary freedom to operate as a business unit in the University. LRD has evolved over years in order to adapt the KUL complex structure and to spread its activities throughout the University. It has shifted from a specialised division towards a matrix structure which, though centralised, operates via a number of specialised supporting services closely integrated within the research groups.[76] It consists of:

- A central multidisciplinary team composed of 50 staff supporting technology transfer and researchers;
- 54 research divisions that gather together researchers belonging to different departments or faculties across the University and who decide to join forces around R&D projects. Research divisions introduce interdisciplinary virtual structures in the University and they are intended to be flexible enough to fit research targeting emerging research and industrial needs;
- Additionally, a group of innovation coordinators act as permanent liaison officer between LRD and its divisions, and are paid by LRD on a part-time basis, along with their researcher or junior faculty duties.

8.3.3 A selective approach embedded in the global regional context

Given its historic presence and its integration into the University's structure, LRD has been a major architect of university business cooperation in the domain of research and, by extension in the field of teaching, within the University. Following the motto of research excellence, it has developed a selective approach to university business cooperation, based on the potential of industrial projects. For instance, rather than a merely large portfolio of patents, it has developed one of value, based on exploitability and quality.[77]

Furthermore, LRD's activities are not limited to the University, but widely implemented in coherence with the regional context. The University collaborates with local SMEs as well as with major international firms. KUL both benefits from regional structures and policies and has had over years a great impact on Leuven and Flemish economic and innovative activities, as follows:

- Support for spin-off provided by LRD relies on the 'Innovation and Incubation centre" jointly owned by the University and the regional development agency and located on the KUL campus;
- Three science parks (Haasrode, Arenberg, Termunck) supported by Flanders and the City of Leuven have been developed around KUL. They host spin-offs of the University together with R&D departments of business enterprises;
- Research programmes from the Flemish government support KUL research and technology transfer activities (i.e. Methusalem programme for top researchers in Flanders; Odysseus programme targeting researchers who have established their career mainly abroad to pursue an independent research career at a Flemish university by supporting them with a start-up project; Hercules-programme for infrastructures);
- The Flemish government implemented in the late 1990s a legal framework to protect technology transfer activities (e.g. the 'Flemish Bayh-Dole Act' of 1998 assigning

[76] Koenraad Debackere, Reinhilde Veugelers, The role of academic technology transfer organizations in improving industry science links, Research policy 34 (2005) 321-342

[77] Koenraad Debackere, The Rise of the academic Technology Transfer Organization, in: review of Business and Economics, April-June 2010, Volume LV, No. 2: 175-189

ownership of intellectual property to universities), spurred by the KUL and other Flemish universities and research institutes cases;

- LRD's activities have spread across Flanders to the 12 HEI members of the KUL Association since 2006. LRD has therefore extended its role within the Region as a cross-university technology transfer office.

One of the best examples of the intertwining between the University and its socio-economic environment is IMEC. Created in 1982 by the Flemish Government as a laboratory for advanced research in microelectronics, IMEC aims at strengthening the microelectronics industry in Flanders. The decision for its establishment was inspired by the strategic importance of microelectronics for the industry, and was fostered by the KUL, which provided most of the staff employed in the laboratory. This included IMEC itself, a semiconductor foundry (former Alcatel Microelectronics, now STMicroelectronics and AMI Semiconductor), and a training program for VLSI design engineers, now fully integrated in the IMEC activities. Headquartered in Leuven, IMEC has offices in Belgium, the Netherlands, Taiwan, the USA, China and Japan, and employs more than 1,750 people (including over 550 industrial residents and guest researchers). In 2009, IMEC's revenue was €275 million, making it one of the largest independent R&D organisation within its field. [78]

Figure 15 Details of the Catholic University of Leuven (KUL)

Type of university	**Multidisciplinary research university** **International-oriented**
Region/ capital city	Flanders/ Leuven
University ranking – World (Quacquarelli Symonds, World University Rankings Results 2010: www.topuniversities.com)	86
University ranking – European (Webometrics Ranking of World Universities: http://www.webometrics.info)	17
Number of students	36,923 (2009/2010) 4,000 PhD (2010/2011)
Staff	9,133 staff members (2010), of which: 1,454 professors (16 per cent) 4,757 research staff, including PhD students (52 per cent) 2,922 administrative and technical staff (32 per cent)
Training	62 Bachelor programmes (of which 2 in English) 125 Master programmes (of which 77 in English) 51 advanced Master programmes PhD programmes can be undertaken in all fields of studies in the 3 doctoral schools
Components	14 faculties 50 departments

[78] IMEC's website: http://www2.imec.be (consulted February 2011)

Type of university	**Multidisciplinary research university** **International-oriented**
	About 240 sub-departments 5 University hospitals and 3 affiliated hospitals
Research indicators 2009	570 doctorates 330 M€ research expenditures 4,047 ISI-WoS publications (2008) 56 per cent of the scientific publications of KUL researchers appear in journals that are in the top 25 in their field 92 spin-off established 73 patent applications, 29 granted
International cooperation	About 14 per cent of all students come from abroad (7 per cent from EU countries and 7 per cent from elsewhere) About 28 per cent of the PhD candidates are foreigners And about 36 of the postdoctoral researchers

Source: Technopolis, based on various documents from the KUL

8.4 Types of university business cooperation in the institution and their impacts

8.4.1 Examples of LRD activities in cooperation with businesses

Beyond the global approach described above, there follows here in more detail a showcase of examples of university-business cooperation schemes as implemented by LRD.

First, LRD implements various financial and technical support schemes for R&D projects in cooperation with industry or for the development of University's spin-offs. Examples include:

- The Gemma Frisius-Fonds (seed capital fund): created in 1997, offers seed and start-up capital to support the establishment of spin-offs at the KUL. The fund has access to capital of €12.5 million. Due to the success of the initial fund, a second Gemma Frisius Fund, also with capital of €12.5 million, was set up in 2002 (supported by Fortis and KBC bank). The Fund supports the very early, most risky, stage of company growth. In this sense, the fund bridges the gap in the funding process between the creation of new knowledge and the invention. Of the 90 spin-off companies created by the KUL until 2009, over 30 of them have received investment support from the Gemma Frisius-Fonds;

  "Over the years 2006 till 2009, LRD directly invested about 4.5 million euro in its spin-off portfolio; while during that same period, the portfolio companies were able to raise an additional 325 million euro in capital from other investors. This is a leverage factor in excess of 70."[79]

- The **Bio-incubator** established in partnership with the Flemish Institute of Biotechnology (VIB) and a local biotech company (AVEVE) to support biotech spin-offs from the University;

- **KUL Energy Foundation Industry-University**: a research fund implemented in the KUL Energy Institute to part-fund its research activities. Firms which contribute to the fund become members of the KUL Energy Foundation Industry-University, which can advise on potential research areas.

[79] Koenraad Debackere (2010)

LRD also provides administrative support on patents and intellectual property, through two mechanisms:

- The **Patent fund:** launched to support the research divisions that usually lack the means to set up and maintain their own research portfolio, to scan their invention' economic potential and to write patent applications;
- The **Intellectual Property Advisory Group:** created in 1999 to set up internal procedures in the field of intellectual property rights.

LRD also supports networking initiatives bringing together academics and industrial staff. To this end, **Leuven.Inc**[80] was established in 1999 as a local network organisation to build a permanent bridge between academic research groups, start-ups, venture capitalists and consultancies in order to promote an entrepreneurship culture in Leuven. It arranges projects, events, training and information sessions for both members and a broader audience. It comprises 600 member organisations and organises approximately 50 events per year, gathering together 4,000 people.[81]

Last but not least, LRD also develops **various types of incentives to foster the cooperation of laboratories and researchers with enterprises:**[82]

- In contrast to most Universities, income from industrial projects is not centralised and redistributed, but LRD divisions themselves are entitled to accumulate financial reserves based on the benefits they generate via industrial collaborations. LRD divisions are also entitled to participate both intellectually and financially in the spin-off companies that they have developed;
- Individual researchers are entitled to salary supplements based on the net proceeds from their contract research and consultancy activities:
  - In case of lump sum and royalty payments proceeding from licence agreements, individual researchers they are also entitled to receive a percentage of the income generated (once expenses have been recuperated);
  - In case of spin-off creation, they can receive a relevant portion of the intellectual property shares (i.e. the IP stock or founder shares). If they wish, they can also invest financially in the spin-off and will hence obtain a pro rata share in the common stock (capital shares) of the company.

Amongst the innovative platforms supported by LRD, the **Centre for Drug Design & Discovery (CD3)** plays a special role since, contrary to other platforms hosted in LRD, it is composed mainly of staff coming from the industrial world rather than academics.

[80] Website of Leuven.Inc: http://www.leuveninc.com/

[81] Koenraad Debackere (2010)

[82] Koenraad Debackere (2010)

A specific centre for development of basic research: CD3 (Centre for Drug Design & Discovery) platform

CD3 was established in 2006 as an investment fund and technology transfer platform aimed at promoting the discovery and development of innovative medicines. It was set up and is attached to LRD. The creation of the Centre originated in the need for academics and industry to translate academic results into drugs, and to bridge the gap between academic research - that does not have the expertise to translate research into industrial drugs - and the pharmaceutical industries - that are usually not involved in the earlier stage of the molecules development that is deemed to be too risky.

CD3 was implemented as a perfect fit for both industrial and academic needs. It is based on an innovative model, since it is organised as a separate operational unit between academics and industrials, using the expertise of 20 staff, most of them having worked previously in the industry.

When it started, CD3 cooperated mainly with SMEs and spin-offs in Leuven, which were not used to working with industry. Now the portfolio of collaboration has spread to SMEs in the Netherlands, France, the UK and the USA, as well as worldwide companies (Pfizer, Johnson & Johnson, etc).

Typically, a research group presents a potential project to CD3 for initial evaluation and discussion. The project is then evaluated internally by CD3, with criteria including scientific aspects, intellectual property aspects, market opportunities and required investment. Upon positive preliminary evaluation, a joint collaboration agreement between CD3 and the research group is proposed. When the project has proven to be potential for development, CD3 contacts industrials that might be interested. Less often and if they are interested in a particular molecule, industries might be associated with the projects from the beginning.

The CD3 is funded half by the European investment Fund and half by internal KUL funding.

So far CD3 has been successful and in only 4 years it has developed important projects, such as the development of new drugs for Alzheimer, and in July 2010 an important licensing agreement was signed with Pfizer to develop a potential treatment of individuals infected with HIV. It has also contributed to the establishment of Arcarios, a company founded in 2010 as a merger of TR-therapeutics – a platform involving the CD3- and Therosteon – a spin-off from the Erasmus Medical Centre in Rotterdam. Arcarios is dedicated to the discovery and development of innovative products in the field of bone and joint diseases such as osteoporosis and osteoarthritis.

This was achieved through the concentration of infrastructures, funding and manpower around a small operational unit providing every support proved to be necessary for researchers and industrials .

Source: LRD's website, CD3 page (http://lrd.kuleuven.be/en/tc/cd3-1/) and interviews

8.4.2 The extension of the 'Entrepreneurial University' in the domain of teaching

As presented so far, university business cooperation in the Catholic University of Leuven is strongly linked to the research agenda. However a key characteristic of training methods at the KUL is that all study programmes are research-based. Research and education are strongly intertwined and collaboration with businesses on research projects as well as the entrepreneurship culture has extended over years to teaching activities. Cooperation in teaching activities varies from faculty to faculty but all in all it includes:

- **Participation of students in research projects** in the University's departments (particularly in pharmaceutical, engineering and technological study programmes);
- **Internships and enterprises' visits** in some masters (or even the last year of Bachelor), to allow students to gain insights of how businesses work and apprehend research;

- **Industrial lecturers** invited to share their experience with students;
- **Continuous education**: all courses in KUL are open for students at work but the presence of working adults is low. Recently, continuous education programmes targeting working adults with vocational education who want to come back to basic education have been developed;
- **A worldwide network of alumni groups** offering a wide range of networking activities[83];
- **Career guidance**: though limited, specific support is offered by the Study Advice service to last year students (job database, information sessions, job fairs with HR-officers of Belgian and international companies, advice for international careers, interactive training session in order to prepare students for the job application process);
- Also, the entrepreneurial spirit developed over 40 years in the University is well developed in the three doctoral schools which opened recently. **A competence profile for doctoral students** provides details on all general competences (relational, academic, technical, intellectual management and leadership skills) that PhD students are expected to develop in KUL.

Figure 16 KUL competence profile for doctoral students

KUL website: https://admin.kuleuven.be/personeel/competentieprofiel/en/index_eng.htm

The matrix was developed as a comprehensive framework with the support of forty human resources representatives from the education, government and business sector and is aimed at doctoral students to orientate their actions towards specific skills during their studies.

Doctoral schools are in charge of developing programme courses in line with the doctoral competence profile. As a result, the Arenberg doctoral school for Science, Engineering &

[83] KUL Alumni website: http://alum.kuleuven.be/english

Technology (opened in 2008), has opened in 2009 a training course on entrepreneurship in order to develop managerial skills amongst its PhD candidates.

Training course on knowledge & technology transfer and the exploitation of research organised by LRD in the Arenberg Doctoral School and the Biomedical Sciences Doctoral School

The course is organised in collaboration with the Industrial Research Fund (IOF) and the two doctoral schools, but is managed by LRD, in charge of the content of the training. This was first launched within the framework of the European Institute of Innovation and Technology (EIT) and the Knowledge and Innovation Communities (KIC).

This module is addressed to doctoral candidates reaching the end phase of their PhD as well as post-doctoral researchers. It introduces the different routes of technology & knowledge transfer and highlight the key attention points and success factors. It covers the three main aspects of research exploitation that entail the LRD areas of competencies:

research collaboration;

patenting & licensing;

creating a new company (spin-off).

Along with case studies and testimonies from professors who work with enterprises or from industrials involved in cooperation projects with the industry, small teams (two to four people) of students are expected to work out an exploitation plan for the research results of one of the team members or one of their research groups. Coached by LRD staff, IOF staff and Research Centre coordinators, students have then to present their exploitation plan to a jury of industrial experts and investors. An award is assigned to the best exploitation plan in each of the doctoral schools, allowing further development of the best project.

The programme was launched in 2009/2010. 90 students attended it in the first year and 21 groups presented their exploitation plan (i.e. about 80 students completed the course). 50 students are involved in 2010/2011. The five day course is spread over a period of five months, as follows:

Day 1 - Setting the Scene;

Day 2 - Collaborating with Industry / Starting Spin-off Companies;

Day 3 - Managing Intellectual Property;

Day 4 - Funding the Innovation Process;

Day 5 - Presenting the Exploitation Plans.

Source: LRD's Website (http://lrd.kuleuven.be/en/agenda/doctoral-school-training-course) and interviews

Additionally, since 2008 the Flanders government (through IWT, the Flemish Agency for Innovation by Science and Technology) funds PhD candidates, who carry out their research at a Flemish university in close co-operation with a Flemish industry, through the Baekeland mandate. The company is involved in the strategic orientation of the project and provides co-funding the university is in charge of the guidance of the scientific work.

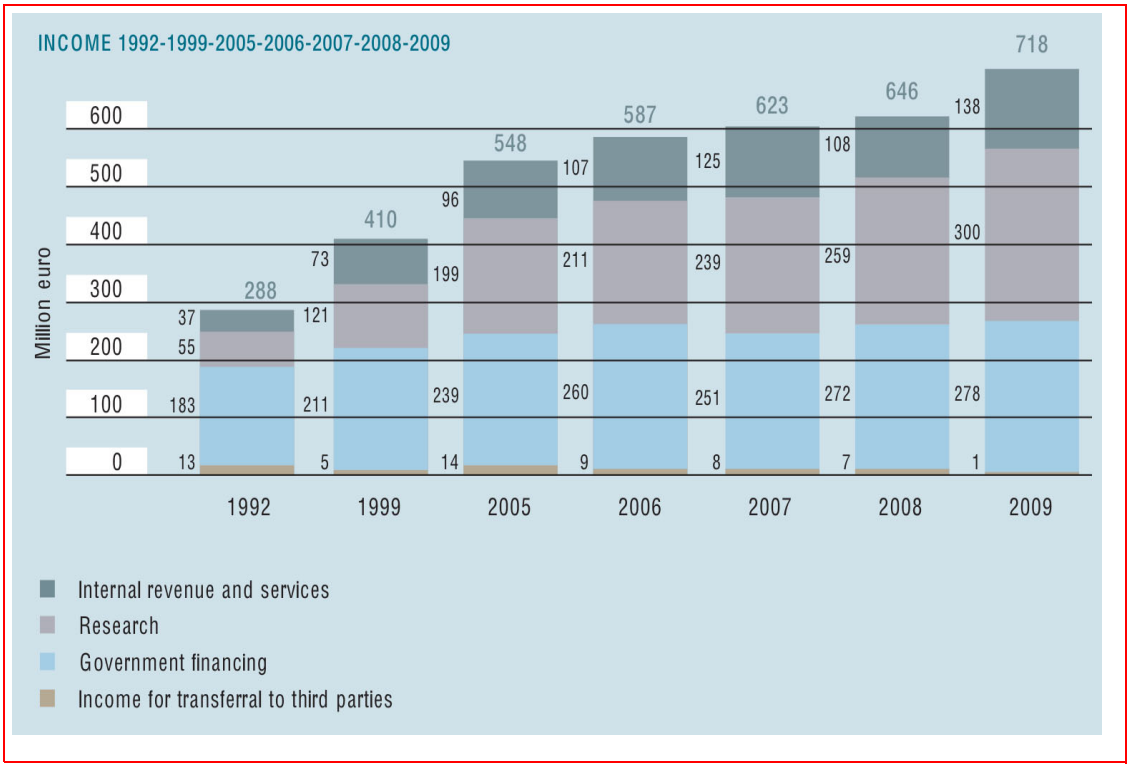
8.5 Strong impacts in terms of research outputs and regional development

KUL voluntary and research-oriented approach to university business cooperation had had very strong impacts in terms of cooperation with industry, research income and technology transfer.

"Research expenditure at KUL amounted to approximately 157 million euro in 1999. By 2009, this figure had more than doubled, to 330 million euro."[84]

All in all, Figure 17 shows that **since 1992 KUL research funding has multiplied by 5.5**, while government funding has increased only by 1.5.

Figure 17 The increase in KUL research income since 1992



KUL, Brochure KUL in brief 2010-2011

This has led to strong impacts in terms of **research and development outputs**.

"Approximately 1,000 new contracts per annum and over 500 active industrial partners"

"56 per cent of the scientific publications of K.U.Leuven researchers appear in journals that are in the top 25 in their field. A considerable increase in the impact of the average publication has also been noted."

"K.U.Leuven produces more than 42 per cent of Flemish academic publications and almost half the citations in the fields in which a bibliometric approach applies."

K.U.Leuven R&D "has assumed responsibility for establishing and guiding about 90 spin-offs", with a strong increase in the number of spin-offs created since the late 1990's.

"In 2009, 73 new patent families were submitted to the patent procedure and 24 new patents were granted."

KUL has 300 active patent families, of which "90 per cent are actively valorised and marketed at the moment, while the average for European universities is currently 33 per cent."[85]

[84] KU Leuven, Brochure KU Leuven in brief 2010-2011

[85] Quotations issued from KU Leuven, Brochure KU Leuven in brief 2010-2011; Koenraad Debackere, KU Leuven R&D and the Leuven model, powerpoint presentation 13/12/2010; and Koenraad Debackere (2010)

This also had important **effects on the regional economy**, since KUL is strongly tied to the regional socio-economic environment. The University is a major player both in Leuven and in the Flemish region and has provided a very significant contribution to the local economy, by contributing to the development of research-based companies in the area around Leuven.[86] Likewise, Flanders also shows very good performance in terms of patenting: the number of EPO (European Patent Office) patent applications per million inhabitants in 2005 was 214.6 (compared to 177.3 for Belgium and 10.7 for the EU 27), with a strong concentration of patents in a small number of multinational companies.[87]

8.6 What are the key lessons which can be drawn out from this approach?

8.6.1 Professionalism and a pro-active structured management as key features of university business cooperation

The KUL approach is based on a mixture of flexible and distinctive features developed since the establishment of K.U. Leuven R&D in 1972:

- The setting up of professional teams both at the LRD central level and in the dedicated support structures such as the CD3, playing an intermediary role between academic researchers and industries;
- The support provided by LRD under the form of a pro-active and selective knowledge management policy focusing on the most valuable patents and offering comprehensive support in some areas of strategic interest;
- The shift from LRD as a separate and isolated entity towards a university-wide commitment to technology transfer activities through the decentralised interdisciplinary research divisions;
- The regional support offered through legislation and support mechanisms, along with the strong embedding of KUL's cooperation activities within the regional context with the extension of the TTO's activities to other universities across Flanders through the KUL Association.

Within this long-established research- and academic-oriented university, there have been important concerns in terms of balance of entrepreneurial and scientific activities. The third mission actively promoted by the KUL might be seen to some extent as conflicting with more traditional basic research activities focusing on the production of knowledge. This refers to a more general debate in the literature of whether university patenting undermines scientific activities. This debate itself shows that one of the main barriers associated with university business cooperation, namely the difference of working culture between universities and enterprises, is still a main concern, even in a technology transfer-oriented university such as KUL. Research studies carried out (mainly by Koenraad Debackere, executive director of LRD) show that technology transfer activities strengthen academic activities (publication, etc) rather than challenge them.

> *"Findings suggest that no trade-off seems to have occurred between entrepreneurial and scientific activities within our sample of LRD divisions. On the contrary, involvement in contract research seems to stimulate the scientific activities of divisions, resulting in larger publication outputs, accumulating over time."*[88]

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[86] KU Leuven, Brochure KU Leuven in brief 2010-2011

[87] European Commission, Regional Innovation Monitor, Flanders profile online: http://www.rim-europa.eu (consulted February 2011)

[88] Bart Van Looy, Marina Ranga, Julie Callaert, Koenraad Debackere, Edwin Zimmermann, Combining entrepreneurial and scientific performance in academia: towards a compounded and reciprocal Matthew-effect?, Research Policy 33 (2004) 425–441

In a nutshell, scientific and entrepreneurial activities do not conflict with each other, but rather complement themselves in the Catholic University of Leuven. However, the organisational structures, support processes and management set up progressively through the LRD, have played a key role in achieving this end. [89]

More recently, funding has also been a main concern in terms of cooperation around research projects, with fears concerning both public budget cutbacks to universities and the decrease of budget dedicated to R&D in enterprises because of the effects of the economic crisis.

8.6.2 The development of learning outcomes in partnership with external stakeholders

In recent years, the commitment of the KUL to entrepreneurial activities has slightly shifted towards its educational activities, and this trend is likely to continue in the coming years.

However, student employability does not appear so far to be a main focus in the University's strategy. The KUL does not publicise results of surveys of student employability which are conducted every two years. Employability is however a growing issue and students are currently pushing for the establishment of a strengthened **career advice support**. This is currently under discussion especially for PhD candidates.

An innovative development is the **elaboration of learning outcomes in cooperation with industries within the Flanders region**. The process has just started and is being promoted by Flemish HEIs. A common set of learning outcomes will be established for all study programmes at the level of Flanders and will be discussed in cooperation with external stakeholders. Each qualification will be linked to generic level descriptors developed and proposed by Flemish HEIs. The descriptors will be generic enough to provide space for each institution to develop its own approach. The procedure is to be organised in three steps:

- Representatives in all institutions offering the programme will first write down a proposal for the development of common descriptors;
- A working group for each cluster of programmes will adjust the different descriptors, helped by a panel of stakeholders involving students, employers and international representatives;
- A proposal will be submitted to the steering committee and, if approved, this will be sent to the accreditation agency for validation.

About 650 programmes will be described and the process will last approximately until 2018. Two pilots have already been carried out in 2010: building technology & civil engineering; communication management & communication science.

8.6.3 Concluding remarks

The KUL example shows that time matters. LRD has been around since 1972 and this makes it one of the oldest TTO in European universities. This has allowed a progressive by steady change in mindset in the academics and researchers leading to increased technology transfer and further cooperation with enterprises.

All in all, the KUL approach to university business cooperation has been developed over years and can be presented as a successful model of research-oriented partnerships that has since grown and extended its scope to involve the full range of teaching activities. It has become holistic over time, but started with research. The University is a very good example

[89] Bart Van Looy, Julie Callaert, Koenraad Debackere, Publication and patent behavior of academic researchers: Conflicting, reinforcing or merely co-existing? Research Policy 35 (2006) 596-608.

of how an old European University can reinvent itself to meet the new challenges related to the changes in research systems and in the development of knowledge.

8.7 Contacts, references

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Ludo Melis. Vice Rector of Educational Policy

Patrick Chaltin, Managing director, CD3 (LRD)

Leen Cuypers, Coordinator, Arenberg Doctoral School

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9 NATIONAL TECHNICAL UNIVERSITY OF ATHENS (NTUA)

Summary of key points

This case study is written in a period of deepening financial crisis for Greece which has a direct effect on Higher education.

The University

- The national technical university of Athens (NTUA) is in the capital of Greece in one of its richest regions
- NTUA has its origins in the first school of technical education set up in 1836 and became a HEI in 1887, set up along the lines of the continental system of education in engineering. Traditionally, the university has been – and still is a publicly funded institution
- The university has very close links with the Technical Chamber of Greece, a very powerful professional organisation
- NTUA graduates are considered highly employable by business but the recent economic crisis has hit graduate employability hard
- University business cooperation is not very well developed in this case, there are no central core strategies or missions and many of the structures do not function optimally such as the TTO for example.

The Business Context

- The growth characterising the region results from the high concentration of economic activity in greater Athens and Piraeus, Greece's main commercial hub and the centre of the Greek maritime industry.
- The primary industries in the region include food and drinks, oil refining, manufacturing and chemicals. The economy, however, is largely service-oriented around a number of sectors, notably banking, finance, insurance, real estate, tourism and shipping
- Collaboration between NTUA and businesses takes place through various channels but in a rather fragmented manner and often at the personal level – not at the institutional level. The absence of representatives from the economy and society in the governance bodies partly accounts for the 'NTUA' approach which rather common amongst Greek universities

9.1 Introduction

The major preoccupation of the Greek political and social economy at the time of writing is the readjustment necessitated by economic turbulence and strong decline in gross domestic product. The consequent reduction in public sector expenditure is having a direct effect upon higher education, not least in the way the Greek government is taking the opportunity to introduce reforms to modernise the culture, content and governance of the higher education sector in Greece. Mrs. Anna Diamantopoulou, Minister for Education, Lifelong Learning and Religious Affairs, has set out the agenda for change which is now to be accelerated. The minister's points include:

'We need to bring Greek Higher Education institutions into the international mainstream. International exchange programs, new programs, joint programs, visiting professors from abroad as well as Greek visiting professors in other countries are going to open the channels of communication and place Greece and its students into a global intellectual powerhouse. These opportunities are opportunities for excellence at the highest level.

We will tune our Universities to societal and market needs. Knowledge is important, but in today's globally competitive work and investment environment, the need for competitive skills is as great as ever.

By changing the administrative structure of our universities along the lines of reforms throughout Europe in the last decade or so, we are freeing the governance structures from many of the inefficiencies of the past. We are especially keen on improving the balance between administrative and academic concerns which under the current system often remain muddled.' [90]

While these fundamental reforms are likely to change the Greek higher education landscape considerably in the future, this case study of the National Technical University of Athens (NTUA) examines an example of university business cooperation practice in the economic context prevailing before the crisis.

The NTUA is situated in the capital of Greece within greater Athens, one of the largest urban areas in the EU in terms of population. Athens is located the Attiki region, in the southernmost tip of central Greece. Although the region represents around 5 per cent of Greece's land area, it is the most densely populated region in the country with the population of greater Athens reaching over 4 million.

Attiki is one the richest Greek regions in terms of GDP (per PPP) and above the EU27 average (€ 28.300 when compared to Euro 25.100 national average). In 2005, the region accounted for 40 per cent of the national aggregate GDP. Furthermore, the Athens urban area rates 9th amongst the top cities in the EU in terms of GDP (at PPP) and, in 2008, it rated 67th amongst the top 100 world urban areas.[91] Although it has lost this place due to a drop in GDP (at PPP) since 2009, greater Athens is expected to remain amongst the 150 top world urban areas.

The growth characterising Attiki results from the high concentration of economic activity in greater Athens and Piraeus, Greece's main commercial hub and the centre of the Greek maritime industry. The primary industries in the region include food and drinks, oil refining, manufacturing and chemicals. The economy, however, is largely service-oriented around a number of sectors, notably banking, finance, insurance, real estate, tourism and shipping.

A major boost in the development of the city and the surrounding urban area came from investment primarily in infrastructure for the Olympic Games of 2004. Since 2009, however, the country has experienced severe economic problems – rising borrowing costs to cover high-rate budget deficit and government debt, reaching 15.4 and 127 per cent of GDP, respectively, in 2009.

Unemployment in the city of Athens, and the surround urban area, is lower than the national average. In 2004 it stood at around 8.6 per cent and 9.1 per cent when compared to 10.49 per cent of the national average.[92] During the period 2006-2009 the average unemployment in the Attiki region stood at around 7.4 per cent but in 2010 it rose to 10.7 per cent while in 2011 it is estimated to rise to around 14.6 per cent. These percentages are slightly below the estimated national average of 11.3 and 15.1 per cent for 2010 and 2011, respectively.[93]

Attiki concentrates 8 out of the 23 Greek universities, including, for instance, NTUA, the National and Kapodistrian University of Athens; the Athens University of Economics and Business; the Agricultural University of Athens; and the Panteion University of Social and

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[90] Lecture by Mrs. Anna Diamantopoulou, Minister for Education, Lifelong Learning and Religious Affairs at the London School of Economics (LSE) on February 2, 2011. http://www.friendsofeurope.org/Contentnavigation/Library/Libraryoverview/tabid/1186/articleType/ArticleView/articleId/2233/Anna-Diamantopoulou-The-role-of-education-in-greeces-economic-recovery.aspx

[91] Pricewaterhouse Coopers, UK Economic Outlook, November 2009.

[92] Urban Audit, City profiles, accessed at: http://www.urbanaudit.org/CityProfiles.aspx.

[93] Hellenic Republic, Hellenic Statistical Authority, Press Release – Labour Force Survey January 2011. Pireaus, April 14th 2011. http://www.statistics.gr/portal/page/portal/ESYE/BUCKET/A0101/PressReleases/A0101_SJO02_DT_MM_01_2011_01_F_EN.pdf.

Political Science. Furthermore, a good number of Technological Education Institutions (TEIs) and Schools of Pedagogic and Technological Education are located in Athens and Pireaeus.

Around 2004, the process of the modernisation of the Greek Higher Education system was set in motion in response to changes introduced at the EU level, primarily. During 2004-2010, for instance, laws were introduced regarding the governance of higher education and covering issues of increased participation, transparency, accountability and increased autonomy; credit system and quality in higher education; and, lifelong learning. As indicated earlier, this process of modernisation is to be accelerated in 2011 as part of the Greek economic recovery programme.

9.2 The university – facts and figures

NTUA has its origins in the first school of technical education set up in 1836. In 1887, the technical university was set up along the lines of the continental system of education in engineering. The new institution consisted of the first technical school and several new schools created at the time. Traditionally, the university has been, and still is, a publicly funded institution.

In Greece, NTUA is considered a pole of attraction for both students and staff. The current total number of students enrolled across the university schools amounts to around 12,800, of which around 4,000 are postgraduate students. Further, there are over 700 academic/research staff, 140 scientific assistants and around 260 staff providing administrative and technical support.[94]

In terms of ranking, NTUA is placed first amongst the Greek universities and 133rd and 340th in the European and world ranks, respectively.[95] For 2011, it is placed in the rank range of the

- 51-100 world universities in the fields of civil and structural engineering and electrical and electronic engineering;
- 101-150 world universities in the fields of mechanical and manufacturing engineering;
- 151-200 world universities in the areas of chemical engineering and computer science and information systems.[96]

NTUA researchers' work is of high quality. This is evidenced in their numerous publications in International Scientific Journals and Proceedings of International Conferences as well as by the prominent place of NTUA in EU-sponsored F&D projects.

9.2.1 Governance

The governance structure of NTUA is common to a publicly funded university in Greece. The key bodies include:

- The Senate, the highest governance body, responsible for defining NTUA's development strategy and its policy in the areas of education and research as well as for supervising their implementation. The Senate consists of the Rector and his team, the Heads of, and representatives from, NTUA Schools as well as representatives from students and support staff. The Senate is supported by a total of 23 committees;
- The Rector, having the overall responsibility for the governance and functioning of NTUA and representing the institution externally. The Rector is supported by a team of two, the Vice-Rector responsible for economic planning and development and the Vice-Rector responsible for academic affairs and staff. The Rector and his team are full-tenure professors elected by representatives from the NTUA community,

94 NTUA, University Guide – Academic year 2010-2011, Athens, September 2010 (In Greek)

95 http://www.webometrics.info/rank_by_country.asp?country=gr

96 http://www.topuniversities.com

including education and research staff, students and technical and administration staff;

- The Rectorial Council responsible, inter alia, for implementing the decisions of the Senate and proposing the university budget.

The NTUA schools, and the departments within them, have a similar structure. They are managed by Boards headed by elected Chairs (or Heads in the case of departments), which are responsible for implementing the decisions of the General Assemblies, the main decision-making body, in relation to the education and research policy and development strategy of individual schools. These decisions and strategies, it should be noted, are set within the context of those of the NTUA Senate.

Industry is not represented in the NTUA governance structure. Nonetheless, the university has very close links with the Technical Chamber of Greece (TCG), a very powerful professional organisation that serves as the official technical advisor of state institutions and government bodies and is responsible for awarding professional licenses to practicing engineers throughout Greece. NTUA alumni, it should be noted, constitute the core of this body, while NTUA academic staff participate in its governance structure.

At NTUA, there are a number of services underpinning the work of the governance bodies and the functioning of the university and supporting students.

9.2.2 A strong focus on education and research

NTUA is a HE institution with a technological focus and a strong research orientation. Academically, it consists of nine schools, eight of which focus on engineering studies and one for general science. Most of these schools were set up in 1887 and 1917, while the schools of Naval Architecture and Marine Engineering and Applied Mathematical and Physical Sciences were established in 1982. The NTUA schools, in turn, are divided into around 33 Departments reflecting the broad scope of the disciplines covered. The Schools, and the key areas covered per school, are:

- Civil Engineering, covering a broad range of engineering subfields, including, for instance, structural, hydraulic, geotechnical, environmental water and maritime, across its four departments;
- Mechanical Engineering, focusing on seven key areas including: construction, design and automation, fluids, thermal and nuclear engineering as well as industrial management and operational research;
- Electrical and computer engineering, covering the areas of electroscience; electric power engineering; and, computer engineering and informatics within its seven departments;
- Architecture, divided into four departments covering the subfields of architectural design; urban and regional planning; interior design and landscaping; and, building technology-structural design and mechanical equipment;
- Chemical Engineering, focusing on chemical sciences; process and systems analysis, design and development; material science and engineering; and, industrial processes and covering many themes of great research interest and with many applications that relate to biomass, food and biotechnology as well as energy and environment, for instance;
- Rural and Surveying Engineering, covering the fields of topography, geography and regional planning, and, rural technology and development;
- Mining and Metallurgy, a new NTUA school, covering the areas of geology, mining and metallurgy and materials;
- Naval Architecture and Marine Engineering, covering the full range of the relevant fields as well as specific areas of marine technology;

- Applied Mathematical and Physical Sciences, focusing on humanities, social sciences and law in addition to purely scientific fields.

NTUA offers undergraduate courses spread across 10 semesters and leading to a diploma following successful completion of practical work and oral examination and a diploma thesis.

There are also postgraduate courses on offer, both departmental and inter-departmental with 18-month courses and lab work leading to Post-graduate Specialisation Diplomas. PhD programmes at NTUA, offered by individual Departments and laboratories within Schools, run from 3 to 6 years. There are approximately 60 PhD nominations per year at NTUA.

Inter-disciplinary post-graduate programmes are often organised, and carried out, in collaboration with other HE and/or research institutions, from within or outside Greece. One example is the post-graduate programme on 'microsystems and nano devices' organised jointly by the NTUA Schools of Applied Mathematical and Physical Sciences; Electrical Engineering; Mechanical Engineering; Marine Engineering; and, Chemical Engineering, in collaboration with the Institute of Microelectronics (IMEL) at the National Centre for Scientific Research 'Demokritos'. The course is coordinated by the Department of Physics within the School of Applied Mathematical and Physical Sciences. The aim of the programme is to develop students' theoretical and technical skills required for a career in research or industry in a novel area. Employability and career development are important objectives of the programme. Another example is a master's programme focusing on energy and environmental management on offer at NTUA is a joint initiative of the School of Chemical Engineering at NTUA and the Department of Industrial Management of the University of Piraeus.

In addition, there have been opportunities for international post-graduate training. In the area of biomedical engineering an inter-university programme was set up in 1989 by NTUA's Schools of Mechanical Engineering and Electrical and Computer Engineering at NTUA and the Medical School of the University of Patras and carried out in collaboration with 22 European Universities. Operating within the context of the Lifelong Learning Programme/Erasmus, this programme has targeted a multinational audience of around 500 students and enabled them to benefit from expertise from a large multinational academic community. Despite the success of, and interest in, this programme, its future is uncertain. Our research findings show that the admission of new students in the programme for the 2011-12 academic year was suspended, reportedly, due to concerns of the Greek universities involved about ensuring the quality of the programme and maintaining its reputation given the severe budget cuts.

Finally, a distance learning post-graduate programme focusing on water resources and environmental management (the 'Educate' project) was set up by a consortium including NTUA (represented by the Environmental and Energy Management Research Unit at the Chemical Engineering School), the Universities of Belgrade and Ljubljana and the Technical University of Bucharest. Although EU funding for the project ended last year, the course continues. According to a NTUA researchers involved in the initiative, the course has been successful and there is considerable in the issues, particularly in view of the need for knowledge and expertise in sustainable development.

NTUA is also a reputable research-oriented technical university striving to establish itself as a 'Technology Resources Center'. In addition to basic research, NTUA is very active in applied research activities carried out within the departments, laboratories (formal entities) and research units, or groups (research structures headed by a professor), across the NTUA schools, thereby covering a very large number of research areas. The research units (or groups) have helped expand the scope of NTUA's research portfolio to include novel, and/or highly specialised areas.

In the context of their research activities NTUA departments as well as laboratories and units collaborate closely with research institutions and researchers active in similar areas and mostly based outside Greece with the view to promoting knowledge but also to improve the

profile of their organisation. Thus, in the area of nanomaterial devices, for instance, NTUA researchers collaborate with researchers at the Laser Thermal Laboratory at UC Berkeley and at the University George Mason. Personal contacts and participation of leading research staff in international networks have facilitated NTUAs involvement in such research schemes.

Applied research activities are supported primarily through funding schemes from the EU (under the Framework Programme, for instance), the Greek General Secretariat of Research and Technology, government departments and other public bodies. Private sector support for research is very limited.

In addition to research activities, NTUA laboratories provide further services, including measurements and tests as well as expert advice. This multiple use of the NTUA research facilities is not only cost-effective and profitable but benefits students.

At NTUA, the only research institute to complement the activities carried out within individual schools is the Institute of Communication and Computer Systems (ICCS-NTUA), set up at the School of Electrical and Computer Engineering in 1989 in order to support:

- Research, technological development and technology transfer;
- The development of ICT, telecommunications and the electronics sectors in Greece.

ICCS-NTUA is heavily involved in studies and research projects, R&D activities and provision of services as well as in post-graduate education.

The intensity of R&D activities varies across schools. A study suggests that during the period 1997-2005, most activities were carried out by ICCS-NTUA (around 390 projects), followed by the Civil Engineering and Chemical Engineering Schools (300 and 251 projects, respectively). However, the main contributors to income from research were the School of Engineering and ICCS-NTUA (of around €30 Million and €22.9 Million respectively) followed by the School of Chemical Engineering (contributing around €14.6 Million).[97]

9.3 Approaches to university business collaboration

NTUA is predominantly a publicly funded research university. Therefore its mission is to provide high quality education and advancement of science and technology through training, research and provision of services for the development of Greece. This mission has been consistent over time. In addition, NTUA's vision is to maintain and strengthen its international position as a reputable HEI. This vision, initially set out in the 2000 internal regulation of the university, has guided NTUA's strategic priorities and activities in the new millennium.[98]

The university's objectives in relation to the production and transfer of scientific knowledge and technology are in line with the objectives of the Greek HEIs as set out in earlier framework legislation of 1980 and in the recent law on reforms in HE of 2007. According to these pieces of legislation, these objectives include the:

- Development of education and research activities, including promotion of innovation;
- Contribution to social progress and economic development at the local, regional and national levels through collaboration with economic operators as well as cultural and societal organisations, for instance;
- Internationalisation of education and research activities.[99]

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[97] Thodoros Loukakis, 2007, The provision of technology services for the development of the country, mimeo

[98] NTUA, University Guide – Academic year 2010-2011, Athens, September 2010 (In Greek). Interviews with NTUA research staff.

[99] This objective was set out in the Law of 2007 on HE, introduced in response to regulatory changes at the EU level. N. 3549/2007 on the reform of the framework law regarding the structure and function of HEI Vouli ton Ellinon (Hellenic Parliament), 13 March 2007, (FEK 69A)

In the case of NTUA, university business cooperation is most evident in such initiatives as the Greek Interoperability Centre, a new research centre targeting eGovernment and eBusiness interoperability providing R&D services for administrations, businesses and research institutions in Greece, South-Eastern Europe and the Mediterranean. The Centre is based at the NTUA's Decision Support Systems Lab and aims at becoming a premium research centre in the field of Interoperability forming a strong regional pole of research and technology in Europe. The Centre has some 60 industry partners[100], mostly in Greece but also throughout the EU, and has a Council which includes representatives of significant private sector entities such as Microsoft Hellas / Microsoft Innovation Centre, Oracle Hellas, Singular Logic S.A., and the Bank of Piraeus. Despite the recent and current economic turbulence, the Greek Interoperability Centre is striving to continue its expanding presence in international research and development projects, establishing new relations and delivering high quality results for government, business and citizens.

While university business cooperation at NTUA is not evident at different levels throughout the university's activities there is support amongst academic staff for closer collaboration with businesses in order for the university to survive as a source of knowledge creation and transfer. There is also evidence that the NTUA components and research staff cooperate with businesses well when opportunities arise. Furthermore, there are links between individual schools, or their components, and businesses that developed through R&D collaboration. These links, however, are central technology transfer service.

9.4 Types of university business collaboration in the institution and their impacts

9.4.1 Activities related to the university's education/training function

University business cooperation in the area of education and training activities has not been a priority for NTUA comprising simply obligatory student placement, introduced at the end of 1980s in the Chemical Engineering School and around 1996 across the other schools. Even in this activity an apparent low level of business interest in placements has resulted in an insufficient supply to meet the student demand. In addition, industry has had little involvement even in post-graduate interdisciplinary programmes, including the Athens MBA Programme, run by NTUA and the Athens University of Business and Economics, which has attracted participation of NTUA alumni. This programme itself does not, however, cover entrepreneurship education themes. Finally, NTUA activities related to lifelong learning and distance education are, as yet, undeveloped, with the exception of the successful 'Educate' programme. Our discussions suggest that there is insufficient interest at the university, particularly amongst senior management and staff, in such initiatives. This has potentially reduced NTUA's chances for collaboration with businesses and for future economic benefits.

Despite the limited interaction between the university and businesses, the employability of NTUA graduates has been consistently high prior to the current economic crisis in Greece (around 2009). Evidence from the Careers Office at NTUA suggests that unemployment amongst NTUA graduates stood at 2.5 per cent in 2005, while unemployment amongst civil, electrical and naval engineers from NTUA was zero per cent. The high employability levels have been attributed to the quality of education and training offered at NTUA and the knowledge and skills gained from the broad range of courses and programme available at the university.

[100] http://www.iocenter.eu/our-network/industry-partners.aspx

9.4.2 Activities related to the university's research and innovation function

NTUA's collaboration with businesses in the context of its research and innovation function takes place through R&D projects supported by the EU Framework Programme, in which NTUA participates, as well as through projects funded by the industry. Evidence shows that' during 1997-2005, R&D activities for, or in collaboration with, the industry accounted for around one third of the university's income on average and 43 per cent of its activities. The strength of links with industry varies, depending on the area. Our discussions with NTUA research staff reveal that the university has developed long-term collaboration in research with some industries, for instance, cement, food, ICT and telecommunications, some of which have very large research sections, employing NTUA post-graduates. However, collaboration has weakened over recent years and, as a recent study shows, NTUA income from R&D services to businesses dropped considerably in 2005.[101] Thus, the relevance of industry to NTUA is not equivalent to that of the public sector, consistently the key user of NTUA research contributing almost consistently around 70-73 per cent of university's income generated from 57 per cent of its research activities.[102] This is not surprising given the large share of the Greek public sector in the overall economic activity. However, the relevance of the industry is expected to increase in view of the budget cuts for public R&D. Discussions with NTUA staff reveal that the current situation in Greece will intensify networking activities with NTUA alumni in order to stimulate interaction with industry.

NTUA established the Technological and Cultural Park of Lavrion, in 1992, intended to save a monument of Greek industrial history, to encourage innovation and clusters as well as synergies taking into account the needs and interests of the local businesses and the promotion of history and culture. In addition to serving as a distinctive national and international focus for educational, cultural and business audiences, the Lavrion site houses several high-technology companies concerned with, for example, communications infrastructure and new technologies and products in the field of advanced materials.

The university is involved to some extent in commercialisation of its own research results through patenting and licensing activities with the existence of the Technology Transfer Office (TTO) –a structure at the central level of the university. However, companies aware of the NTUA research activities tend to contact individual departments, or teams, directly, so that much TT takes place independently of the TTO and the NTUA central structure. While the TTO had been initially set up by the General Secretariat for Research and Technology (GSRT) to facilitate and coordinate TT, the subsequent loss of GSRT support reduced the effectiveness of the TTO role.

9.4.3 What are the key lessons which can be drawn from this approach?

NTUA is a rather small university with a dedicated technical orientation. Despite its size, the university offers courses and research programmes in a broad range of scientific fields. The effective participation in the 7th Framework Programme, exemplified by the Greek Interoperability Centre, has brought NTUA engagement with major industrial actors, further enhancing the reputation of its activities. While the NTUA primary focus is on excellence in education and research, its activities related to the third mission of universities take place through individual departmental contacts and networks rather than through services within the central structure of the university. The main links are however with the public sector. The pursuit of excellence in specific fields has clearly produced very high levels of employability of NTUA graduates, who benefit from the institution's reputational asset.

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[101] NTUA – Technology Transfer Office (TTO), 2007, Research and Service Provision at NTUA, Paper prepared by Prof. Thodoros Loukakis, Head of the TTO

[102] ibid.

Some structures and activities that have been introduced, i.e., the TTO, have faced difficulty in embedding themselves in the institution and so have had limited success. This may be partly due to the fact that the developments resulted from top-down rather than a bottom-up approach and partly due to the culture and institutionalised practices prevailing in NTUA.

The expectation is that the forthcoming changes in governance and market exposure in Greek higher education will stimulate the requisite cultural and institutional development in NTUA to enhance and enlarge existing and new links with business which will be essential to the revitalisation of the Greek economy.

As Mrs. Diamantopoulou concluded in her recent speech:

'All these changes I have just described are pieces of the same puzzle that when put together form a contemporary, competitive education system and the image of a new country ready to move on as it builds a new future: One that is based on knowledge, innovative ideas, creative people and a new market force.'[103]

9.5 Contacts, references

Ms Eleni Paspaliari, Head, Careers Office

Ms Despina Tsaousidou, Officer, Technology Transfer Office

Professor Emmanouil Koukios, Chair, School of Chemical Engineering

Professor Dionissis Assimacopoulos, Head of Environmental and Energy Management Research Unit, School of Chemical Engineering

Professor Thodoros Loukakis, former Head of the NTUA Technology Transfer Office, Professor at the School of Naval Architecture and Marine Engineering and Chair of the Research Committee of the Technical Chamber of Greece

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10 SLOVAK UNIVERSITY OF TECHNOLOGY (SK)

Summary of key points

The University

- The STU is the leading technical university in Slovakia and is the only comprehensive University of Technology in the country, with all 7 faculties having substantial technological content. STU graduates enjoy one of the lowest graduate unemployment rates in Slovakia of 2.4 per cent, 3 times lower than the other technical universities.
- University representatives place employability of the STU's graduates high on the agenda. Close links with local and international industrial partners are deeply rooted in the STU's culture, and form part of every major chapter in the strategy documents. The majority of staff works in some form with industry, supported by university management because of the positive correlation with teaching quality.
- Within the organisational structure are two boards with executive and advisory competences. Both of these boards include members from the most significant relevant industries and ensure that the university meets the needs of the society and economy.
- University business cooperation is embedded at all levels of the University. All departments are involved in relationships with enterprises. There are several centres / institutes central to the university that support university business cooperation activities,
- All students undertake two courses working with industry, usually resulting in co-supervised thesis. These courses and quality professors with experience from industry provide a solid basis for professional career of the STU graduates.

The Business Context

- Despite its small size, Western Slovakia has traditionally been a major industrial region both in terms of the overall proportion of people employed in industry and its industrial added value. Over the last 20 years the automotive industry has become one of the main producers and this development offers great opportunities for collaboration for multiple STU faculties.
- Bratislava, which is home to 6 of 7 STU faculties, is experiencing rapid development and increase in a number of foreign service and high-tech oriented businesses, including global companies. Bratislava is the most productive region in Slovak economy accounting for 26 per cent of the country's GDP, with more than 75 per cent of its population working in the service sector, mainly composed of trade, banking, IT, telecommunication industry, and tourism.
- Without the need for binding regulation from government, the STU has successfully applied a centralised approach towards supporting university business cooperation activities by setting up organisational structures, predominantly co-funded by the ERDF.

10.1 Introduction

10.1.1 Location and economic context

The main campus of the Slovak University of Technology (STU) is situated in Bratislava, the capital of Slovakia. One of its 7 faculties, the Faculty of Materials Science and Technology, is based in Trnava, which is also located within the region of Western Slovakia.

Western Slovakia has the lowest unemployment rate in the country and a high level of development in industrial sectors, above all the automotive one, represented by Volkswagen Slovakia in Bratislava and PSA Peugeot Citroen in Trnava. Other notable producers in this region are, in order of their turnover: the oil refinery Slovnaft Bratislava; Samsung Electronics

Slovakia Galanta; SPP (the Slovak Gas Industry) Bratislava; Slovenské elektrárne (the Slovak Power Plants), Bratislava[104].

More specifically, Bratislava, the capital of Slovakia, is experiencing high levels of investment in development driving the construction industry. All of these "local" industrial sectors provide vast opportunities for collaboration for the faculties of the STU. There have also been instances in which university-business cooperation (UBC) was established with representatives of more distant sectors (i.e. plastics sector from Zlin region in the Czech Republic).

Bratislava region has an area of 2,053 km² and a population of 603,699 (2005). Despite its small size it is the most productive region in Slovak economy accounting for 26 per cent of the country's GDP. More than 75 per cent of Bratislava's population works in the service sector, mainly trade, banking, IT, telecommunication industry, tourism and others. In recent years service and high-tech oriented businesses have been thriving in Bratislava. Many global companies, including IBM, Dell, Lenovo, AT&T, SAP, and Accenture, have built / are building their outsourcing and service centres in Bratislava. The Faculty of Informatics and Information Technologies is again well positioned to collaborations in these IT-intensive sectors.

10.1.2 Regional and national policies supporting university business cooperation

The political support of University-Business cooperation in Slovakia is mostly reflected in statements in non-binding strategic documents such as the "Long-term plan for educational, R&D, creative and other activities at universities until 2014"[105]. The first priority related to university business cooperation in this document is the improvement of quality of science and education in Slovak universities, the argument being that firms will only collaborate with high quality academic institutions. Furthermore, the Ministry of Education, Research, Development and Sports of the Slovak Republic planned to include the criteria of mobility and involvement of professors in firms in decisions related to the level of institutional funding for universities. Despite the abovementioned political support, there is no regulation that would make such cooperation on any level compulsory. The support of this development relies solely on recommendation. Based on these declarations is the direct support from the Government for the development of the cooperation with industry realised via projects funded largely by the EU.

10.2 The university – facts and figures

10.2.1 Introduction

The Slovak University of Technology in Bratislava (STU) is a modern educational and scientific institution. Since its foundation in the year 1937 more than 125,000 students have graduated, with an average 19,000 students now studying at the STU every year. At present, the STU consists of seven faculties. All the STU faculties provide a study in accredited programmes within the complex system of a three cycles: bachelor, master and PhD. The first cycle programmes last three or four years (depending on the Faculty) and offer a bachelor degree; Second cycle programmes last two years and offer an engineer degree (equivalent to master degree); Third cycle programmes last at least three years and offer a PhD degree. Studies may be either full- time or part-time. In total, students can choose from more than 200 study programmes in all three cycles within 74 study courses.

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[104] http://www.slovakia.culturalprofiles.net/?id=-6838

[105] Dlhodobý zámer vo vzdelávacej, výskumnej, vývojovej, umeleckej a ďalšej tvorivej činnosti pre oblasť vysokých škôl do roku 2014

Faculties operate a credits system compatible with the European credit transfer system enabling mutual mobility of students within European Union member countries and a larger European area. In the domain of scientific and research activities the STU successfully participates in European Programmes[106].

The Slovak University of Technology has obtained the status of research-oriented university. Since its foundation, the university has contributed significantly to development of scientific knowledge, enrichment and utilisation of scientific knowledge for the benefit of mankind. The university pursues research in all the areas in which university education is provided, thus in the areas of architecture, civil engineering, geodesy, cartography, chemical technologies, food processing, machinery, electrical engineering, electronics, informatics, information and communication technologies, applied physics, mathematics, economics, and social sciences.

The STU has 6 faculties in Bratislava:

- Faculty of Civil Engineering;
- Faculty of Mechanical Engineering;
- Faculty of Electrical Engineering and Information Technologies;
- Faculty of Chemical and Food Technology;
- Faculty of Informatics and Information Technologies and
- Faculty of Architecture;

and one faculty is located in Trnava:

- The Faculty of Material Sciences and Technology.

10.2.2 Organisational Structure

The organisational structure of the university follows the traditional pattern of faculties, departments and other STU institutions. Primarily the links between STU and the economy are enhanced through the Board of Trustees, which oversees the distribution of the budget, and development of short-term and long-term plans. The Board of Trustees plays a major role in all strategic issues. In addition there is the Industrial Board of the STU, which comprises representatives of significant and relevant companies, playing also an important, but advisory, role in similar matters. The members of the Industrial Board of STU have the opportunity to evaluate the quality of education, research and science performed at the university.

The presence of the industry representatives in these two boards suggests that relevance of the University's activities to the social and economic environment is placed high on the STU's agenda, both in terms of the employment of its graduates and in terms of cooperation with Slovak industry.

The relationship between STU and Slovak industry is two-way; STU provides graduates to industry and industry provides equipment and other facilities to STU, and funds its relevant activities. Industry aims also to help the STU in establishing a wider research environment, while people from industry are expected to act as specialised teaching staff in the University[107].

10.2.3 Employability of STU's graduates

The latest figures on unemployment published by the Institute of Information and Prognoses of Education[108] show that the unemployment rate of STU graduates is only 2.4 per cent, three times lower than the average of the other two Technical Universities in Slovakia. This extent

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[106] http://www.stuba.sk/new/generate_page.php?page_id=132

[107] EUA Institutional Evaluation Programme, March 2007

[108] http://www.uips.sk/publikacie-casopisy/analyzy-prognozy-studie

to which its graduates fulfil the needs of the economy is proof that STU plays an important role in the Slovak economy, enabled by all of the STU Faculties. Credit for the sustained high levels of employability of graduates is given to cooperation of STU with firms in the area of education. IBM Slovakia, Oracle Slovakia, HP Slovakia T-com, Tatrabanka, and others have supported a multitude of academic and training programmes[109].

The university does not hold any formal statistics on the sectors / companies where their graduates are employed after receiving their degree. Despite this, the university Career Advice Centre (CKP) contributes to the collaboration with representatives of selected areas of business practice for better preparation of students for successful access to employment. The centre offers the services for students and firms alike. Students' benefit from the advisory services, and the information is based on the current needs of industry (in the form of events, workshops, presentations, listings of current job offers etc.). Ultimately these efforts result in the higher employability of students and the satisfaction of employers with quality graduates.

10.2.4 Position of the University within the system of Higher Education

Apart from the STU, there are two additional Technical Universities in Slovakia: the Technical University in Zvolen and the Technical University of Košice. However, STU is the only comprehensive University of Technology in Slovakia (with its 7 Faculties having all concrete technological content). The Technical University in Zvolen comprises 4 Faculties (among which is only one with concrete technological content), while the Technical University of Košice comprises 8 Faculties (among which 2 have no technological content – Faculty of Arts and Faculty of Economics). On the other hand, technological Faculties exist also in other Slovak Universities. 4 of them are in the University of Žilina (with 7 Faculties in total), 3 of them are in the Alexander Dubcek University in Trencin (with 4 Faculties in total), and one in the Slovak University of Agriculture (with 6 Faculties in total).

The Slovak-based, non-governmental Academic Ranking and Rating Agency (ARRA), which has been evaluating and ranking the faculties at Slovakia's public universities since 2004, placed STU as a whole on the top of the chart of technical universities for the last three years. Moreover the Faculty of Chemical and food technologies scored the highest within all faculties, and in 2010 two of the top 3 technical faculties in Slovakia were part of the STU[110].

The University ranking by the Webometrics placed the STU 830th in the league of the top 5000 World Universities (and No. 412 in top European Universities) in 2010. This was an improvement from 995th place achieved in the previous year[111].

10.2.5 Additional institutions / organisations at the University

The following is the list of additional institutions / organisations, relating to increasing its level of university business cooperation, established by the STU:

- Institute of Life-Long Learning (ILLL);
- Career advice centre, ALUMNI club;
- Centre for cooperation with practice;
- University know-how centre:
  - University Technology Incubator;
  - Centre for technology transfer;
  - Virtual library,

[109] STU annual report, 2009

[110] Assessment of higher education institutions, 2010

[111] http://www.webometrics.info

- 6 centres of excellence in the following areas:
  - Renewable energy;
  - Settlement infrastructure;
  - Flood protection;
  - SMART Technologies and Services;
  - 5-axis machining;
  - Materials diagnostics.

10.3 Approaches to university business cooperation

STU's approach to university-business collaboration is unaffected by Slovakia's relatively weak national and regional support for these activities compared with other EU Member States. On the contrary, student employability and the relevance of university's courses to the economy are high on STU's agenda. The relevance of STU's activities to the economy and to society is emphasised in all strategic documents. STU has taken an institutional approach to university business cooperation but there might be some additional support of these activities from its individual faculties.

> *"The STU is in terms of support of university business cooperation ahead of the game in Slovakia."*

Cooperation with "practice" is a standalone section in STU's Annual report and is deeply rooted in the university's long-term strategic objectives. This cooperation is not limited to research related contracts. STU's approach to university business cooperation is evident at all levels of the university (teaching, research, management, administration, etc.) and is geared up for benefit of students, researchers and industry.

> *"The whole educational process and its organisation must create conditions for preparation of graduates for their professional career."*[112]

As mentioned above, due to the close cooperation between the university and representatives of industry meeting in the Industrial Board, the STU is able to apply relevant advice and experience to the creation or modification of new study programmes in respect of the preparation of topics for thesis (MSc., PhD.), At the same time STU departments benefit companies through the provision of technical assistance.

10.3.1 Employability agenda

Each undergraduate student at the STU is required to attend a one-month "field practice" course, usually including sessions at premises of a firm working in a related field. In this month the students are meant to familiarise themselves with project and manufacturing processes in the firm. Secondly, in postgraduate programmes the majority of students are working on their dissertations together with their prospective future employers. In their fourth year of study, students have "pre-dissertation practice" leading to their topic, and often they consult on this heavily with the representative of the firm. These links are either established by the students themselves or with the assistance of lecturers based on their contacts in the related fields.

The Slovak legal system does not preclude a lecturer from active involvement in a private company and their involvement in these activities outside the academia has a positive impact on their teaching quality. It is much easier to relate to theories when a lecturer uses recent "real world" examples. Even though there are no statistics available, at least a half of STU's lecturers work together with the industry: either through contract research, as a second job or even as owners of firms.

[112] Source: Long-term strategy document of STU

"One is a better lecturer if he/she understands the academic and business perspective and can pass this broader knowledge on the students."

These two instruments create direct contact between students and firms in the educational process at STU.

In 2007 STU established an ALUMNI club which creates a platform for communication between those who have graduated from this institution over the last 70 years and the university itself. Some of its more specific objectives relate directly to exchanging practical knowledge between the academia and practice, including developing topics for student dissertations, organisation of excursions, and student placements in companies.

Apart from the abovementioned activities supporting the employability agenda the STU has, via CKP, been organising presentation days, career days, and a Job Forum.

10.3.2 Research and innovation agenda

Despite the economic crisis STU has been involved in 758 research contracts of total value around €5 million. These contracts provide an opportunity for PhD students and, to a limited extent also master's students, to participate in applied research for a private firm that can lead to their future employment. In many instances this includes work with new equipment and development of new methodologies and feeds back into teaching process at the university. Furthermore STU's research and innovation agenda includes activities such as establishment of centres of excellence undertaken together with the Slovak Academy of Sciences. In order to support this development STU has established a Research Centre that provides technical services and, in collaboration with the know-how centre, created the database of research potential of the university.

A less structured approach has been taken in the area of setting up common facilities with industry (examples include Volkswagen in Bratislava and PSA Peugeot in Trnava). STU, in collaboration with companies, created common laboratories and workplaces: these present an environment where researchers demonstrate the working process and students gain the experience for future jobs.

10.3.3 Entrepreneurship Agenda

Entrepreneurial activities are supported mainly through the University Technology Incubator providing support and facilities to start-ups, being set up by the STU students and recent graduates.

10.3.4 STU's external actors

STU widely supports cooperation with the business sphere through the activities of its associated institutions. STU's centralised approach to university business cooperation is in 90 per cent of cases related to short-term goals, as the support is based on relatively short-term results – thesis, contracts, presentations, etc.

The types of external actors involved in university business cooperation with the STU include a number of associations, local / regional governments (e.g. Bratislava, Trnava municipality), and a long list of companies (e.g.. Volkswagen Slovakia, PSA Peugeot Citroen, TRW Steering Systems Slovakia, Slovenský Plynárenský Priemysel (Slovak Gas Industry), Tesco Stores SR, Continental Matador Rubber, Emerson, IBM Slovensko, Oracle Slovakia, HP Slovakia, T-com, Tatrabanka).

10.4 Types of university business cooperation in the institution and their impacts

This section presents successful examples of schemes / projects realised by the STU in the area of university business cooperation. Even though there might be more examples in each category, the scope here extends to those providing opportunities to draw key lessons from this case study.

10.4.1 Curriculum development

STU has, in collaboration with the University of Vienna and the Automotive Cluster Vienna Region (ACVR), set up a 2-year Professional MBA programme for the Automotive Industry[113]. This programme is aimed at training managers for the automotive and components supply industries. Its establishment was supported by the programme of cross-border cooperation SK-AT. The lecturers include not only academics, but also professionals working in the sector across Europe. The educational process includes visits at automotive firms in both of the countries. All courses are run in English, which allows an international student base. Testimonials of its graduates state that it is a well-structured programme and the academic background of international lecturers offers an ideal environment for gaining managerial and entrepreneurial skills that can be applied in practice. The 20-25 students attending MBA Automotive Industry programme are from the wider Central Europe region.

The second example of STU's cooperation with businesses in curriculum development is provided by the Faculty of Material Sciences and Technology which has been involved in project AUTOPLAST, funded by the cross-border cooperation programme SK-CZ. Project partners included Automotive Cluster West Slovakia, Plastics Cluster from the Czech Republic and Trnava municipality. The overarching project objective is to develop cooperative relationships between businesses, clusters and universities in the area of plastics for automotive industry and improve the innovation potential of Trnava and Zlin regions. The specific project goals include improvement of quality of education in the area of plastics and in the medium term to conceptualise curricular development for needs of firms[114].

10.4.2 Entrepreneurship education / Technology transfer/establishment of firms

In 2006 the STU was granted €1.437m for establishing and managing the first University Technology Incubator in Slovakia. In addition to the ERDF funding, the STU contributed to its establishment with €1.1 million from internal sources[115]. The incubator generated great interest from some 90 firms, from which the STU selected 30 prospective projects. Over 60 per cent of these were related to IT and the rest to bio-medicine, construction and wood processing activities.

The start-up office within the incubator provides consultations to the incubated firms in the field of establishing a firm, legal and economic aspects of entrepreneurship, drafting of the business plan and applying for grants from various sources including the European Funds.

As a partner of the Industrial property office of the Slovak Republic, the University Technology Incubator has been providing advisory services in the area of Intellectual Property Rights to the incubated firms as well as to the public. An office called INNOINFO within the incubator informs SMEs about pre-diagnostics of industrial law and mediates the first contact with the Industrial Property Office of the Slovak Republic.

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[113] http://automotive.stuba.sk/

[114] http://www.autoplast.eu/

[115] http://cordis.europa.eu/erawatch

10.4.3 Placements/mobility (staff or students)

Within the organisational structure of STU there is a career advice centre (CAC) which contributes towards cooperation with representatives of selected areas of practice in order to prepare STU students for a successful accession into employment.

The economic crisis has significantly influenced the supply-demand curve for graduate positions. In the year 2008/2009 the number of students using CAC's services has increased by 27 per cent while the number of offered positions was reduced by 70 per cent. Nevertheless the number of topics for undergraduate dissertations has increased by more than a third since the previous year. Most of the topics were submitted by TRW Steering Systems Slovakia, Slovenský Plynárenský Priemysel (Slovak Gas Industry), Tesco Stores SR, Continental Matador Rubber, and Emerson.

CAC provided advisory services for students and graduates in the form of regular meetings organised by a personnel agency. These meetings included professional advice on writing CVs, motivation lists, and self-presentation at interview. CAC organised a lecture on the topic of the state of the labour market during the crisis, with the participation of the president of Entrepreneurial alliance of Slovakia and other economic experts.

10.4.4 Continuing education/LLL

The Institute of Life-Long Learning (ILLL) (icv.stuba.sk) is a department of the Slovak University of Technology in Bratislava established in 2001, currently with more than 200 instructors/tutors and annually more than 3000 students participating in courses prepared by ILLL. The main focus of the ILLL is in teaching languages and information technologies. ILLL supports disadvantaged individuals within society who can benefit better from a wide variety of courses that are on offer. ILLL is equipped not only to provide modern LLL with lecture, computer and language laboratories but also to provide support services online. ILLL is a member of national and international associations and networks (Slovak Association of Institutions of LLL, European University Lifelong Learning Network, etc.)[116].

The expertise in the field of LLL and the fact that this department of STU is ahead of the national support for such activities was demonstrated by both participation in national and international projects and in amending Slovak law on LLL (LLL memorandum, e-learning reports, continuing education and training for adults etc.).

ILLL covers lifelong learning and provides educational activities and courses with current content especially in cross-sectional areas and fields of study and interdisciplinary fields of and uses classical as well as modern teaching methods. The advantages of educational activities and courses organised by ILLL (under STU) are that reputable specialists from the faculties with practical experience provide the teaching. These pedagogical approaches are adapted to requirements of students. ILLL supports new trends in education - distance education, flexible learning, e-Learning with multimedia support.

Institute of Life-Long Learning consists of:

- Department of the director
- Continuing Education Centre
- Department of Technical Pedagogy
- University of the Third Age
- French Centre
- Language Centre

10.5 What are the key lessons which can be drawn out from this approach

The main identified impact is the positive effect of university business cooperation on graduate employability. The unemployment rate of graduates varies across STU faculties between 3-6 per cent, the lowest in the country, and this is attributed to university business cooperation-related activities described above.

Especially for the technical fields represented in the STU, close cooperation with industry is an absolutely crucial condition for the application of theoretical knowledge and its transfer to real life, ideally with commercial value (i.e.. innovation). Students value a high quality of education delivered by lecturers who are actively involved with the industry.

10.6 Contacts, references

Prof. Ing., PhD. Dušan Petráš, Vice Rector for public and international relations

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Dlhodobý zámer vo vzdelávacej, výskumnej, vývojovej, umeleckej a ďalšej tvorivej činnosti pre oblasť vysokých škôl do roku 2014

[116] http://www.stuba.sk/new/generate_page.php?page_id=744

11 UNIVERSITE DE TECHNOLOGIE DE COMPIEGNE (UTC) (FR)

Summary of key points

The University

- The UTC is a leading institution in terms of "academia-enterprises" partnerships. The University was created in 1972 to develop relations between enterprises and the universities as well as to adapt academic research and training to industrial needs. Owing to its original statutes and mission, the UTC is not subject to the barriers that typically hamper French Universities' collaboration with enterprises
- Although there is no strategic document specifically dedicated to university business cooperation, cooperation with enterprises lies at the basis of the University's *raison d'être* and is far older than the recent laws implemented at the national level in order to foster collaboration. Unlike a traditional French University the UTC statutes were drafted in order to ensure the openness of the University towards the regional and national socio-economic environment.
- University business cooperation is embedded at all levels of the University. All departments are involved in relationships with enterprises and there is no specific department dedicated to business cooperation.
- There is a continuation between partnerships in the field of research and partnerships in the field of training, and university business cooperation meets both research and employability agenda.
- During their studies, students must spend two six-month periods of internships in industry, in France or abroad. These internship projects complement the students' scientific and practical knowledge acquired at the university and provide a solid basis for their professional career.

The Business Context

- Despite its small size, Picardy has traditionally been a major French industrial region both in terms of the overall proportion of people employed in industry and its industrial added value. Picardy is also a major agricultural region, where cereals and oilseed crops, beet, and potatoes predominate.
- Picardy has generally suffered a strong period of deindustrialisation, as the regional industrial employment shrank by 22 per cent. Most of these jobs have been replaced by service-related activities, which account for 60 per cent of Picardy's enterprises. Picardy's industry is characterised by its even distribution throughout the Region, with a dense network of SMEs. The concentration of foreign companies is higher than anywhere else in France
- The region hosts two of the 71 French competitiveness clusters gathering together regional public and private actors involved in specific sectoral research and innovation: I-Trans (transport) and Industries et Agro-ressources (green chemical and agro-products).

11.1 Introduction

Compiègne is located in Picardy, a region in northern France, close to the Paris metropolitan area. Picardy hosts 3.2 per cent of the French population (1.85m inhabitants), has 3.6 per cent of the French surface area, and some 2.3 per cent of French GDP (INSEE). Despite its small size, Picardy has traditionally been a major French industrial region[117] both in terms of the overall proportion of people employed in industry (3rd region in France) and its industrial added-value (3rd region in France). The main activities are foundries and metalworking (1st in France for production of valves and fittings and locks), the rubber industry (3rd in France), plastics and para-chemicals (2nd in France) with perfumery and cosmetics in the forefront. The glass industry (2nd in France) is also highly developed. Although concentrated in the Oise and Aisne valleys, Picardy's industry is characterised by its even distribution throughout

[117] Source: http://www.arcmanche.com/en/members/picardie-region/#secteurs

the Region, thanks to a dense network of small to medium sized firms. The concentration of foreign companies is higher than anywhere else in France.

Picardy is also a major agricultural region, where cereals and oilseed crops (2nd in France), beet (1st in France) and potatoes (1st in France) predominate. Picardy farmers earn the 2nd highest average gross income per farm. Directly linked to this agricultural strength, the agro-food business constitutes one of the region's spearhead industries. Picardy also enjoys the presence of major sugar manufacturers (1st in France), and the major suppliers of preserved and ready-cooked meals (2nd in France).

In respect of changes in economic conditions, Picardy has generally suffered a strong period of deindustrialisation, as the regional industrial employment shrank by 22 per cent. The textile sector for instance lost 55 per cent of its employment between 1989 and 2002. Most of these jobs have been replaced by service-related activities, which account for 60 per cent of Picardy's enterprises. One quarter of the enterprises are cottage industries with 94 per cent of regional enterprises comprising less than 20 staff.

> *"Top national position in frozen and canned vegetables, ready meals, beetroot, sugar, potato starch, metal working, ironmongery and valve fittings.*
>
> *2nd national position for glass making, cosmetics products, bar-turning, farm implements and wheat.*
>
> *3rd national position for rubber, plastics processing and agricultural machinery."*

There is a very active research sector: the region hosts two of the 71 French competitiveness clusters gathering together regional public and private actors involved in specific sectoral research and innovation: I-Trans (transport) and Industries et Agro-ressources (green chemical and agro-products).

The high concentration of international companies in the region - they employ some 19 per cent of the regional workforce, compared with 10 per cent at the national level - suggests a vulnerability to foreign decision making. Yet, there is a high level of regional private sector expenditure on R&D activities compared with that of the public sector (85.8 per cent), considerably higher than the national average at 62.9 per cent (Eurostat). This indicates that the region comprises technology intensive enterprises, despite the weight of traditional and low technology intensive industries. In addition, approximately 77 per cent of researchers in the region work for private enterprises, compared to 57 per cent at the national level.[118]

Despite the importance of private actors in the regional economy, there is evidence of a weak entrepreneurship culture within Picardy, at least in respect of future knowledge-based industry. This is illustrated by the fact that the region suffers from a deficit in the active population holding a higher education diploma (16 per cent vs. 22 per cent at the national level) and a deficit in the number of radical innovation projects - 12 per cent of OSEO financed projects, compared to 21 per cent at the national level in 2005.[119]

On average between over the last decade (2000-2008), Picardy's unemployment rate stood at 9.7 per cent, which is above both national (9 per cent) and European (8.5 per cent) rates (Eurostat).

11.2 The university – facts and figures

> *"The UTC is renowned in industry for facilitating the integration of its students into the workplace"*

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[118] Conseil Régional de Picardie, Stratégie régionale de l'innovation en Picardie, 2008

[119] *Ibidem*

The UTC, together with the Technology Universities of Troyes and Belfort-Montbéliard, make up the network of Picardy technology universities. The UTC itself is an engineering school. Students study common core subjects for the first 2 years and then go on to specialise in one of the engineering programmes in the next 3 years. The UTC offers students 6 areas of specialisation: biological engineering, process engineering; data process engineering; mechanical engineering; mechanical systems engineering; urban system engineering. UTC students also receive further training courses run by the Department of Technologies and Humanities. The University also offers ten master's degree programmes in engineering for students who have completed a bachelor's degree at another institution or for those wishing to specialise in research, and two professional bachelors.

Unlike other Universities in France but following the *Grandes Ecoles* model, the UTC selects students based on previous academic performance. UTC students are afforded a great deal of flexibility in the choice of scientific and technical subjects, ensuring that they are able to tailor their learning to their needs and career aspirations.

The UTC also provides a wealth of research opportunities (Masters and Doctorates) organised in 8 research units and 10 laboratories. These research opportunities cover three strategic orientations - Environment; Intelligent and reliable transport; the Equipment of human beings for the future - and a wide range of disciplines:

- Biotechnology
- Mechanics
- Complex socio-technical systems
- Biomedical Engineering
- Process Engineering
- Science and Technology of Information and communication
- Energy and sustained development
- Modelling and calculation
- Transport

11.3 Approaches to university business cooperation

Within the French Higher Education system, an overarching reform of the universities was endorsed on 10 August 2007 through the Law on the Freedoms and Responsibilities of Universities[120]. This law gave French universities autonomy concerning budgetary matters and human resource issues. A first group of 20 universities applied for and were given the status of autonomous University in January 2009. As of January 2011 a total of 75 universities – that-is-to-say about 90 per cent of French universities – have been granted autonomy. The reform aims at opening universities and strengthening the linkages, often criticised as weak, between Universities' training and industry's needs. It has allowed, for instance, representatives of the business world to take part in university governance. As such it has had, and will have in the forthcoming years, important implications in university-business cooperation matters.

11.3.1 Business cooperation as the raison d'être of the University

UTC's situation is however quite unique within the French context. It was set up in 1972 as an experiment to develop a new kind of relationship between enterprises and the universities, as

[120] Available at: http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000824315&dateTexte= (November 2010)

well as to adapt academic research and training to industrial needs. The originality of its statutes – making it both a University and a *Grande Ecole* - offers the University wider opportunities to cooperate with business enterprises than traditional French universities.

Although there is no strategic document specifically dedicated to university business cooperation, cooperation with enterprises is the University's *raison d'être*. University business cooperation is a well-established and structured practice embedded at all levels (research, teaching, management, administration, etc).

The UTC statutes were drafted in order to ensure the openness of the University towards the regional and national socio-economic environment:

- One person from outside the University – usually from industry- chairs the administrative Board, e.g. at present Christian Estève, Executive Vice-President of Renault;
- Out of the 28 members of the administrative board, 14 come from the socio-economic world, including industrials and local/ regional authorities;
- A scientific committee comprising 23 members (of which 6 are from business enterprises) leads and implements the research strategy, while the training strategy is steered by a 27-person committee including people from industry;
- The University can recruit one third of its teaching staff directly by contract without them having to go through the traditional recruitment process in French universities. It allows the University to recruit a large proportion of people working in industry;
- Since the director of UTC is elected by the administrative board amongst the University's staff, the director of UTC is not necessary an academic. For instance the current director has pursued most of his career in the industrial sector in the USA, Canada and France.

The key driver behind University-business relations is the need to address concrete economic and societal problems. In terms of research, cooperation enables problems to be brought to light and to address them in a practical way. In terms of training, cooperation allows students to face concrete situations, to develop their skills for research and for industrial careers.

11.3.2 An integrated and diffuse approach to university business cooperation

Following an integrated approach, university business cooperation is embedded at all levels of the University. There is no separation but rather a close cooperation between research and teaching activities. Often, new collaborations on research projects come from new contacts developed with student placements during partnerships or *vice-versa*. Cooperation is not limited to excellence in research projects, but is implemented to find concrete solutions to all problems faced by the industries that cooperate with the University.

All departments are involved in relationships with enterprises and there is no specific department dedicated to business cooperation. However, the following directorates are responsible for specific university business cooperation features:

- The Directorate for promotion and partnerships is the key actor. It is in charge of promoting the results of research towards enterprises and coordinating partnerships;
- The Directorate for research is responsible for scientific partnerships with universities and scientific networking;
- The Directorate for Teaching is in charge of programme curricula, continuous education and the recognition of prior learning.

The University participates actively in the two regional competitiveness clusters, which allows strong relations, particularly with regional SMEs:

- The president of the UTC also chairs the presidency of the Industry and Agro-resources cluster;
- The UTC leads research on automotive within the I-trans cluster.

Regional relations are therefore of the utmost importance for the UTC and the University strongly conforms to the Picardy regional strategy for research and innovation. However, it also collaborates with big firms at the national level, especially in the transport sector.

Broadly speaking, relations with enterprises are implemented on a long-term basis and each department and research unit maintains its own network of partners.

11.3.3 Innovative and adaptive cooperation features

The UTC is less subject to the barriers that typically hamper French Universities' collaboration with enterprises as a consequence of its original statutes and mission. This includes the recruiting system in the French academic system that prevents them from hiring non-academic staff, the difference in academic and enterprise culture and the lack of dialogue between the two, and the lack of adaptation to skills required in the industry.

Businesses have always been involved in the University but mechanisms for partnerships have evolved over time in accordance with emerging needs. The UTC is very pro-active in exploring new ways of cooperating with its socio-economic environment. Recent developments include the creation of the Innovation Centre and the Innovation Foundation, together with the development of engineering training in apprenticeship.

In the field of training, the UTC relies to a high level on cooperation with other HEIs to set up training adapted to industrial needs. For instance, the engineering degree offered through continuous education is co-organised by the Network of the technology universities (comprising Compiègne, Troyes and Belfort-Montbéliard universities).

Figure 18 Details of the Compiègne University of technology (UTC)

Type of university	**Research-oriented University** **Research and training in the field of technological engineering**
Region/ capital city	Picardy Region
University ranking – World (Quacquarelli Symonds, World University Rankings Results 2010: www.topuniversities.com)	Not ranked in the top-200 universities
University ranking – European (Webometrics Ranking of World Universities: http://www.webometrics.info)	354
Engineer schools ranking – France (Usine Nouvelle ranking)	6
Number of students	4,450 (87 per cent in engineers curricula; 6 per cent in masters; 7 per cent in doctoral training)
Degrees awarded per year	650
Training	6 engineers training 11 Masters

Type of university	Research-oriented University Research and training in the field of technological engineering
Staff	850, of which 450 teachers and researchers
Components	10 laboratories; 9 multidisciplinary research themes
International cooperation	9 double degree programmes 140 active international exchange agreements enabling more than 50 per cent of its students to study at least one semester abroad 15 per cent of international students
Number of internships in enterprises each year	1,500
Average job searching period for UTC engineers (2008)	0,8 months
Average first job gross annual wage (2008)	€ 35,800

Source: Technopolis, based on the website of the UTC (http://www.utc.fr/utc-en-chiffres.php) and various other sources

11.4 Types of university business cooperation in the institution and their impacts

11.4.1 Overview of university business cooperation schemes

Figure 19 presents a showcase of university-business cooperation schemes as they are implemented in the UTC. This illustrates the wide range of initiatives taken at the level of the universities and offers a good overview of the cooperation outreach.

Figure 19 Overview of the main university business cooperation schemes implemented in the UTC

	Scope	Specific features	Approach/ Trends in university business cooperation
Cooperation on research projects	Two different schemes: • Competitive joint research project funded by the National Agency for Research, the Regional Council, etc. Researchers in laboratories are in charge and the Services for research and promotion/partnership only accompany them to built the consortium and for IP (administrative aspects) • Direct bilateral partnership between the UTC and an enterprise or a PRO.	• The UTC performs well in collaborative research and has been awarded as a Carnot institute together with the Troyes University of Technology in 2006. This arrangement came to an end in 2010. • Presence of joint laboratories with industrial partners: – with Valeo: laboratory dedicated to automotive technology; – with the CNRS and SUEZ Environnement,	Bilateral partnerships have decreased in proportion compared to competitive joint research projects over the last decade, but are increasing since a few years because of the impact of the Research Tax Credit.[121]

[121] With the Research Tax Credit (Crédit Impot recherche, CIR), French companies can benefit from a tax reduction for a large range of research-related spending, including R&D personnel expenses, R&D subcontracting, patenting costs, etc.

	Scope	Specific features	Approach/ Trends in university business cooperation
		for the development of water intelligent systems.	
UTC Foundation	Created in 2008, aims at attracting funds for innovation in research, teaching and technology transfer.	The French Law on Freedoms and Responsibilities of Universities allows universities to create foundations to collect money from the private sector since 2007. The UTC was amongst the first universities to use this scheme.	Programmes are set up in accordance to each funder, linking research and teaching activities. For instance, the UTC and the CETIM (Technical Center for the Mechanics Industry), joined together to create a common institute devoted to mechatronics, which already benefits from a first chair in hydraulics and pneumatics. Preparation is being made for a second chair in EcoTechnologies in collaboration with the ÉTS "École de Technologie Supérieure de Montréal" in Canada.
UTC University Business Transfer Centre	The centre gathers all the services offered to enterprises (including an incubator).	It includes support to create spin-off companies by staff and students ('UTC Dynamique Innovation").	
Involvement of industrial representatives in curricula development	• Industrials take part in the board in charge of curricula contents and teaching methods in each one of Degree and Master specialities; • They also take part in the Board for studies and student life.		
Involvement of industrials in teaching activities	• One third of the teaching staff is recruited directly by the university on a contractual basis and come from the industrial world, either research or education staff. • Industrials carry out punctual interventions in the different courses and programmes		The direct recruitment of staff from industry has allowed the launching of new themes of research and studies. They enable industries to externalize their professional training. Reciprocally, they enable the university to benefit from additional resources to adapt its training programs to specific industrial needs.
Mandatory internships	Studies involved two training periods of six months each during the third and sixth semesters of studies.	The University visit interns on site, which is a way to have a look on the working conditions as well as to discuss with enterprises on what are their needs how training could change.	• Around 1,500 students are therefore placed in enterprises each year • Internships represent often the first way to get to know new enterprises
Continuous education	• Courses adapted to the profile of each student (distance learning, internships, possibility of recognition of prior learning)	UTC was one of the first engineering schools to implement continuous education and recognition of prior learning in France:	• 500 students in continuous education in the University each year (about 12 per cent of all students) • Strong demands from

	Scope	Specific features	Approach/ Trends in university business cooperation
	• Demand come either from individuals or from industries/ industrial sectors • Example of the continuous education engineer degree: addressed to people with two years of higher education studies or more, studies last 2 years (full-time) or three-years (part-time)	• The Continuous education service has been created in the late 1970s just after the creation of the University • A first programme in biomedical engineering was set up in 1975, following medical staff demands for engineers able to deal with modern equipments in hospitals	enterprises in specific domains: engineering industry, health, rail industry • Strong collaboration with other universities with complementary competencies to set up programmes, particularly within the network of technology universities (e.g. the continuous education engineer degree is coordinated amongst the three Universities of Technology).
Professional undergraduates	Two professional undergraduates in maintenance of multi-technical systems and composite field have recently been launched. They are offered as initial or continuous training.	These are the first programmes not delivered at master level in the UTC.	Established following strong demands from specific industrials who were in need of undergraduates whose skills are between the engineer and technician staff
Apprenticeship	An engineering degree in mechanics in delivered through apprenticeship.	Apprenticeship is yet little developed in French engineering training and the UTC is one pioneer within this domain. The first promotion is to be graduated.	The degree delivered in the same degree as for other programmes (general engineer). The apprenticeship is a way to increase students' awareness of the industrial world and of industrial values.
Career guidance	The Employment Watch Office (Observatoire des metiers) is in charge of reporting on students' employability.	It determines trends in employment through the publication of regular employability survey.	
	Internships service (with 6 assistants)	It helps students to prepare interviews; organises meeting with enterprises every week ('enterprises lunch').	
Alumni association: UTC Tremplin[122]	Very active in fostering partnerships opportunities through internships, jobs, etc.	The Business Club UTC gathers together enterprises created by UTC students and alumni.	

Technopolis

11.4.2 Showcase of examples

The innovation centre

Prior to 2008, no linkages existed to support research projects during the period between the invention in laboratories and the development in incubators. The innovation centre launched

[122] http://www.tremplin-utc.asso.fr/public_v3/index.php

in 2008 is designed as a pathway between these two stages and provides support for the essential intersection of knowledge and skills that go beyond the initial theoretical basis.

It entails a seed capital fund of €500,000 per year. More open to socio-economic actors than a research laboratory, the innovation centre fosters creativity around research projects that associate teacher-researchers, industrials, but also students, whose participation is encouraged as they bring a renewed point of view. It fosters creativity in research but also creativity in the collaboration between university staff, industrials and students. Depending on the field of innovation, people from the wider society can also be involved as end users.

In concrete terms, the centre helps to support the development of prototypes, to verify their relevance for industry and to adapt them to industrial needs. For instance, one project currently underway at the centre concerns the development of an artificial liver through cell cultures. The centre has offered material support to develop a prototype in collaboration with industries, as well as an estimate of fabrication costs. This will lead in the creation of a start-up enterprise in 2011 by one PhD student.

Managerial skills as a way to strengthen engineering skills

One of the key features of UTC's education compared to other French engineering schools is the strong focus put on SHS (sciences humaines et sociales) education. About one third of degree courses are dedicated to philosophy, sociology, cognitive sciences economics, communication, management, etc. and this is compulsory for all students. UTC training is therefore a mixture of operational training and the more theoretical background intended to give students a broad overview of contemporary challenges faced by industry.

The implementation of entrepreneurship courses in the study programmes is part of this interdisciplinary approach and is based on the idea that the job of engineers relies more and more on a strong managerial dimension.

The Department of Technologies and Humanities is in charge of entrepreneurship courses and it delivers two types of training, open both to initial and continuing education students:

- Two programmes that come in addition to the speciality courses:
  - FIRME (Training in Innovation and Firms' International Relations)
  - Intensive Entrepreneurship training, addressed to students eager to develop an innovative enterprise. The programme intends to train students in entrepreneurship and to support their project in collaboration with UTC Dynamique Innovation.
- One transversal speciality dedicated to the management of innovative projects offered to all UTC students, in addition to their normal courses. The training is based on development projects in partnership with industry, but eventually students can also create their own enterprise, though few do so. The speciality is intended to bring students closer to the reality of innovation processes in industry.

11.4.3 Strong impacts in terms of student employability

The University has developed reporting methods regarding students' employability:

- One person is in charge of reporting on students' employability and of determining trends in employment;
- Evaluation of courses: the students' satisfaction is evaluated through an online survey;
- Following up of graduates: meetings are organised through the alumni association where they discuss challenges and opportunities in terms of training.

Studies show that the UTC performs very well in terms of graduate employability. Usually there are more internships and jobs offers than there are UTC graduates. A survey conducted on the employability of students who graduated in 2008 showed that:

- On average students found a job in less than 1 month (0,8 months) and the average annual gross wage was €35,800;
- 58 per cent found a job before the end of their studies and 88 per cent in less than one month;
- 83 per cent of the students got a job strongly related to their training, 31 per cent of them worked as R&D engineers and decreasingly as industrial engineers.

Additionally, about 50 per cent of the University's budget for research comes from partnerships with enterprises, i.e. €2 million turnover in 2009 for direct partnership and €9 million for competitive joint research projects.

11.5 What are the key lessons which can be drawn out from this approach?

11.5.1 The weight of cultural barriers

Over recent years, the UTC has been very active in strengthening its cooperation mechanisms with industries both at the level of research (Innovation foundation, innovation centre) and training (apprenticeship). This allows the University to ally itself closely to industrial demands and needs and to adapt its research and training offers to socio-economic trends. For instance, industry has anticipated a shortage of experts in the railway domain within a few years and the UTC, in collaboration with six other universities has developed a new training programme.

Interviewees note however that, still, cooperation is sometimes hampered by cultural barriers (differences in research agendas, protection of IP rights, etc) between industrial and academic culture that are really strong within the French context, even if enterprises are involved at all levels. The cooperation with SMEs is also sometimes hampered by the context in which small businesses operate and by their lack of time and availability to develop research projects. The National Evaluation Agency for Research and Higher Education (AERES) reports in its 2008 evaluation of the UTC that most of the research conducted in the University is in partnership with industry but is mainly financed by public funds, not by industrial partners.

Likewise, few staff within the research units come from industry, since the units are mainly joint research units with the National Centre for Scientific Research (CNRS). Between 2004 and 2007, experimental 'innovation units' were set up in order to integrate people, recruited on contract and coming from industry, more easily into these units. The experiment was however abandoned in 2008, due to the difficulty of integrating industrial researchers in academia-type based units.[123]

11.5.2 A future strategy based on the strengthening of recently implemented mechanisms

There are no big changes planned in the near future. The University plans to strengthen its recently implemented mechanisms, such as the innovation centre.

Part of the future strategy of the University is the further development of studies by apprenticeship. The apprenticeship begins in the third year of study and the apprentice spends a growing part of his or her time in the enterprise throughout the end of his studies (60 per cent in the University and 40 per cent in enterprise during the third year; 25 per cent in the UTC and 75 per cent in enterprise in year five).

A study curriculum for apprenticeships in mechanics has already been launched and a new one will be introduced in informatics in September.

[123] AERES evaluation (2008)

Within the French context, this approach is quite new in engineering training which is deemed to be generalist and not tied to one particular industry. As such it is faced with a wide range of new issues, of which:

- The implementation of a new pedagogy towards students, whose skills and expectations are different than students in the 'normal' courses;
- Concerns in terms of independence of the training, since students should graduate as a general engineer with general skills and not as an engineer of a particular enterprise (this is all the truer since apprentice are often placed in big companies);
- The definition and validation of professional learning outcomes that account for one third of the total degree.

11.6 What are the key lessons which can be drawn out from this approach

This French case is interesting in the sense that it is part of a general trend - at least in some European countries - towards the creation of universities dedicated to technological and Applied Sciences. Contrary to traditional universities, criticised for not cooperating enough with industries and business enterprises, these universities typically intend to bring academic research and academic curricula closer to industrial needs.

Launched as a pilot experiment in a context traditionally not in favour of university business cooperation, the UTC performs very well compared with other Universities. This is mainly due to its regional implementation within the competitiveness clusters and to a strong commitment to socio-economic issues both at the level of research and training. Thanks to its industrial linkages, the University has indeed proved to be very successful in anticipating and answering industrial needs, often through pioneering collaboration methods (e.g. apprenticeship in engineering training).

11.7 Contacts, references

11.7.1 Contacts

Bruno Bachimont, Direction par interim service Valorisation et Partenariats, Directeur Recherche

Cécile Legallais, Teacher researcher, research director, Porteuse de projet au sein du Centre innovation

Ghislaine Joly-Blanchard, Direction formation pédagogie/ teaching and pedagogy director

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12 UNIVERSITY OF LIMERICK (IE)

Summary of key points

The University

- Limerick was founded as "Ireland's American University" and synthesised many American ideas in education, including: the cooperative education programme, grade point marking, continuous evaluation, and most importantly, networking with industry.
- UL graduates enjoy an employment rate 8 per cent higher than the national average for all other Irish graduates. This can be attributed to the Cooperative Programme (CoOp) in which all students at University of Limerick take part in an 8-month internship at a business. A key aspect of the CoOp programme is that about 75 per cent of the employers also go on to employ the graduates.
- University business cooperation is centrally managed and administered. The university devotes considerable resources to collaboration for the purposes of increasing graduate employability.

Business Context

- UL is located on a science and technology park. Regardless, the area has one of the highest unemployment rates in the country.

12.1 Introduction

The University of Limerick provides an effective example of how business cooperation is embedded in a university's history, structure and values. The most developed form of business cooperation at the university is its cooperative education programme (CoOp). A key lesson to learn from the University of Limerick is that it makes the most of its strengths without compromise, resulting in mutual respect between businesses and the university, leading to more efficient and increased knowledge exchange.

12.1.1 Regional Context

Limerick, with the fifth largest population in Ireland, is located near the Shannon free zone, one of the largest industrial business parks in the country. A low corporate tax rate of 12.5 per cent, government subsidies and one of the lowest labour costs in the EU have attracted international companies including GE Capital, Intel, Lufthansa, Proctor and Gamble and Veritas Software. Although a major employer in the area in size, the Shannon free zone (600 acres) comes second to the National Technology Park (800 acres). The park is home to, and partially managed by, UL. As the first science and technology park in Ireland, the Park is home to over 80 organisations employing over 3,000 skilled people. The Park has a balanced mix of multinational subsidiaries, Irish technology companies, R&D entities and support services, which occupy more than 30 buildings with a total floor area of circa 1.5 million sq. ft. Nonetheless the unemployment rate in 2006, when the economy was booming, was the highest in the Republic, at 14.6 per cent. With the recession came the departure of major employers, such as Dell. This combined with other factors left Limerick, as with the rest of the country, in a troubling economic situation.

In Ireland there are two relevant organisations for university business cooperation: Irish Business and Employers Confederation and the Irish Universities Association. The Irish Business and Employers Confederation (IBEC)/Irish Universities Association (IUA) Joint Council promotes collaboration between enterprise and universities and provides a forum for university heads and senior business people to discuss national and international issues of common interest. The competition for state funding is increasing and given the reduction in

funding in real terms in recent years, the universities in Ireland need to obtain funds from sources other than the state. Taxation incentives for capital development in the university sector were eradicated in the most recent budget, with public–private partnerships promoted as an option for increased development within the sector. However, the greatest emphasis, and source of income for tertiary organisations from a national level continues to come through a budget committed to research[124]

12.1.2 Regional Policy Example

There are many regional policies attempting to bridge universities and businesses. Recently there were two national graduate internship programmes, one administered by the Irish Business and Employer Confederation (IBEC) and the other by FAS, the national training authority. Under these programmes, graduates work for a period of up to twelve months, while retaining any unemployment benefits. Most of these placements are unpaid, similar to a scheme in the UK run by the Higher Education Funding Council for England. The new Irish government has announced that it will create 5000 internships for graduates to replace the above programmes with a Graduate Internship programme. Under this programme, graduate interns will get €100 per week in addition to their training/unemployment allowances. According to an interviewee the potential problem with such programmes is that these internships may shut the door on many graduate jobs as companies replace entry-level positions that are paid with unpaid interns. This is the opposite of the CoOp programme, discussed in more detail further on, which places internships and graduate careers on one spectrum, minimising displacement and often creating new paid positions. However, this scheme may not necessarily be just a means for existing graduate employers to subsidise payroll cost. For some, programmes such as these can be very useful if they identify new employment opportunities in sectors not normally involved in graduate recruitment. The SME sector is a case in point. This sector is responsible for 53 per cent of all employment in Ireland, for example, but has traditionally had a low participation in graduate (and placement) recruitment. Many of the 230,000 Irish SMEs could benefit hugely from graduate expertise in areas such as incubation, entrepreneurship, marketing, operations and R&D. Extending the SME graduate employment market would have the effect of creating new and sustainable graduate opportunities, a strategic priority sector for any unpaid internship programme. This targeted approach could also be applied to other sectors, for example, placements in the non-profit organisations.

12.2 Institutional Context

"Working with industry is part of Limerick's DNA" –Vice President of Limerick

Working with business has been prevalent throughout University of Limerick's (UL) history and inception in the 1970s, when Limerick was founded as "Ireland's American University". UL synthesised many American ideas in education, including the cooperative education programme, grade point marking, continuous evaluation, and most importantly, networking with industry. State subvention, both capital and recurrent, has been the primary source for the provision of basic teaching and research services and facilities. During the 1970s, the decreasing national funding drove Limerick to the European Investment Bank and Word Bank in addition to private and alumni donors. At a time when Irish universities depended heavily on the state for funds and did not aggressively seek other avenues of finance, this was quite an innovative approach. Philanthropic gifts and grants in excess of €100 million have been secured for developments to date. These additional funds have made a major contribution to the University's advancement, funding libraries, research, and buildings. This has shaped the university and even the region. As a result, each of the university's four faculties, Kemmy Business School, Faculty of Education & Health Sciences (including a Graduate Medical

[124] University of Limerick, Strategic Plan, 2009

School), Faculty of Science & Engineering, and the Faculty of Arts, Humanities & Social Sciences is engaged with regional and international businesses. These partnerships can be quite fruitful- Northern Trust, an international financial services company, opened an office in the National Technology Park because of its proximity to Kemmy Business School.

UL currently has a student population over 13,000. According to the Higher Education Authority in 2010, “UL graduates enjoy an employment rate 8 per cent higher than the national average for all other Irish graduates”. Fifty three per cent of graduates went directly into employment, 41 per cent in Ireland and 12 per cent overseas. A drop in employment levels reflects the ongoing downturn in the economy which has affected the graduates of 2009. Despite this, the employment record of UL graduates is higher than the national average, with the number of graduates seeking employment at 11 per cent. This is lower than the official labour market unemployment figure, which is currently in excess of 13.7 per cent. The public sector accounts for the highest concentration of graduate jobs, particularly education, which at 30 per cent is up 6 per cent since the previous year, while Health at 13 per cent is down 2 per cent since the previous year. Despite the continuing problems encountered in the financial services sector, the Business, Finance and Insurance sectors between them accounted for the second highest proportion of graduates, at 24 per cent. The central university activity is the development of tailored educational programmes to meet both the business and societal needs without compromising academic standards. The high employment rate of UL graduates could be attributed to this philosophy of industry-relevant programmes.

12.3 Approach to university business cooperation

In Ireland, Higher Education Institutes are directly under state control and are intended to be more technical and applied than the universities. In 1989, the State raised the status of UL from an Institute of Higher Education to a university. However, UL has kept some of the more ‘practical’ approaches from its status as an Institute. This combined, with a self-described ’entrepreneurial spirit‘ has resulted in an overall structure which constantly develops interactions with industry: business cooperation is centralised and permeates all aspects of the university. The rationale for cooperation is an employability agenda, so UL promotes its cooperative education programme (CoOp) in which students are required to gain work experience in order to complete a course. The entire undergraduate student body is mobilised to become ambassadors for the university.

Although the university has been through periods of more and less engagement with industry, as a greater percentage of graduate employers become private an increasing number of programmes are tailored to employers. In the last five years, with the coming of the recession, there has also been an increased demand for employer orientedemployer-oriented programmes from the students. However, this increased demand has not been met easily as businesses have reduced cooperation with universities. In response, the university has sought to increase the variety of its business placements by expanding the number and types of potential employers - for example, by engaging more and more with international and non-profit organisations. Finally, according to interviewees, many of the staff work at Limerick in order to gain access to industry. They feel that they are better able to transfer knowledge to industry via the CoOp programme at UL. The centralised nature of business cooperation means that the university devotes considerable resources to the endeavour- whether they be administrative and financial or creative and personal. Herein lies the strength of Limerick’s ability to cooperate with industry.

To summarise, Limerick’s relationship with businesses is ingrained in its structure and centrally managed providing a significant incentive for students, staff and external actors to work within the university. UL then provides a large amount of support and infrastructure to reinforce university business relationships.

12.4 Types of university business cooperation in the institution and their impacts

Of the many different forms of University Business Cooperation, CoOp is by far the largest and most important. For that reason it is also one of the most evolved programmes, having been through a long learning and adaptation process.

12.4.1 Cooperative Programme

CoOp, is a formal, compulsory and integrated part of every undergraduate degree at UL and is one of the largest such programmes in Europe. Some 2,000 undergraduate placements are secured annually in industry, commerce, public service and other professions- about 30 per cent of which are international participants. The University has an established network of over 1,700 Cooperative Education employers who provide a range of relevant career experience. All students, participate in the programme for a series of 8 months[125] unless there are extenuating and exceptional circumstances. The university is successful at administering these programmes because it does not simply cater for the demands of industry. This encourages businesses to learn the university's core values and prevents the standard academic rubric from being compromised. An example of this is the 8-month placement. Everyone starts at the same time of the year. Both students and businesses have requested flexible start times and shorter or longer placements. However, the university does not compromise because the timings as they stand present a few benefits. First, it requires the business to create a position for the students every year. However, because this position isn't available year round, it is less likely that this position will be the same one year to the next. For example, at Northern Trust, the position available to students is one in which the students work in different jobs throughout the placement giving them an understanding of various task so they develop a range of skills. Had the university catered to the company and had the students take positions year round then it is more likely that one particular job with only a few tasks would be held constantly by a revolving number of Limerick students giving the students less of an opportunity to learn. The 8 month placement, not only forces the business to employ the students in new ways, but also allows the university to better able to centrally manage the preparation programme for the placement so that every student is fit to represent the university. This would altogether be too difficult a task if all the students were managing their own placements at varying times of the year. The key lesson is that the university maintains its values and does not simply cater to the business needs on all aspects.

The programme gives the university, students and staff, an opportunity to create contacts in industry and "typically these contacts are used in the planning of new courses, the modification of existing courses, and the development of collaborative research"[126]. As part of the programme, a faculty member is required to visit the student and the supervisor, to monitor progress, their skills development, and their contribution to the organisation. The meetings are held separately to encourage open discussion and to facilitate an exchange of knowledge and understanding between the parties. This method of conducting the cooperative education programme means that the faculty as well as students is able to cooperate with business and potentially react to the experience. Further, the business is able to better gauge the potential from the university because of the interaction with a formal university representative. The visit becomes a useful tool for the university to gauge future coop placements, graduate positions, and other interactions with the business. This creates an integrated link between teaching and research which incorporates business cooperation. The students become the ambassadors for the university. The lecturers and professors have a structured reason to go into the businesses at multiple points in the year to monitor the student's progress. This creates a tacit exchange of knowledge that allows an opportunity for

[125] Humanities programmes are an exception with six-month placements.

[126] University of Limerick, "Cooperative Education Faculty Handbook".

the academic to understand the current challenges of the business. These challenges may then be addressed in a changing syllabus for teaching the next generation of CoOp students, and depending on the nature of the problem, be taken as a challenge in the department research. Further, the academic may pass knowledge from his or her own understanding of the challenge creating a two-way exchange of knowledge. However, this exchange is efficient because there is another formal task at hand, namely, assessing the student. There may not always be knowledge to exchange and having a primary, structured agenda makes it more likely that businesses feel that the visits themselves add value. Finally, the visit from a representative has two effects. First, it gives business the opportunity to discuss successes and problems with a representative of the university. Second, it forces the representatives of the university to develop business skills creating a communication learning process. This process is extremely important, and UL devotes considerable resources to make sure that it takes place. It sends representatives out to international placements and provides transportation funding and organisation among others. The key lesson is that a two-way learning process is a difficult and chaotic process. For that reason it is important to have a structured goal so that the exchange has a targeted objective.

One of the key aspects of the CoOp programme is that about 75 per cent of the employers also go on to employ the graduates. Graduate Placement and CoOp are part of the same division and not separate objectives of the university. This prevents CoOp from becoming a displacement programme such that the students who have yet to graduate take the entry-level positions at the local businesses. Ensuring that the students are paid a market rate further prevents displacement. The employers are not able to exploit ‘cheap labour’. Because such a large number of students participates in the Coop programme simultaneously the university has to engage small businesses as well as large to place all the students. There is no set pay for Cooperative placements. A minimum salary is recommended to cover living expenses but there is some variation in what is paid by individual employers. Though rare, it may be the case that employers do not pay any salary. According to university officials, employers almost always pay a salary and there is little incentive for them to not do so. The salary stimulates the student to act as an actual employee and both parties benefit. Typically, according to the university, the students are paid the standard market rate of pay. CoOp staff spend, on average, one day a week visiting potential and past employers.

Employers are asked to evaluate students on 10 different criteria including professional skills, interpersonal relations, and organisational effectiveness skills. Similarly students are asked to judge these skills before and after placement. Most of the time, the evaluations reveal that skills increase. However, some of the time, the difference between the pre and post evaluations reveals a decrease in skills that may signal, amongst other interpretations, that there was a misperception of abilities prior to the CoOp. Whether the skills increase or decrease a goal of the programme is to address the skills, but if it only attends to the changing perception of skills, that is also advantageous to the student. It is important for learning that students are not penalised or graded upon an increased difference between their pre and post evaluation. The students are able to self-evaluate honestly and find areas for improvement or areas for self-promotion. The university gains a sense of what employers seek in potential employees and how to better support the student to fulfil these objectives. The university is then able to pass this knowledge back to the students and the employers through a well-developed career services department improving CoOp and creating an evolving rubric. One way that UL creates knowledge transfer about these skills is that it requires all students to give a presentation showcasing their lessons to fellow students, staff and professors. Honest and consistent evaluation is critical when a programme is not standardised in what it teaches. CoOp is not like a class in which a standardised test fits all participants. As stated by a representative at the university, evaluations may often be overlooked when programmes are different from one student to the next, so the means to gain the most value from them is to treat the evaluation as a co-learning process. Well designed IT tools are an important asset at Limerick, ensuring ease of response in undertaking the evaluation for the student, that the employer has direct access to relevant

CoOp materials, and that the university can easily monitor CoOp from start to finish. For example, part of the evaluation is a survey which is attached to the end of the mandatory final report that the students fill in online. Students do not realise it is optional creating a 99 per cent rate of return for the survey. Similar IT tools exist at every stage of CoOp providing the organisational infrastructure to run such a large programme successfully.

The programme has developed a good reputation in the region making it is easy for the university to convince businesses to participate. In fact, businesses move to the Limerick area to participate in the program. Some employers from outside the region use Limerick as the 'go-to' university for internship placements. A former employer stated that even though the company headquarters were based in London, they found it worthwhile to travel to Limerick to recruit because the CoOp programme is well developed and more importantly well-supported. This support comes in two forms. The first, mentioned earlier, is the structural support. There are clear contracts, criteria, and students are trained to understand the employer's needs. The second is less formal and consists of developing a relationship with the employer. This may come in the form of engaging a representative from the company to give a lecture or there may be informal relationship building strategies such as taking the employers out around Limerick. An institutionalised example of this is that CoOp staff are encouraged to potential and past employers at least one day a week. UL provides, on campus meeting areas as well as compensation for informal meetings off-campus. UL's investment in tacit knowledge exchange is crucial for their success in cooperating with business.

There are 4 perspectives to the CoOp Programme, that of the business, of the student, of the professor and of the university, each of which will helps to further substantiate key lessons of CoOp. The employer gains temporary staff willing to undertake complex routines. As one employer said, "The programme is of benefit to all parties, as it allows students to obtain a flavour of working in an external environment prior to their qualification, and allows employers the benefit of fresh thinking and ideas that a student can bring to the workplace". Employers often use the students as a means to challenge their workplace. One employer brought in a blind student to test that their workplace was fit for people with disabilities. The student gains real life experience and the ability to communicate his or her skills to prospective employers. Even when students do not take a job with their CoOp employer, they may transfer business knowledge from one company to the next in addition to applying that what they learned from their course. The professors are able to develop relationships with employers in order to keep their research and teaching up to date. Academics choose to work at Limerick because it provides them an opportunity for collaborative development. Visiting employers is not an extra task issued from the university but something that they do voluntarily. Further, it is an opportunity to engage in regional development. Finally, the university sees CoOp as part of a core value to engage with industry, mobilising its largest resource to do this - the students.

12.4.2 Modules and Courses for Professional Development

UL has mandatory modules in most courses tailored for professional development. The modules are specific to the course that they are in and are not generic in their approach. For example, every engineer must take modules such as *The Engineer as a Professional,* while the Journalism course requires *Professional Skills for Journalism.* Many of these courses have been developed with input from industry in the form of guest lectures or course development. UL is also responsive to industry requests to develop specific modules. For example, Infineon Technologies requested a Supply Chain Management that UL now supplies at undergraduate and postgraduate levels[127]. The course was initially funded in partnership with the government of Ireland, through IDA Ireland, the public Industrial Development Agency. The university is receptive to these courses but is wary of

[127] Infineon Technologies and the University of Limerick Initiate University Education Program for Supply Chain Management (2010): http://www.idaireland.com/news-media/press-releases/infineon-and-the-universi/

compromising academic standards. UL has stated that 'in designing courses for industry the aim is to increase individual capability, to improve organisational capacity for competitiveness and to develop innovative practices.' Companies choose UL, partly because of the flexible entry, exit and progression route that allows those in the labour force to progress from second level education to a professional doctorate while remaining at work. However, by not compromising academic standards the courses develop routes for research. The advantage in this case in particular for Infineon Technologies, was the teaching of SCOR, a management tool that has become the standard in high technology supply chain management, a skill determined to be deficient in recent graduates. The course resulted in research in supply chain management.

12.4.3 Life Long Learning Courses

This department of Life-Long Learning and Outreach is facilitated by UL for short courses and in-company training. It is part of UL's commitment to extending education to non-typical students. These courses are part of the lifelong learning initiatives identified by national and EU policy[128]. These students bring with them an understanding of industry's needs. Once the students complete their education they are able to better facilitate the university through their companies e.g. they establish new CoOp opportunities. The Enterprise Research Centre at UL also sets up courses tailored for industry. The courses are part-time and flexible to encourage a greater influx of alternative students who are better able to seek out and transfer relevant knowledge. These courses also work with other higher education institutes to encourage regional development.

12.4.4 Scholarships and Prizes

Scholarships for encouraging university business cooperation are usually classified as one of two types. The first type is government scholarships which encourage business cooperation. The second type is a scholarship direct from businesses. An example of the latter is the Intel-Shannon Women in Technology Scholarship in which Intel offers mentoring and placements to winners in addition to funding for tuition fees. The scholarship is especially targeted toward women in specific courses listed by the UL. This scholarship is especially successful because the business is contributing more than money, in that it is generating a supply of students that it finds valuable. This is an example of a scholarship which includes placement, so unlike the one provided by government, it does not act as a displacement initiative. UL encourages such scholarships, including, for example, the Product Design Prize given by Hewlett Packard, where the university supports the prize by devoting resources to the competition. In addition to ensuring that the relevant modules have the specific resources necessary for a student to potentially win the prize, UL sets up a space for the competition to be held and awarded. Interactive scholarships such as these are useful because they actually put students in touch with the types of challenges businesses face. The university learns how to better facilitate and encourage such scholarships by inviting business representatives onto campus.

12.4.5 *The Foundation*

The UL Foundation is an institution within the university which finds external funding for UL capital projects. Capital projects completed by the Foundation include upgraded facilities in the Student Centre and library, research units such as materials and surface science institute and infrastructure development including buildings. Recently, in addition to funding capital projects, the Foundation is dedicating resources for teaching such as an endowment for the funding of future professors and students. The external funding may come from businesses,

[128]See Learning for Life: White Paper on Adult Education: http://www.education.ie/servlet/blobservlet/fe_adulted_wp.pdf

private individuals, charities or institutions. The Foundation stresses to potential benefactors that by aiding UL one is aiding not just the university but the region as a whole. This establishes UL as the main point of contact, not only to the university but to other organisations in the region, so UL becomes a central relationship broker. UL refers to the cooperative programme, relevant courses and partnerships to industry to showcase this role. A teaching portfolio strongly linked to business in these ways makes it easier to attain research funding as well. Once again, teaching and research are not treated as separate functions at the university. Thereby, business cooperation isn't limited to research. UL is able to better aid research by incorporating business cooperation at the teaching level as well. The Foundation becomes an agency to advertise and contact the university and aids businesses by aligning the goals of the various stakeholders.

12.4.6 Workshops, Presentations and Local Engagement

More common forms of community engagement, such as presentations by industry and career fairs for students are also available at UL. However, UL encourages quality by limiting these activities to specific students fulfilling certain requirements or those that are most keen to sign up. An important lesson from the engagement is the effort to make the seminars and workshops interactive instead of simple lectures. One way to do this is to have cross-disciplinary seminars in which participants have to exchange ideas. Past workshops incorporating engineers with artists have been useful in this regard. Similarly, businesses are encouraged to develop interactive seminars.

12.5 What are the key lessons which can be drawn out from this approach?

One key lesson for University Business Cooperation from UL is that it does not compromise its values. This allows the university to meet long-term targets and better enables cooperation in the future. For example, the university does not "sell its students short" by encouraging placements without pay. It also does not compromise a standard academic rubric when creating courses for industry. This ensures that businesses understand the objectives of the university- namely a focus on developing long-term critical thinking skills as opposed to solving short-term problems.

The following eleven lessons are substantiated with references to examples of good practice earlier:

- **Centralised and structured interaction**- the university provides the appropriate contracts, training for students, staff and programmes to interact with business. The central management ensures that enough resources are allocated for university business cooperation and that the collaborations are of high quality. For example, the university trains every student prior to their CoOp undertaking;
- **Encouraging tacit knowledge exchange**- wherever possible the university does not conduct business at arm's length. Staff make an effort to meet businesses up to one day a week. Businesses are actively engaged to come onto campus. Representatives are sent to meet students in international placements. Tacit knowledge exchange needs formal and informal processes to facilitate it;
- **Preventing displacement programmes**- Cooperative education and graduate recruitment are part of a single agenda and do not compete with one another. No unpaid graduate internship, whether a university program such as CoOp or the national programme, should be at the expense of a previous graduate position. Any internship programme should have clear strategic targets and should have as its key objective the development of new and sustainable graduate employment markets. It should be a graduate employment placement scheme, not a graduate employment "displacement" scheme;

- **Linking research and teaching-** When businesses cooperate with research, they are invited to teach or develop modules and lectures. Similarly when businesses cooperate at the non-research level (via CoOp for example), the university actively tries to foster future research activities;
- **Honest and consistent evaluation**- UL surveys its students regularly. It also encourages presentations where students teach each other the lessons they learned. Industry representatives also sit on evaluation committees;
- **Encouraging life-long learning-** UL recognises alternative students, such as those that have already been in industry for many years, as a resource for knowledge exchange;
- **Regional development-** UL brokers relationships not only between itself and businesses, but between businesses and between other regional organisations. As a result they are better able to gauge the needs of their local community;
- **Proper IT management-** IT tools simplify every step of the process, from monitoring a programme to providing a database of students to businesses. The IT management also helps the university to gain knowledge of results from programmes which differ from one person to the next;
- **Targeted programmes and training-** students at UL are trained for business in sector specific modules. This encourages precision in preparedness for the interaction;
- **Interactive programmes-** Whether a module, seminar or scholarship, businesses and students are given resources to build interactive events to discourage one-way knowledge transfer;
- **Flexibility-** Students are given a choice of flexible modules. This allows students to develop the skills they deem deficient. Further, staff are given flexibility as to arrange their own visits to universities. This creates self-initiative to explore opportunities.

12.6 Contacts, references

Paul McCutcheon, Vice President of the University of Limerick

Patrice Twomey, Director of Cooperative Education & Careers at the University of Limerick

Catherine Duffy, Managing Director at Northern Trust

Tim Hall, Professor of Electrical Engineering at the University of Limerick

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13 UNIVERSITY OF PORTO (UNIVERSIDADE DO PORTO) (PT)

Summary of key points

The University

- The University of Porto (UP) is a multidisciplinary education and training institution with a strong research orientation. It consists of 14 faculties, a business school and some 70 research units, while a doctoral school is planned to promote the development and internationalisation of UP doctoral programmes. There is a broad range of some 700 subjects and training programmes on offer to nearly 31.000 students, 7,000 of them postgraduate and 2,000 foreign students. There are around 2.300 lecturers and researchers supported by 1,700 administrative staff. 76 per cent of the teaching staff, the equivalent of around 1,860 FTE, have a PhD.
- UP's mission statement includes a commitment to the promotion of economic development through:
    - the systematic protection of intellectual property rights;
    - the commercialisation of research outcomes
    - the dissemination of entrepreneurship training amongst students, researchers, and teachers

The Business Context

- UP concentrates on high-end R&D, which it has significantly expanded and increased funding for over the last few years. Small to large R&D centres were made to conduct specialised and interdisciplinary work. They all share the vision of having a modern research university with cooperative links to outside enterprises and government organisations. Some of the most recognized research centres in the university are the IBMC- Instituto de Biologia Molecular e Celular and the IPATIMUP - Instituto de Patologia e Imunologia Molecular da Universidade do Porto.
- UP offers a flagship business qualification: a Master's Programme in Technological Innovation and Entrepreneurship (MIETE) at its Faculty of Engineering.

13.1 Introduction

13.1.1 The national and regional context

The University of Porto (UP) is located in the second largest city in Portugal and the capital city of the North Region (Região Norte). Although this region is one of the poorest in Portugal, in terms of GDP per capita (ranging between 83-85 per cent of the national average and between 57-63 per cent of the EU average during the period 1999-2009), its western part where Porto is located, has a vibrant economy and industry underpinned by a modern infrastructure.[129] Furthermore, the Porto metropolitan area (Grande Porto), with a population of over 1.3 million in an area of 390 sq. km, is located at the centre of the Atlantic strip of the Iberian Peninsula and, therefore, it has a strategic position for access to routes to Africa, America and Asia.

The Porto metropolitan area is placed second in Portugal after the Lisbon metropolitan area in terms of GDP per capita and also has an unemployment rate considerably lower than the average national rates in 2008 and 2010 (below 8 per cent and over 10 per cent,

[129] Eurostat Database, Regional Statistics, Regional economic accounts, Cross domestic product indicators. Accessed at http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database.

respectively).[130] This is due to the high concentration in the area of a broad range of industry and services sectors, both traditional and knowledge-based, including pulp and paper, cork, food, textiles, telecommunications, tourism and banking. Around a third of the Portuguese companies operating within and outside Portugal have their headquarters in the Porto area, particularly in Porto and Maia, the latter having the largest industrial park in the country. Examples include the pharmaceutical Bial; Amorim, the largest cork producer; BCP, Portugal's largest public bank and BPI, the Portuguese Investment Bank; and Groupo RAR, active in several agri-food industry sectors. The Porto area is also a major exporting centre accounting for around 60 per cent of the country's exports.[131]

The Porto area contains a total of 56 higher education institutions, 22 public and 34 private, including universities, polytechnics and other HE schools, including the state-funded University of Porto and the Polytechnic Institute of Porto; the privately-owned Fernando Pessoa University and the Porto Higher Education School of Arts; and, the Portuguese Catholic University of Porto.

13.2 The university – facts and figures

The UP dates back to 1911 when the Portuguese Republic was established. It resulted from the merging of various schools (some dating back to the 19th Century), notably the Polytechnic Academy, the School of Medicine and Surgery, the Royal Academy of the Navy and Commerce and the Royal School of Surgery. Traditionally, the university has been a publicly funded institution. Following the enactment of the new regulation on universities in September 2007, which strengthened university autonomy over university affairs, the UP Statutory Assembly voted for the UP to become a foundation university, that is to obtain a mixed status (semi-private/semi-public), involving the development of new university structures. The objective was to reduce both the fragmentation within the university, caused by the independent legal status of the university faculties and research institutes operating within UP, and the complexity of decision-making. Structural changes would, in turn, have a positive impact on the output and quality the university's activities. The quest for improved quality and outputs also reflects the vision of the current Rector for the university to be in the range of the top 100 European universities by 2011, the year of the 100th anniversary of the UP. The changes were completed in May 2009 when the UP Foundation emerged and the new governance structures were put in place.

Currently, the UP is headed a Board of Trustees, consisting of 5 external personalities, including the CEO from Grupo Sonae, appointed by the General Council, and responsible for managing the Foundation. The remaining key governance bodies include

- The General Council, of 23 members representing the education and research community and students as well as the society, and responsible for electing the rector and supporting the university management team on a range of issues of strategic and operational nature, for instance
- The Rector, having the overall responsibility for the university's smooth functioning and is supported by a team of Vice-Rectors and Provosts with responsibilities in key areas of the university's activities, including academic and research and innovation, collaboration with business as well as university property and public contracts

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[130] Eurostat Database, General and Regional Statistics, Regional labour market statistics, regional unemployment. Accessed at http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database#. And, Statistics Portugal – – Instituto Nacional de Estatística, Dados Estatísticos, Territorial Statistics, various tables obtained from http://www.ine.pt/xportal/xmain?xpgid=ine_main&xpid=INE

[131] Porto Commercial Association – Porto Chamber of Commerce and Industry. Porto City – A World Heritage Site. Accessed at http://www.cciporto.com/ing/regiao.htm

- The Senate, a body providing guidance and advice and with the mission to ensure cohesion throughout the university and also the participation of all units in the university management

The representation of the industry in key governance bodies further strengthen links with the economy and society.

UP is a multidisciplinary education and training institution with a strong research orientation. Academically, the UP consists of 14 faculties, a business school and some 70 research units, while a doctoral school is currently being established to promote the development and internationalisation of UP doctoral programmes. The university has also a number of support services and offices. These facilities are spread across 3 campuses, the Porto, the Asprela and the Alegre Campus, located in the centre and outskirts of the city of Porto.

The UP faculties, and the business school, are self-governed units with autonomy over pedagogic, scientific, administrative and financial matters. They carry out education/training and research functions covering a broad range of disciplines, including: Architecture; Engineering; Fine Arts; Arts and Humanities; Business Economics; Law; Medicine; Biomedicine; Dental Medicine; Pharmacy; Psychology; Sciences; and, Nutrition and Food Sciences. The university offers study programmes across these disciplines that are organised in three cycles, according to the Bologna guidelines:

- The first cycle, consisting of a three- or four-year programme and leading to a graduate degree (licenciatura);
- The second cycle, corresponding to a three- to four- semester master programme, including specialisation courses, a dissertation/project or a traineeship, and a public exam. In the current academic year, there are nearly 140 courses available across the UP faculties;
- The third cycle, leading to a doctorate degree. Currently, there are 89 doctoral programmes on offer at the university.

In addition, a small number of disciplines, notably Architecture and Engineering as well as Medicine, Pharmacy and Psychology, offer students the opportunity to pursue an 'integrated master programme' of a 5- or 6-year length. This programme has been found to somewhat discourage 'inward' and 'outward' mobility.[132]

The broad range of subjects and training programmes on offer, around 700 according to the current Rector, have made UP attractive to students. Thus, nearly 31.000 students are enrolled at the university, including over 7,000 postgraduate and 2,000 foreign students. Further there are around 2.300 lecturers and researchers supported by 1,700 administrative staff. 76 per cent of the teaching staff, the equivalent of around 1,860 FTE, have a PhD.

Research is carried out within some 70 university units, including centres and institutes, covering the full range of fields and sub-fields of sciences, arts and humanities and reflecting the knowledge and skills generated in the UP faculties.[133] These units vary considerably in terms of size, orientation and status. For instance, some multidisciplinary units are fully integrated within individual faculties, for instance, the Centre for Legal and Economic Research within the Faculty of Law. Others are autonomous non-profit private associations in which the university and/or its individual faculties are members. Examples include the Artificial Intelligence and Computer Science Laboratory, the Institute of Systems and Computer Engineering (INESC) and the Institute of Mechanic Engineering, bringing together researchers from different faculties of the UP (e.g. the Faculties of Sciences and Engineering) and their counterparts from partner HEIs (i.e. the University of Beira Interior, the Porto

[132] EUA – Institutional Evaluation Programme, 2010. University of Porto Evaluation Report

[133] In 2008, there were 69 research units, including associate laboratories, at the UP. *Source*: University of Porto, Rectory, Continuous Improvement Service, 2008. FCT R&D Units

Polytechnic and the Technical University of Lisbon). Most research components have developed strong links with the industry – particularly the R&D intensive engineering, pharmaceutical, telecommunication and transport industries, e.g., EFACEC, Bial, Telefonica and Salvador Caetano. Thus, through its research activities, UP contributes to innovation and technology, or knowledge, transfer, thereby supporting the national science and technology policy objectives and securing economic returns.

With regards to its ranking as a HEI, the UP is placed amongst the 169-204 European universities and the 400-500 world universities, according to the Academic Ranking of World Universities.[134] By contrast, it has better SIR scores, achieving the 99th place amongst the top 100 European universities; the 15th amongst the Ibero-American universities; and, the 1st place amongst the Portuguese universities.[135] In terms of its research record, the University has performed well, despite the fragmentation of research. In recent assessments, carried out by international research panels for the Portuguese Foundation for Science and Technology, over half of the UP research units active in engineering and technology, health, natural and social sciences and arts and humanities, were assessed either 'excellent' or 'very good'. Examples include the Centre for Animal Science Studies; the Institute of Molecular and Cell Biology; the Institute of Molecular Pathology and Immunology; and, the Institute of Systems and Computer Engineering of Porto (INESC). The strength of the UP-generated research is also evidenced in the good publication record of the UP researchers whose scientific papers represented 22 per cent of the total number of Portuguese publications indexed in the Web of Science.[136] These successes notwithstanding, the current UP leadership is reportedly interested in concentrating the UP research efforts on four key areas of research, notably health sciences, media, technologies and energy, environment and the sea, where the university has a strong record, with the view to enhancing the status and image of UP as one of the top 100 European research universities.[137]

13.3 Approaches to university business cooperation

University business collaboration is fairly well established at the UP. Traditionally, UP academics and researchers have been actively engaged with the regional industry and, in recent years, this engagement has been encouraged by the government. Furthermore, collaboration with the industry is an important part of the University's mission, which is

> *to create scientific, cultural and artistic knowledge, to provide high quality training, strongly anchored in research, to promote the social and economic value of knowledge and to actively participate in the progress of the community in which it is established.*

The "promotion of economic value (or development)" by UP, intended to contributed to strengthening the Portuguese business, will be supported, according to the university's mission statement, through:

- the systematic protection of intellectual property rights;
- the commercialisation of research outcomes;
- the dissemination of entrepreneurship training amongst the students, researcher, and teachers.[138]

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[134] Academic Ranking of World Universities – 2010. Accessed at http://www.arwu.org/ARWU2010_5.jsp

[135] Scimago Institutions Ranking (SIR), SIR World Report 2010 and Ranking Ibero-americano SIR 2010. Accessed at http:www.scimagoir.com

[136] See, EUA, 2010. For further information on citations indexed in ISI Web of Science, see the UP website.

[137] José Marques dos Santos, Richard N. Katz and Ted Dodds, 2008. "Being Present in the World": A Conversation with Professor José Marques dos Santos, *EDUCAUSE Review,* 43:1 (January/February 2008), pp. 34-40

[138] University of Porto, Strategic Plan 2009-2013.

University business collaboration takes place throughout the UP functions and at different levels – at the central university level and across the faculties and the UP research centres. At the central university level, university business cooperation is managed by services within the Rector's office operating under the Vice-Rectors and the UP Provost who are responsible for the strategic aspects of university business cooperation. At the faculty/research centres level, collaboration is implemented through various channels given their status within the UP Foundation. Furthermore, the extent of collaboration varies, depending, largely, on the scientific field/subfield, the industry needs and the reputation of the faculty/research component

The most recent UP strategic plan for 2009-2013 outlined the UP's vision to become one of the "top 100 universities in Europe in 2011, the year of its 100th anniversary" and its strategic priorities. These are:

- Ensuring effective governance and management of the Foundation;
- Achieving excellence in training and research;
- Strengthening internationalisation – that is mobility of students and researchers.

The university partnership with businesses is important for advancing its priorities related to governance and excellence and fulfilling its mission. This is evidenced in the participation of personalities from the business community in key governance structures. There are also various university activities that relate to components of the university's mission and strategic priorities as well as to university business cooperation. Examples of these activities are presented in the following section.

13.4 Types of university business cooperation in the institution and their impacts

13.4.1 Courses for learners' employability and development

The university has undertaken a number of initiatives to support graduate employability as well as personal, or professional, development. The university, for instance, offers courses and programmes (with some offered for around 15 years) tailored to the needs of the industry in general, and specific industry sectors, in particular, notably the engineering industry. Several of these programmes tend to be multidisciplinary. Examples include the Masters programmes in Industrial Engineering and Management and Innovation and Technological Entrepreneurship, connected with the faculty of Engineering and the Business School. The UP management, according to our discussions with UP staff, is committed to further strengthening multidisciplinarity and equipping UP graduates with key competences needed by the industry with the view to enhancing graduate employability and also enabling the university to fulfil its third mission.

In the context of the lifelong learning, the university also runs courses covering various areas, including multi-disciplinary areas, in social sciences, law, sciences, humanities and business. The Faculty of Medicine, for instance, offers around 16 courses, i.e., in anesthesiology, health and ageing, while the Law Faculty offers courses in medical law and procedural practices and civil law. The more technology-oriented courses facilitate learning with the use of the resources (including knowledge) available in the relevant research units. Thus, they can contribute indirectly to scientific and technological development at workplace.

13.4.2 Entrepreneurship Education – The MIETE Programme

UP has been successful at integrating entrepreneurship education in the curriculum. The Engineering Faculty, for instance, runs 2-year specialist courses, including coursework, seminars and project work that link entrepreneurialism and occupational safety or sustainable environments and the MIETE Programme, a Master's programme in Innovation and

Technological Entrepreneurship, the latter considered an example of good practice.[139] Entrepreneurship, is a key component of the university's mission. The push for promoting an entrepreneurial culture and education at UP partly came from the current University rector, a strong proponent of entrepreneurialism, and partly from the need for entrepreneurial education identified by the students and the top management at the Faculty of Engineering, according to our discussion with the Director of MIETE Programme.

The MIETE Programme, operating since 2004, targets candidates from different disciplines (including management, engineering, sciences and design, and biotechnology) and backgrounds, i.e., graduate students, lecturers, researchers and middle managers from businesses. Initially, the intention was to focus on business development for existing companies as there was considerable business interest. This did not materialise due to different views of the students and the business regarding the ownership of the work results. Thus, the MIETE Programme focuses on training managers and entrepreneurs seeking to strengthen their innovation potential through work within multidisciplinary teams. Work covers the various phases of innovation, including product design, innovation process, product marketing and business development. Teamwork is guided by mentors and based on a hands-on approach. The Programme is supported by an Advisory Board bringing together the business world and academics from the US, the UK and the Netherlands with expertise in relevant areas, notably organisational competitiveness, IPR and technology commercialisation.

The Programme has been successful. The number of candidates nearly doubled from 2007, to 2008 and then into 2009 (with the number of applications being around 12, 25 and 60, respectively). Furthermore, the Programme has encouraged the launching of companies during 2004-2008 by former students, including IDEAVITY which provides innovative web solutions.

13.4.3 University business cooperation in UP research and innovation activities

Research and innovation related activities constitute a large part of the university's interaction with the businesses. In 2008, the income from these activities amounted to € 12.2 million which was around 34 per higher than the income of the income in the previous year. This suggests the increased emphasis placed by the university on promoting the economic value of knowledge, which is part of its mission.

At the university level, UPIN (University of Porto Innovation), under the responsibility of the Vice-Rector for R&D and Innovation, was created to underpin the commercialisation of UP's research activities within the university and to promote the uptake of these activities to external stakeholders. UPIN is organised into three interlinked components:

- The Strategy, Promotion and Assessment of R&D+I unit, seeking to promote collaboration and inter-disciplinarity between the UP research components ;
- The Economic Appraisal Unit, responsible for IPR related activities as well as for promoting training in entrepreneurship for the university students and staff and liaising with the Science and Technology Park of the UP;
- The funding promotion unit.

University business interaction takes place through various channels. There are collaboration agreements for R&D projects between individual companies and UP technology intensive faculties and research centres, bringing together complementary skills and convergent interests. These agreements are often based on longer term strategic partnerships with

[139] EC, DG Enterprise and Industry, 2008. Entrepreneurship in Higher Education non-business studies. Final Report of the Expert Group, March 2008

Portuguese business. In addition to income for the university, collaborative R&D benefits the university as it provides opportunities for training and employment of UP research students and graduates. There are additional opportunities for university collaboration with business through participation in contracted research activities supported by the EU's Framework Programme for R&D and work financed by the Structural Funds. Collaboration with business goes beyond the regional level. University research departments and laboratories have good working relations with Swedish and Brazilian chemical processing companies, for instance.

UP and its researchers seek to encourage the commercialisation of the R&D activities generated in the university. Thus, during the period 2004-2010 around 180 invention disclosures were submitted, while patenting and licensing through UP Technology Transfer Office (TTO) began in 2004. Currently, the university has 52 active national patents, 28 of which have been granted and 23 international active patents, 16 of which have been granted. The university has also licensed a very small number of technologies and processes in Portugal, which the process of licensing a technology in other countries is under way.[140] The university has yet to benefit from licensing and patenting, which are longer-term result activities (marketing in life sciences and pharmaceuticals may take around 10 years). These activities, however, have longer-term benefits. They can strengthen UP's reputation as an innovative research university and enhance its attractiveness for foreign students and researchers. They may also lead to further opportunities for sponsored research and income for the university. Finally, they are important for the entrepreneurship agenda of the university.

Drivers and obstacles to commercialisation: Despite the university's commitment, commercialisation of research results through patenting and licensing is challenging due to a number of factors primarily related to businesses, particularly SMEs constituting the bulk of the Portuguese business. The key factors are SMEs' lack of awareness about IPR and collaboration with universities and their inability to invest in innovative R&D. The Portuguese companies' R&D investment amounts to around 0.2 per cent of GDP. Furthermore, the industry and universities in Portugal do not have a long history of collaboration as the industry is not research intensive. Finally, the university TTO lacks proof of concept funding and, therefore, they currently tend to focus their efforts on involving the more sophisticated and high-tech SMEs in the region.

13.4.4 Entrepreneurship related to UP research and innovation activities

In addition to offering entrepreneurship education courses, UP sought to promote entrepreneurship through its research and innovation functions. The UP Science and Technology Park was set up in 2007 to support the development of spinoffs with rapid growth potential, to enable companies benefit from the synergies existing with the UP research departments and centres and to encourage technology transfer abroad. Our discussion with the TTO revealed that, to date, the UP incubator facilitated the launching of around 46 spinoff companies, 11 of which are currently fully operational.

Furthermore, the TTO has sought to promote entrepreneurship in IPR in several ways. One example is the 25K Euro competition award for the development of a business plan first launched in 2010 and attracted 46 participants. Given this interest, the TTO will organise another competition this year. The intention is to promote entrepreneurship amongst UP students, alumni and researchers. The TTO also organise meetings and events bringing researchers from different research departments and institutes together to discuss issues related IPR, the commercialisation of research results and EU-funded research opportunities. The TTO also approaches the businesses to inform about R&D developments and to identify opportunities for collaboration.

[140] Based on discussion with the TTO

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University of Porto, Strategic Plan 2009-2013.

14 UPPER AUSTRIA – UNIVERSITY OF APPLIED SCIENCES (FACHHOCHSCHULE OBERÖSTERREICH, FH OÖ) (AT)

Summary of key points

The University

- The FH OÖ, as other Austrian Fachhochschulen, is dedicated to tertiary education with a stronger vocational and technical orientation, and does so through practice-oriented teaching methods (student projects, dissertation, internships) involving industries at all levels.
- The University has no strategic document specifically dedicated to university business cooperation, but university business cooperation is embedded in its strategy at all levels and cooperation takes place at the level of departments in each one of the four FH OÖ Schools.
- A change in the FH OÖ status in 2003 enabled the University to increase its research activities, and, therefore, its cooperation with industries.
- 50 per cent of students attend part-time programme, often designed to meet demand in particular industries or industry branches.
- The University is strongly embedded at the regional level and participates in the regional research and innovation strategy.

The Business Context

- Upper Austria is the leading industrial region in Austria. Its economic structure is mainly oriented towards the production, conditioning and installation of metal products; the automobile industry; engine building.
- Upper Austria is an industrial research-intensive economy, wherein R&D is led by the private sector (in 2007, 77 per cent of the GERD originated in enterprises). Despite companies within the region being mainly SMEs, they are renowned for their innovative skills and their specialisation in niche markets.
- Facilities provided at regional level (clusters, incubators, etc) foster R&D activities and cooperation between academics and enterprises.

14.1 The national and regional context

Upper Austria is one of the 9 regional states (*Bundesländer*) in Austria, located in the northern part of the country. In 2008 the Region was ranked 49 out of the 271 EU NUTS 2 regions in terms of GDP per capita and stood in second place after the capital city Vienna amongst Austrian Bundesländer.

> *"Upper Austria has become in the last decades the leading industrial, technology and export Land in Austria"*[141]

Upper Austria is one of the leading industrial regional states in Austria with around 25 per cent of Austrian industrial production and export. The secondary sector accounts for 40 per cent of Upper Austria's GDP in 2006, compared with 30 per cent for Austria, whereas the tertiary sector accounts for 68 per cent in Austria and only 57 per cent in Upper Austria. Key economic sectors in Upper Austria are as follows:

- Metal production and metal conditioning;

[141] Oberösterreich, Standort- und technologie bericht 2008.

- Automobile industry;
- Engine building;
- Installation of metal products.

Key industrial sectors are presented below.

Key industrial sectors in Upper Austria

- ***Vehicles and automotive components (e.g. BMW, truck manufacturer MAN, KTM, Rosenbauer, Bombadier-Rotax, MIBA)***
- ***Machinery, engineering and environmental engineering (e.g. ENGEL, Trumpf Maschinen Austria, VA TECH, Scheuch)***
- ***Metal production and processing (e.g. voestalpine, AMAG)***
- ***Plastics, chemicals and paper (e.g. DSM, Lenzing AG, FACC)***
- ***Wood and furniture (e.g. Wiesner Hager, EWE, menswear, HALI, JOSKO)***
- ***Food (e.g. Brau Union, Grieskirchen, Ried, Freistadt, Schlägl)***
- ***ICT (e.g. LIWEST, Fabasoft, BMD systems company, SAP Austria)***
- ***Green Energy (e.g. Energie AG, Linz AG)***
- ***Health Technology (e.g. Gespag, BWT AG)***
- ***Tourism and Gastronomy***

Source: Website of the Upper Austria Land: http://www.land-oberoesterreich.gv.at

Upper Austria's unemployment rate stood at 3.5 per cent on average between 2000 and 2008, far below the national (4.3 per cent) and the European (8.5 per cent) rates (Eurostat). This is one of the lowest unemployment rates amongst European NUTS 2 regions. This shows the high level of adjustment between workforce demand and workforce supply. However as elsewhere in Austria, the education system of the Region has been criticised over recent years for not being able to cope with the growing demand of enterprises and industries for R&D skilled personnel.

An innovative and modern industrial regional state, Upper Austria's GERD is in the top-three of the research and innovation related Austrian Länder in 2007. The Regional innovation scoreboard (2009) classifies the region as a 'medium-high' innovator. Furthermore, the region is situated within a very dynamic area at the heart of Europe, with strong connections with South Germany, the Czech Republic, Slovakia, Northern Italy, Hungary, etc. Upper Austria is an industrial research-intensive economy, wherein R&D is led by the private sector. Despite companies within the region being mainly SMEs, they are renowned for their innovative skills and their specialisation in niche markets. In 2007, 77 per cent of the GERD originated in enterprises and 15 per cent in the public sector. Upper Austria is ranked in first place when it comes to Austrian regions' BERD, as well as in the number of patents registration, and is far ahead the other Länder. Additionally, the establishment of Clusterland Oberösterreich GmbH, bringing together five clusters and four network initiatives - in the field of automotive, wood industry, plastic, health, mechatronics, design and media, human resources, environment and energy - has paved the way for further cooperative projects between the private public sectors.

14.2 The university – facts and figures

"The University of Applied Sciences of Upper Austria is the largest Fachhochschule in Austria."

The University of Applied Sciences of Upper Austria (FH OÖ) is a vocational-oriented higher education institution launched in 1994 as one of the first Austrian Fachhochschulen.

The University is strongly embedded at the regional level and participates in the regional research and innovation strategy. The region often consults the University when a new regional plan is to be launched. Interactions between the University and the region are therefore circular: the University benefits from Upper Austria being a very dynamic region in terms of innovation and the region aligns with professorial expertise to further develop its innovation strategy. The University's Representative for Research and Development attends for instance the regional Advisory Council for Research and Technology, together with other universities and enterprises.

A decentralised institution, the FH OÖ comprises four schools across the region. Each of them specialises in a specific field of study and research and cooperates with socio-economic actors towards local structures. For instance, the Hagenberg School is part of the Science Park "Softwarepark Hagenberg", which hosts several university research departments and software companies and has established itself as a dynamic centre of computing and software development with an international reputation. Likewise, the School of Management, situated in Steyr, cooperates with very well known companies such as BMW, MAN, SKF, etc. As other Fachhoschulen, the FH OÖ offers Bachelor and Master degree, but no doctoral degrees.

Figure 20Study and research specialisation of each campus

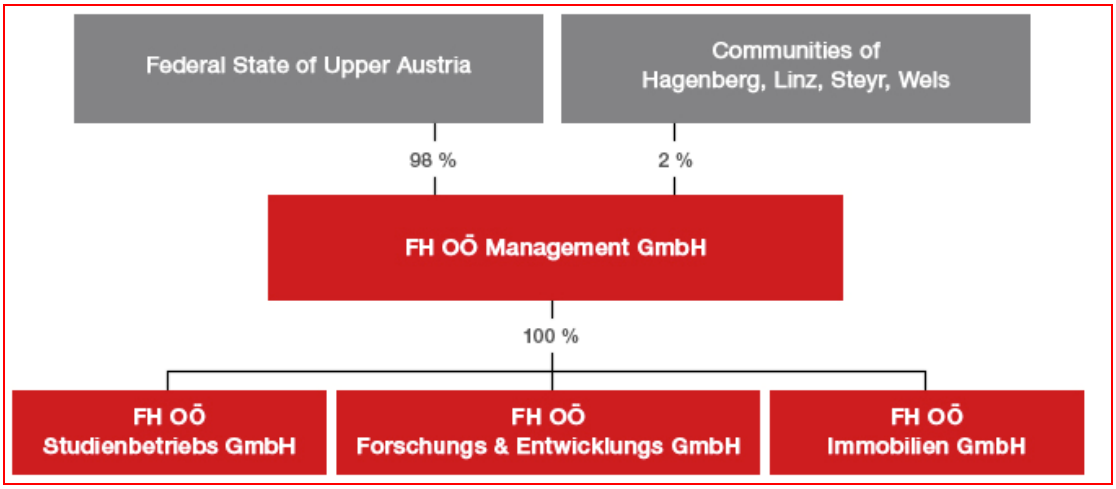
Schools	Fields of studies	Fields of research
Campus Hagenberg	Informatics, Communication and Media	• Software technology and applications • Media and scientific technologies • Information and communication systems • Life of elderly persons
Campus Linz	Health, Social services and social work	• Life of elderly persons • Medical technology: Biomechanics • Applied social sciences and non-profit management
Campus Steyr	Management	• Production optimisation • Logistics and Corporate Networking • Digital Economy
Campus Wels	Technology and Environment sciences	• Automation technologies and Simulations • Material and production engineering • Energy and Environmental sciences

Technopolis, based on the four schools' websites

The four campuses are led by a holding company, FH OÖ Management GmbH, responsible for strategic and management decisions. The University is in 98 per cent ownership of the federal province of Upper Austria, the remaining 2 per cent being in the hands of the Schools' communities, each owning a half per cent respectively. FH OÖ Management GmbH heads the following subsidiaries:

- For teaching - FH OÖ Studienbetriebs GmbH: responsible for training, scientific pedagogy and didactics;
- For research - FH OÖ Forschungs & Entwicklungs GmbH: non-profit company designed to ensure the grouping and efficient processing of research and development activities at the Upper Austria University of Applied Sciences. It owns the four research centres present on each one of the campus;
- For infrastructures - FH OÖ Immobilien GmbH.

Figure 21 Corporate structure of the Upper Austria – University of Applied Sciences



Source: Website of the University: http://www.fh-ooe.at

14.3 Approaches to university business cooperation

Austrian Universities of Applied Sciences or 'Fachhochschulen'[142] were launched as a way to foster cooperation between academia and enterprises and were inspired by similar models in Germany and in Netherlands. Here one should point to the cooperation with Finland that started its own polytechnics programme at the same time.

Austria: a bimodal education system, wherein Fachhoschulen are specifically dedicated to vocationally oriented education on a tertiary level

Side by side with public and private universities, Fachhoschiulen or Universities of Applied Sciences were introduced in Austria by the 1993 Federal Act on Fachhochschulen study programmes as non-university tertiary education with a stronger vocational and technical orientation.

Ever since, this sector has been continuously expanded. According to the Federal Act on Fachhochschule Studies, Fachhochschule programmes are to endow students with the knowledge and skills they need to meet the practical demands of their individual professional fields with scientifically grounded state-of-the-art methods. In addition, the Fachhochschule sector aims at the professional flexibility of its graduates.

Contrary to public universities, Fachhochschule programmes, which are provided by various (mostly private) organisations, have to be formally accredited by a Fachhochschulen Council.

In November 2010, Austria has 22 public universities, 21 Fachhochschulen and 13 private universities.

The Austrian case is interesting in the sense that it is part of a general trend - at least in some European countries- towards the creation of universities dedicated to technological and Applied Sciences. Contrary to traditional universities that are criticised for not cooperating enough with industries and business enterprises, these universities typically intend to bring academic research and academic curricula closer to industrial needs. In other words, university business cooperation is mainly provided in such countries by a new type of vocational institution that tends to challenge the traditional university. In Austria, this shift has

[142] 'Fachhochschule' and 'University of Applied Sciences' are used equally in the remainder of the text.

taken the shape of the national move in favour of vocational third cycle education. France has experienced a similar movement, although restricted to a pilot 'University of Technology', that has now spread to two other similar universities.[143]

14.3.1 Research projects, and practice-oriented training methods as key drivers for university business cooperation

> *"The FH OÖ is both highly research- and practice-oriented, with strong commitments in terms of placement and lifelong learning."*

Cooperation with business enterprises engages all the University's activities: research, teaching and curricular development, with a close interaction between partnerships for research and partnerships for teaching/curricula. Typically new contacts originate from research projects and then flow to the teaching area, although drivers for cooperation are diverse and do not always conform to this pattern. Business involvement in teaching activities and curricular development is typically a sign of longer-term commitment, while cooperation on research projects is always limited in time.

In terms of training, university business cooperation is strongly embedded in the practice-oriented teaching methods of the University and takes the form of internships and student projects in cooperation with industries.

Apart from the training and research agenda, the strong entrepreneurship culture within Upper Austria is a second key driver of cooperation with enterprises. As noted previously, the region hosts a wide range of SMEs; and private enterprises are the best performing economic and innovation sector at the regional level. Not only is the delivery of teaching matching industrial needs a key priority within the University, but entrepreneurship is also strongly supported amongst students.

The best example of the close link between academic activities in the FH OÖ and industrial needs is the creation of the Linz School of Applied Health and Social Sciences about ten years ago. This was pushed by industries, in cooperation with hospitals. The creation of the school aims to meet work supply demands in terms of medical engineering, since no degree in this field formerly existed in Austria.

14.3.2 A decentralised approach to university business cooperation that follows the University global strategy

The University has no strategic document specifically dedicated to university business cooperation, but university business cooperation is embedded in its strategy at all levels and the University's annually updated strategic programme entails university business cooperation matters. Likewise, no specific team is dedicated to university business cooperation, either at the central level or at the level of each school. However, cooperation takes place at the level of departments and each of them designates one Head in charge of maintaining the contact with industry.

Broadly speaking, the University maintains a large network of industrials and academic cooperation partners within Upper Austria, Austria as well as abroad. It is estimated that:

- About 50 per cent of research partnerships take place with enterprises within Upper Austria;
- About 35 per cent with enterprises in Austria;
- About 15 per cent with international enterprises (of which: Singapore, Japan, Canada).

[143] For further information, see the French case study.

Below are displayed various examples of enterprises working with the University.

Examples of the FH OÖ's industrial partners:

Siemens (Engineering and global technology services); Siemens VAI (Metals and mining technologies)

Miele (domestic appliances and commercial equipment)

Trumpf (medical technologies)

Rosenbauer (fire fighting equipment)

Twyn Group (IT Solutions & Marketing Services)

Pottinger (Agricultural technology)

Keba (Automation solutions for the industrial, banking and services as well as energy sectors)

Palfinger (hydraulic lifting, loading and handling systems)

Rotax (engine manufacturer)

Saint-Gobain Glass Solutions (glass and glass systems)

As far as research is concerned, each research group is in charge of managing its partnerships, e.g. mobile computing companies and telecom companies in Hagenberg; logistics companies and joint software tools in Steyr; mainly medical companies in Linz; and aerospace companies (among others) in Wels.

Most of the funding for research partnerships is regional or national, but the four schools also take part in European FP projects.

14.3.3 A change of status into private company has widened university business cooperation over recent years

The main shift in university business cooperation took place in 2003 as the University, a former association, changed its status to become a private enterprise. Previously the University carried out few research activities and engaged few research staff. As an association, it was less likely to define common research projects and to contract with enterprises since the structure was not flexible enough – e.g. decision making involved too many people. Since the change of status, the process of launching research projects with enterprises has been simplified and common rules have been introduced regarding IPR and contracts. As a result, research activities have increased both in quantity and quality and, since many are conducted with enterprises, the cooperation with enterprises has also increased. These new partnerships have then largely spread to teaching activities.

Broadly speaking, the main changes in university business cooperation over the years consisted in adapting the teaching and research offer to industrial, societal and economic needs. For instance, ten years ago the Hagenberg School launched a specific curriculum dedicated to security in IT. At the time, the theme was quite new for Austria and Europe and nobody was interested in it. Now it is a burning issue and many enterprises have developed an interest in hiring graduates with master's degrees in secure information systems. Even so, the 15 students per year graduating with this degree are not enough to meet the demand.

Figure 22 Details of the University of applied sciences of Upper Austria

Type of university	Research- and vocationally-oriented higher education institution Specialisation in Applied Sciences
Region/ capital city	Upper Austria Region
University ranking – World (Quacquarelli Symonds, World University Rankings Results 2010: www.topuniversities.com)	Not ranked in the top-200 universities
University ranking – European (Webometrics	Not ranked in the top-500 universities

Type of university	Research- and vocationally-oriented higher education institution Specialisation in Applied Sciences
Ranking of World Universities: http://www.webometrics.info)	
Number of students (Winter semester 2009)	4,434
Degrees awarded (2008/2009)	1,186
Training	25 bachelor programmes 24 Master programmes 1 diploma programme 22 continuous education programmes/ part-time? (berufsbegleitend studien)
Staff	Almost 600 full-time staff and 1000 part-time lecturer
Components	4 campus
International cooperation (2009/2010)	426 incoming foreigner students 387 outgoing students 200 active international exchange agreements
Research (2009)	28 per cent of all funding dedicated to Austrian universities of Applied Sciences

Source: Technopolis, based on uni: data datawarehouse on higher education from the Ministry of Knowledge and Science, and various other sources

14.4 Types of university business cooperation in the institution and their impacts

14.4.1 Overview of university business cooperation schemes

Figure 23 presents a showcase of university-business cooperation schemes as they are implemented in the FH OÖ. This illustrates the wide range of initiatives taken at the level of the universities and offers a good overview of the scope of cooperation.

Figure 23 Overview of the main university business cooperation schemes implemented in the FH OÖ

	Scope	Approach/ Trends in university business cooperation
Cooperation on research projects	Two type of collaborative research projects: • Contract research: through which enterprises (mainly SMEs) contract with the University to solve a particular issue (about 60 per cent of all research projects); • Joint project: that involve several partner around funding from Austria and the EU (about 40 per cent).	Strategy to develop participation in collaborative projects funded by the EU
Technology transfer	• The University's incubator situated on the Linz campus. It fosters entrepreneurship in the University and brings entrepreneurs to university. • An additional incubator is present on the Hagenberg campus and is dedicated to information technology.	At regional level, the Upper Austrian Research GmbH (UAR) is in charge of promoting the transfer of technology from science to business. The UAR is organised roughly speaking around the same locations (Linz, Wels and Hagenberg) and field of specialisation than the FH OÖ.

	Scope	Approach/ Trends in university business cooperation
Involvement of industrials in teaching activities	• Many of the University's full-time teachers and researchers come from industry and have experienced career mobility between industry and enterprises (For instance, about 50 per cent of the teaching staff work part-time alongside with a position in the industry in the Hagenberg campus.) • Many lecturers teach at the university on a part-time basis alongside their regular careers in industry	The mobility of professor and lecturer between industry and Academy is fostered by the dynamism of the regional socio-economic environment
Involvement of industrial representatives in curricula development	All Universities of Applied Sciences are reaccredited every five years. The accreditation process involves enterprises that do not typically take part in the Universities activities i.e. companies from outside Austria, in order to collect different views.	Every change in study programmes should be accredited by the federal Ministry of Education, Arts and Culture.
Mandatory internships	• In all programmes offered across the University, students spend a defined period of study working in a company. The work placement, either in Austria or abroad, is an integral component of the degree, during which students are confronted with concrete, on-the-job tasks. It lasts from nine to 15 weeks. • In the Hagenberg campus, a yearly fair allows enterprises to talk to students and to present them opportunities for internships or jobs. Renowned companies include Siemens Medical Solutions, Concord in the USA or Microsoft Corporation.	• For students, work placement might serve as a springboard for more long-term career perspectives. • For the University, they allow the enlargement of partnerships portfolio through mechanisms that are 'softer' than research projects.
Students projects	• Students are expected to work on projects during their third semester. The project lasts six months and involves four to six students. • Likewise, bachelor and master dissertations are expected to deal with concrete situations and to be carried out in cooperation with industry. Research themes should be innovative, practice-oriented and relevant to economic or societal needs. The enterprises provide infrastructure, nominate a tutor and assume the costs related to the project, including possible financial compensation for students.	Cooperation is a win-win situation where students work on concrete examples in close cooperation with enterprises and apply their theoretical knowledge, while enterprises are provided with a young and different point of view on specific situation.
The integration of general/soft skills in curricula	All university programmes aim to provide students with general skills, i.e. skills that focus on their personal development and are necessary for future careers in the business world.	For instance, English is the language of instruction in many programmes and courses in many foreign languages are offered (e.g. Spanish, Czech, Italian, Japanese and Russian). Courses in public speaking, presentations, teamwork, moderation, leadership skills support and negotiations are also delivered.
Continuous education *(see below)*	About 50 per cent of the University's programmes both at the bachelor and master levels are organised part-time	Strong commitment to continuous education at the national and regional level
Entrepreneur-ship education	There is a variety of mechanisms among the four schools • Management courses in the Steyr School • The Chamber of commerce offers free courses to support graduates and students who want to develop their own company;	• The Steyr Management School mainly carries out entrepreneurship and management courses. • That being said, the entrepreneurship culture is widely developed on the Hagenberg campus as well, together with a regional dynamism within the

	Scope	Approach/ Trends in university business cooperation
	• At the Hagenberg School, all programmes include entrepreneurship courses delivered by consultants specialised in the topic; • A system of mentorship by entrepreneurs for graduates and students wanting to develop their own company is implemented in the Hagenberg school, and the park provides a wide range of services through its incubator;	ICT field.
Alumni association	Allows the University to keep in touch with former students.	Participation of former students in teaching activities through regular lectures, presentations or short talks. This allows students to have an accurate view of career opportunities.

Technopolis

14.4.2 Focus on the continuous education schemes and part-time studies

Continuous education is a focus of education policy both at the regional and national level. Within Upper Austria, the adult education forum (*Erwachsenenbildungsforum Oberösterreich, EB-Forum*) was launched in 1993 and has been continuously strengthened since then. Interesting is the '*weiterbilden*' platform dedicated to professional continuous training that brings together all training offers within the region.[144] Likewise, the brochure '*Ausbildungen für Berufstätige in Oberösterreich*' (2010) offers information on training opportunities. At national the level, all vocational training is listed on the website of the Ministry for Economy, Family and Youth.[145] At the national level, the website 'E*rwachsenenbildung*'[146] (Adult training) dedicated to continuous education, offers information as well as a list of training opportunities all across Austria. Austria's business and trade associations (e.g. Federal Economic Chamber, the Federation of Austrian Industry, the Chambers of Agriculture etc.) tend to act as lobbies in support of adult education. They have, for instance, achieved the increase of education-related tax allowances for companies to 20 per cent. They also offer a multitude of specific support measures. The Federal Economic Chamber and the Federal Ministry for Economic Affairs and Labour, for example, grant financial aid to people who have completed apprenticeship training if they wish to take a vocational examination.[147]

As far as the FH OÖ is concerned, about 50 per cent of the University's programmes both at the bachelor and master levels are organised as part-time (compared with 32 per cent in all Fachhochschulen in Austria in 2007/2008[148]). Curricula, teaching concepts and also entrance procedures are tailored to the needs and wants of gainfully employed persons. Information sessions on part-time studies are carried out at the level of the four schools (e.g. yearly session organised in the evening in the Hagenberg campus).

The example of the Master's in Information Engineering and Management (Master-Studiengang Information Engineering und – Management149) organised by the School of Informatics, Communications and Media in Hagenberg;

144 http://www.weiterbilden.at/process.asp

145 BmWfj, http://www.bmwfj.gv.at/Berufsausbildung/LehrberufeInOesterreich/Seiten/Lehrberufspaket2010.aspx

146 www.erwachsenenbildung.at/

147 Eurydice, The Education System in Austria, 2008/2009, online : http://eacea.ec.europa.eu/education/eurydice/ (consulted November 2010)

148 Institute for Research on Qualifications and Training of the Austrian Economy (ibw) and Institute for Research on Vocational Training (OIBF), National Report on the Development and State of the Art of Adult Learning and Education (ALE) Austria: Prepared for the UNESCO 6th International Conference on Adult Education (CONFINTEA VI), 2008

149 Website: http://www.fh-ooe.at/campus-hagenberg/studiengaenge/master-studien/information-engineering-und-management/ (consulted in December 2010)

Former students actively lobbied for the creation of this Master's degree. It is designed for management positions in the IT business and is particularly suitable for people with a first degree in information technology. As in other study programmes, many of the professors have worked previously in industry, while several of the lecturers come directly from the private sector.

The degree lasts four semesters like full-time Master's, but courses are organised on Friday afternoon – from 14.40 to 19.35 or 20.25 - and on Saturday – from 8.00 to 14.35 - and make a wide use of e-learning elements. 20 students graduate from the Master each year. Prior learning recognition is an integral part of the programme.

A good illustration is the example of one student, Roland Wurzinger, who attended the Master's in 2006-2008 as the company Happy-Foto GmbH, specialised in photographic products and services, employed him. He had already graduated from the University in 2004. He dedicated his Master's thesis to the Internet-related developments in the company, which was a rather traditional-oriented business, through the use of e-tech techniques and e-tools. It shows how the business model of Happy-Foto GmbH has been adapted to these global changes, i.e. the rise of digital photography and the resulting detachment of the traditional analogy photography.

Demands for part-time studies typically come directly from industries, in search for specific skills. Study programmes are developed by a dedicated team comprising academics from the FH OÖ, private scientists from the FH OÖ and industry. The team discusses the appropriate balance between fundamental science, practical training and internship. When the curriculum is documented, it is sent to the Ministry of Education, Art and Culture for accreditation.

Several study programmes (both part-time and full-time) target public sector administration or the NGO sector, rather than enterprises. For instance, the Master in services of General Interests (SGI) offered by the Linz School since 2007 qualifies for complex management tasks in the public sector and in the field of social or health services. Students are required to be present for one whole week per semester as well as during course time on Friday afternoons (2-8 p.m.) and Saturdays (8.30 a.m.- 4 p.m.) and Wednesday evenings when necessary (5-10 p.m.). Additionally, blended learning elements reduce the time the students have to be present. Courses are provided in English.

14.4.3 The impact in terms of research and students employability

The dynamic regional context and the reputation of the University have contributed to develop its partnerships portfolio and to attract big European companies, such as the Swiss pharmaceutical company Roche recently. In 2009, the turnover of the FH OÖ Forschungs & Entwicklungs GmbH was about € 8 Million. Likewise during the 2010 enterprise fair, the Hagenberg School faced far more demand than there were places for enterprises. This illustrates the attractiveness of the campus for companies.

No data on employability are available at the level of the whole University. However, as a result of practice-oriented training methods, the employability rate of students once they graduate is rather good:

- In the Linz School, about 70 to 80 per cent of students are hired in the enterprise when they have done their internship, while the rest find a job in one or two months.
- In Hagenberg, there are typically more job offers than graduates (on average: 5 to 6 jobs per graduate) thanks to the regional dynamism in the field of ICT, and all graduates find a job directly after their graduation.

In terms of entrepreneurship, it is estimated that about 20 per cent of the Hagenberg School's graduates start their own company after graduation. Hagenberg School is indeed one of the most entrepreneurship-oriented campuses.

14.5 What are the key lessons which can be drawn out from this approach?

14.5.1 Key issues emerging/ Hurdles encountered/ Barriers

University business cooperation has always been part of the University's strategy and the mechanisms implemented so far work rather well, as demonstrated by the number of industrial partnerships and by the good results in terms of students' employability. Over the last decade and thanks to its new status, the University has become an attractive place for either regional, or national or international enterprises.

"The formula works."

Mechanisms for university business cooperation are well implemented in each of the FH OÖ Schools and departments and have been stable over time. They are also strongly embedded in regional structures in links with the Upper Austrian socio-economic environment.

Every new programme implemented in Austrian Fachhoschulen is subject to an employability study carried out by external consultants, in order to ensure that students find employment. When implementing a new programme, the Fachhoschulen have therefore to prove the working prospects for future students.

One main issue concerns the Austrian Fachhoschule system as a whole and its need to balance professional training with fundamental knowledge. Fachhoschule have proved to be efficient in delivering a sufficient vocational-oriented labour force in support of industry, but are criticised for not training S&T graduates for high-level research and innovation activities. At the level of each department in the FH OÖ, the balance between fundamental knowledge and practice is therefore a key point, discussed by the different stakeholders in charge of the curriculum development. In the longer term, there is a risk of training students suited to specific industry or industrial branches, but not suitable for the general labour market.

14.5.2 Future strategies

At the University level no big changes are planned. Most of the people interviewed within the framework of this case study agree with the fact that the formula works. The number of research projects is to continue to increase but it will be based on existing partnerships with industries.

In terms of research, the University orientates its strategy towards European collaborative research programmes.

An innovation in the Hagenberg campus is the International Co-location Centre Hagenberg (ICCH) to be launched as a pilot project in 2011. It is based on a brand new concept, i.e. a direct and exploratory cooperation between graduates and enterprises to integrate ideas from graduates in existing or new companies. The basic idea lies in the goal to foster dialogue between graduates and enterprises around concrete projects, as a way to develop creative ideas as well as new forms of cooperation. The experiment is still under design and an initial meeting took place in January 2011.

14.5.3 Concluding remarks

From the point of view of the authors of this case study, the University of Applied Sciences of Upper Austria provides good practice in matters of university business cooperation. It is a good example of a higher education institution specifically dedicated to applied sciences that contributes to the development of new forms of partnerships with businesses in order to overcome the traditional dichotomy between academia and businesses prevailing in several European countries.

As evidence of its recognised effectiveness, the University currently contributes to the implementation of the 'Fachhochschulen' operational model in Bulgarian institutions of higher education, where the concept is brand new. Predictably, one of the main challenges there consists precisely in the development of cooperation with Bulgarian industries.

14.6 Contacts, references

14.6.1 Contacts

Prof. (FH) Dipl.-Ing. Dr. Johann Kastner, Vice-President for R&D, FH OÖ Forschungs und Entwicklungs GmbH

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Professor Michael Rabl, Head of Studies Innovations- und Produktmanagement in the School of Engineering and Environmental Sciences

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15 UNIVERSITY OF SURREY (UK)

Summary of key points

The University

- The University of Surrey has a reputation as 'the University of Jobs' with a strong employability record, the main reason for its selection here as a case study. Graduates from the University of Surrey are the most employable of any chartered university in England. In 2008 (the latest statistics available) 96.7 per cent entered employment or further education, compared with the UK national average of 91 per cent.
- University business cooperation in embedded in Surrey's delivery of both education and research, with university business interactions running throughout its activities, not as a central function but managed and implemented at a school/faculty level in a variety of ways, tailored to particular needs. The institution's roots go back into the 19th century as a vocational college intended to widen participation in Higher Education for the masses.
- The University has devised a 'Lifewide Learning Award scheme '. This pilot scheme awards a 'Graduate Employability Certificate' intended to provide Surrey graduates who do not have a job with the opportunity to demonstrate the employability skills they have gained through extra-curricular activities.

The Business Context

- The South East Region is one of the largest manufacturing areas in the UK , home to 750,000 businesses, with a total value of exports of around £40 billion. The South East contributes 15 per cent of total UK GDP
- The region also has a strong industrial presence together with a higher than UK average proportion of the economy that is knowledge-based (including finance, research and development, and professional services). A large number of multinationals are based in Surrey, which has more organisation and company headquarters than any other UK region

15.1 Introduction

The University of Surrey is one of 16 universities in the South-East region of England. The county of Surrey has a population of 1.1 million, of which 82 per cent is economically active with unemployment very low at 2.0 per cent (compared with the UK national average of 7.7 per cent). Surrey benefits from many structural advantages such as its proximity to London and two airports, London Gatwick and London Heathrow. Surrey has the highest average wage in the UK (many residents working in finance in the City of London). It also has a strong industrial presence together with a higher than UK average proportion of the economy that is knowledge-based (including finance, research and development, and professional services). A large number of multinationals are based in Surrey, which has more organisation and company headquarters than any other UK region. Electronic giants include Nikon, Whirlpool, Cannon, Toshiba, Samsung and Philips. Car companies include Kia Motors and Toyota, and drug companies include Pfizer and Sanofi-Aventis. Surrey also benefits from industrial clusters, including advanced electronics, engineering and air transport in Redhill and Reigate, pharmaceuticals in Surrey Heath, biotechnology and the centre for excellence in food research in Leatherhead and research and development relating to advanced engineering (electrical / electronic) in Guildford. The University of Surrey has strong ties with key links in biotechnology, medical, satellite technology, digital and multimedia sectors. Surrey benefits from a 'varied labour market, a significant proportion of which has come from

the highly rated research departments within the county's universities.'[150] There also high levels of entrepreneurship and an above average percentage of the workforce is employed as managers and senior officials.

Of the 16 universities in the region, eight are in the top 50 in the UK. The whole region, home to 750,000 businesses and with a total value of exports of around £40 billion is one of the largest manufacturing areas in the UK. The South East contributes 15 per cent of total UK GDP (Source: South East England Development Agency).

15.2 The university – facts and figures

The University of Surrey has around 14,500 students and over 2,300 members of staff[151]. It covers a broad spectrum of subjects from the Arts and Human Sciences to Engineering, Health and Law. In total it offers 50 subjects at undergraduate level. The University is highly rated in the UK, achieving 20th place in the Guardian University Guide League Table[152] with nine subjects placed in the top 10 in the Times Good University Guide. Although the University has a teaching and research emphasis towards science, engineering and technology, hospitality and tourism still took first place in the Times, Independent and Guardian league tables while other areas receiving high ratings included Sociology and Economics. Recent expansion has included the human sciences and performing arts.

While extremely successful in terms of its teaching record, Surrey University also has a strong and growing research record. It has successful RAE scores (the UK Research assessment exercise), achieving either 'world class' or 'internationally recognised' for almost 90 per cent of its 50 subject areas. Another indication of the university's research strength lies in the growing proportion of income derived from sources other than Government grants: up from 10 per cent to about 70 per cent in little over a decade.

The university also has strong ties with industries requiring research. This is exemplified by the Surrey Research Park, located on campus, set up to assist the regional economy through fostering innovation and creating an opportunity for knowledge transfer, while successfully providing the University with an extra income[153]. The park houses over 140 high-technology companies with a cumulative annual turnover in excess of £500m, exceeding its 2010 target of £5.3m of income to the University.

The University has a reputation as 'the University of Jobs' with a strong employability record, the main reason for its selection here as a case study. Graduates from the University of Surrey are the most employable of any chartered university in England. In 2008 (the latest statistics available) 96.7 per cent entered employment or further education, compared with the national average of 91 per cent. Between 1996 and 2008 the University's rate of graduates into unemployment was 2.3 per cent, compared with the national average of 6.3. The number of graduates to enter graduate-level jobs was 80 per cent, compared with the national average of 69 per cent, while the average starting salary for a Surrey graduate in 2008 was £22, 022.[154]

University business cooperation in embedded in Surrey's delivery of both education and research. The institution's roots go back into the 19th century as a vocational college intended to widen participation in Higher Education for the masses. Its academic reputation steadily

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[150] Surrey council, 2010, http://www.surreycc.gov.uk/sccwebsite/sccwspages.nsf/LookupWebPagesByTITLE_RTF/Economic+Profile+of+Surrey?opendocument

[151] 2010 figures

[152] http://www.guardian.co.uk/education/universityguide

[153] The Surrey Research Park is one of only three science parks still owned, funded and managed by the university that opened it, helping Surrey to amass one of the highest proportions of private funding at any British university.

[154] University of Surrey website, 2010, University of Surrey website, 2010

grew until it became the first of its kind to achieve the status of a 'College for Advanced Technology',[155] then becoming a chartered University in 1966. Despite this change in status, the University retained its strong tradition for industrial linkages and is known for its professional training schemes, which are sandwich-year placements lasting 12 months. These schemes have been running for over 40 years. There are very few Universities in the world that have the University of Surrey's track record in this type of fully supported and integrated placement year.

15.3 Approaches to university business cooperation

The University of Surrey has university business interactions running throughout its activities. This is not a centrally managed function of the university but is managed and implemented at a school/faculty level in a variety of ways, tailored to particular needs. This is the case in the majority of UK universities which are highly autonomous institutions. However the University of Surrey has an unusually strong strategic emphasis on university partnership with industry and graduate employability as a key performance indicator.

The most recent university plan (2009) focuses on the 'Student Experience, Widening participation & outreach and Internationalisation'. A cultural change programme focusing on leadership development and engagement of Heads of Departments in the implementation of the strategy has been launched.

The University of Surrey's mission is stated as "to work in partnership with industry, commerce, the professions and with other institutions for the benefit of our world. We will achieve this by providing scholarship attuned to the particular needs of society, developing leading-edge research and creating a rich and varied learning environment."

As set out in the Learning and Teaching Strategy[156] one of its aims is

> *"To provide the highest quality student learning experience that combines academic rigour, personal and professional development and employability through introducing students to the most up-to-date knowledge that will enhance and develop their skills for independent academic study, digital media literacy, innovation, and working in professional contexts."*

As part of this, the university records and reports on both academic and personal achievement managed through the "student experience" sub committee.

This case study highlights some of the activities which are taking place at Surrey University which support the employability of the student and involve university cooperation with business for the purpose of education rather than research.

A high profile approach which is used throughout the university and across all faculties and disciplines is the "Professional Training Placements" [157]. Professional Training schemes vary between departments and have been adapted and developed by each department to provide the best opportunities for their students. More details follow, with an emphasis on the placements undertaken through the school of management and the faculty of Health and Medical Science. The overall governance structure of the Professional Training Placements is presented and discussed.

Another focus is on the work of the CETL "Centre of Excellence for Teaching and Learning which advocates the idea of lifewide learning".

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[155] University of Surrey website, 2010, http://www.surrey.ac.uk/about/history/

[156] Learning and Teaching Strategy, 2010-17

[157] There are three main types of placements offered by Surrey. In this case study, it is the 48 week placement which is presented (one academic year).

The case study then explores some of the pressures which affect the academic profession in helping to enhance the student experience whilst at the same time maintain research excellence.

15.3.1 Professional Training Placements for University of Surrey Students

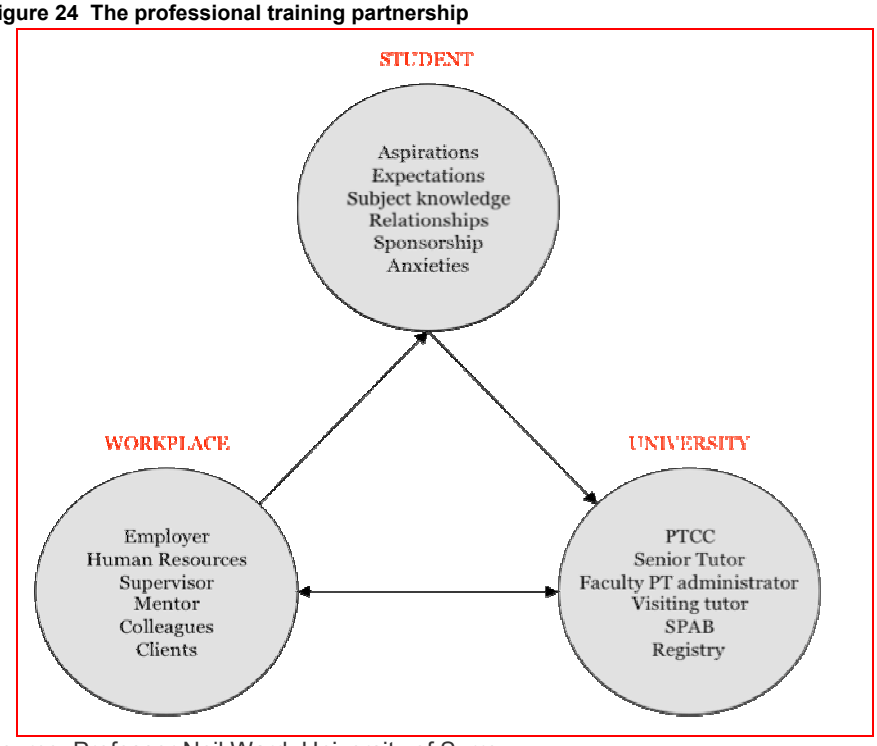
Although professional training placements have now become common on University courses, Surrey is unique in terms of the level of support it offers its students, where they are supported from the application stage right through to the end of the placement.

A pioneer in integrated professional training, the University has operated its scheme in partnership with industry and professional bodies for the last 40 years. About 50 per cent of University of Surrey undergraduates complete a professional year as part of their degree – the highest proportion of any UK university. Generally they spend the third year of their four-year degree programmes working as professionals in industry, the public sector or the professions, in the UK or abroad (around 25 per cent of professional training placements are abroad). Most students are paid a salary by their employer which is usually about two thirds of a graduate level salary. In the UK alone, over 350 organisations, including many blue-chip companies, provide professional training placements for University of Surrey students. Around 1,000 placements are made each year; 15 to 20 per cent of students take up permanent employment with their placement company on graduation, and about 40 per cent of graduates gain employment with companies offering placements.

Placements are arranged and supervised by the University and in most degree programmes the student's performance in professional training is formally assessed as a credit towards the final degree. Some distinguishing features of this programme make it stand out amongst universities.

- There is a network of Senior Tutors for Professional Training in the University who are trained and experienced in placing and supervising students; the tutors have a wide understanding of the industries and professions linked to their own subject field.
- The University uses its long-term relationships with industry and professional bodies to help students find placements. It also ensures that in many cases the undergraduate programmes are attuned to the contemporary needs of industry and the professions and students are well prepared for their placement year;
- Students are matched closely to placements so that individual interests, academic strengths and career ambitions of the student correspond to the particular requirements and business climate of the employer;
- Their tutor visits students from the University at least three times during the professional training year so that progress can be monitored and close liaison is established with the employer. Links are maintained throughout between student, tutor and employer;
- For each placement, training objectives are set for the professional year in advance and the experience of the professional year is developed in the final year when the student returns to campus; project work during the year enhances the qualities of judgement and professional know-how gained in the year away.

Figure 24 The professional training partnership



Source: Professor Neil Ward, University of Surrey

15.3.2 Governance and strategy of the professional training placements

The "Professional Training and Careers Committee" coordinate the professional training scheme at the University of Surrey. The committee is directly accountable to the Senate (the main governing body of the University) and there is a central annual budget for the visits. There are around 25-30 people on the committee. Professor Neil Ward, coordinator of Professional Training, and in charge of quality, chairs the committee. A representative senior tutor from each faculty is responsible for policy, regulation and legislation. They advise the Associate Deans of each faculty and liaise with other senior tutors. There are also industrial/professional advisers, a representative from SCEPTrE (the Centre of Excellence in Teaching and Learning, careers, the student union, the disability officer and STAG (the associated think tank for professional training). The whole committee works independently of the faculties.

In addition to the committee which meets three times a year, an annual Professional Training Community day provides an opportunity for academics involved in professional training to come together to discuss any issues. There are also mini conferences, and a validation review every three to five years.

STAG is the strategic think tank for professional training which meets three to four times a year for full and frank discussions on any issues arising.

The quality standards of the placement are established and maintained by continuous monitoring and an annual survey of student opinion. Under consideration is a mid term survey which could help influence the final half year of the placement rather than just shape future placements.

A key role in organising the professional placements is the administrator. At the faculty and the department level, the administrator is responsible for liaising with students, budgets, coordinating visits and finding new placements.

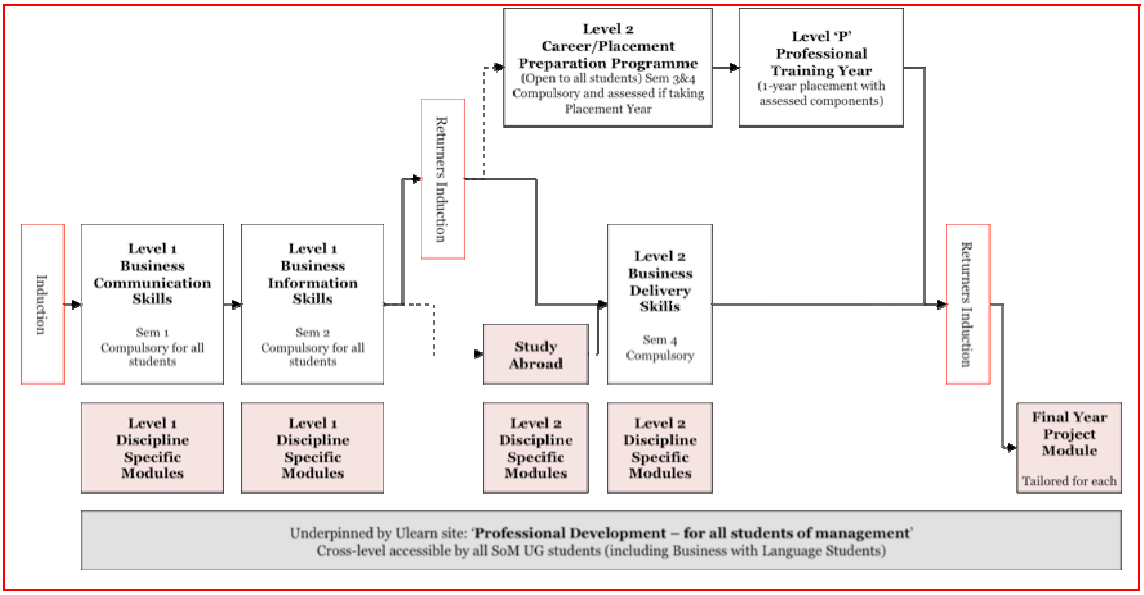
15.3.3 Assessment and accreditation

Assessments are made on the basis of written records, the three visits from the academic tutor and in consultation with the student's employer. For each student, learning and assessment outcomes are defined. The placement may be recognised in the degree award (e.g. MChem, MPhys). Several professional bodies recognise the University of Surrey professional training year and students successfully completing it are granted exemptions from certain of the requirements for membership of professional bodies. Examples of this are State Registration in Dietetics and Chartered Engineer status through the Institution of Mechanical Engineers and the Institute of Materials.

15.3.4 Spotlight on Professional development in the School of Management

The whole approach to employability starts as the undergraduates enter the first year. There is a considered focus on the development of professional attitudes, attributes and abilities. The first year involved a management skills module and there is the use of an e-portfolio system to record and reflect on professional development from the start of the degree. At an early stage students are all given the option of applying to study abroad. This is a scheme where students study at an institution outside the UK during the autumn semester of the second year. Also during the second year students have the option of undertaking the placement preparation programme, which is designed to help them secure the 1-year placement and make the most of the Professional Training Year. The university's Careers Service provides supportive resources and workshops for this programme and a dedicated team of tutors and administrators provide individual support and guidance both before and during the placement year. Students are encouraged to start thinking about work from the first year and therefore there is a range of online resources designed to help students develop transferable skills, engage in meaningful work experience and summer internships, make the most of part-time work, and engage in socially-focused activities that will enhance their CVs.

Figure 25 The SoM Professional Development thread – helping students enhance their employability



Source Lindy Blair, University of Surrey, School of Management 2011.

For the placement, the individual student has the freedom to apply for any placement of interest, but the school of management already has hundreds of placement opportunities available. They are advertised centrally and each student can apply for as many as they like. If students wish to arrange their own placement, this has to be approved by the school of management who will sign a contract with the organisation. The placement coordinator briefs all companies and a relationship is built between the two.

There is support and guidance for finding a placement and securing a place, through the "professional training orientation programme" during the second year. The placement counts for 10 per cent of the degree and is judged on an assignment, reflective practice and feedback from the tutor and the company. In some faculties, the students and the placements are matched by the tutors. In the School of management, the students are responsible for applying for their own placement opportunities. Even if students make the decision to not do a placement, they are encouraged to attend events and seminars dealing with employability. Overall of a cohort of 300 students who consider a placement, 180 will go on to completion. Some students will not be successful, which may reflect their personal ability at that point in their studies.

For the school of management, as well as the academic senior tutor looking after the student (around 60), there is 1 FTE academic managing the process and 1 FTE administrator. As a model it is resource intensive but effective.

15.3.5 Lifelong/Lifewide learning – recognition of extra curricular learning

Surveys undertaken in the UK[158] have shown that co- and extra-curricular award and recognition schemes are now an important feature of the UK Higher Education landscape. This phenomenon is associated with all university peer groups and is especially well represented in the top 20 research intensive Russell Group and 1994 Group of Universities. The emergence of co- and extra-curricular awards suggests a system-wide adaptation that is fundamentally about making higher education more relevant to the lives of learners and recognising that there is more to learning and education than simply studying a subject.

Surrey University has a number of examples of supporting lifelong learning. It has a partnership with Progress South Central, an organisation designed to address the needs of vocational learners and to help remove the barriers they face in their career progressions. Surrey University also offers Professional Development courses, which are postgraduate courses for mature students who have experience in their field and wish to take the subject further. Another way that Surrey University supports Lifelong Learning is through its Lifewide Learning Award scheme[159]. This pilot scheme awards a 'Graduate Employability Certificate' and is intended to provide Surrey graduates who do not have a job with the opportunity to demonstrate the employability skills they have gained through extra-curricula activities. Surrey University try to build this insight into all their courses as they design them:

'What we do as educators and institutions is only one side of the educational equation. Learners are busy preparing themselves for the rest of their lives…. When designing educational experiences educators usually begin with their own concepts of a curriculum. We begin with our purposes and the outcomes we want to promote.'[160]

At Surrey University, SCEPTrE is the Centre of Excellence in Teaching and Learning (CETL), which embraces the complexity of the learning experience. SCEPTrE is concentrating on the development of student's professional practices. The Centre of Excellence has introduced the term lifewide learning.

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158 Tom Norton (Norton 2009) and Charlie Rickett (2010)

159 http://www.surreylifewideaward.net/

160 University of Surrey website, SCEPTrE Portal, 2010, http://sceptre2.drupalgardens.com/content/lifewide-education

"We are calling this lifewide learning to complement the well-established life-long journey that we all make" (Jackson 2008). An individual's lifewide enterprise contains far more opportunity for learners to exercise their will than the parts of their lives that are only associated with an academic programme. But will alone is not enough alongside this intentionality learners must have the agency (ability to think, capability to act, self-awareness and self-regulating capacity) to engage in ways that will enable them to act, influence events, achieve their goals and learn through their experiences."

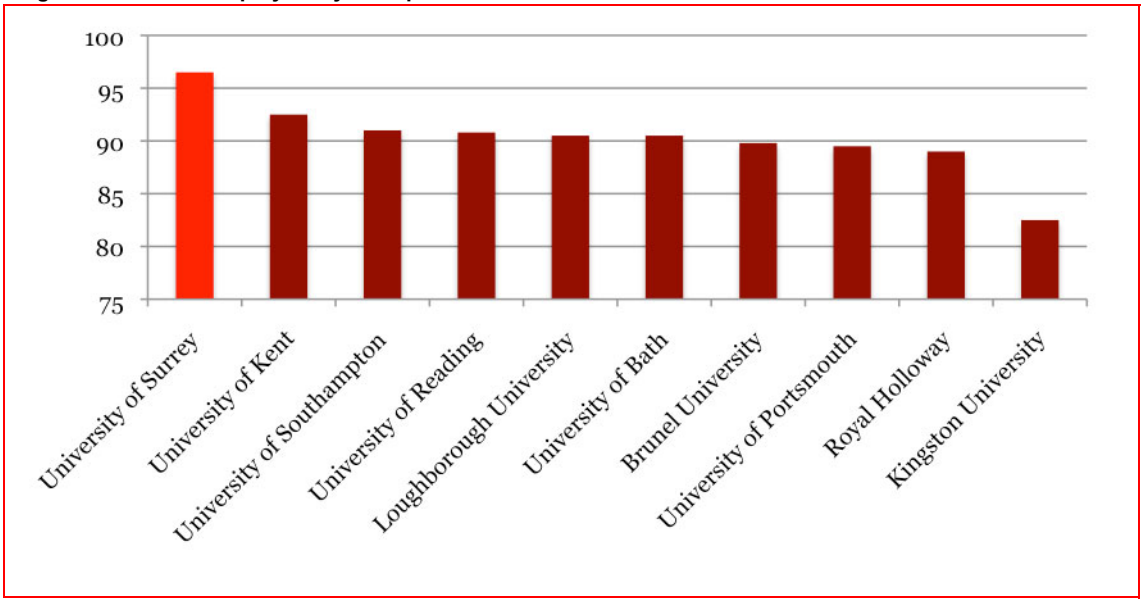
As part of the student experience a Personal Development Plan has been introduced to encourage educators to pay more attention to lifewide learning. SPECTrE also has a number of examples of way to encourage the development and documentation of professionally relevant skills. There is a project called CoLab (collaborative enquiry) which a team of students have developed over the last few years into a student commercial enterprise. As part of CoLab the students recently held an event call Taste of Technology which had a dual role of inviting local businesses in to the University and having students explain to them how they could use web 2.0 technologies in their marketing; the other was to give the students practical experience of networking with real companies.

Another SCEPTrE approach is the SCEPTrE Academies. These provide opportunities for students to combine and integrate learning and experiences through a mixture of approaches. The students have a choice of five possible academies. In the Cultural Academy the students share their cultural experiences, and then work together to create an enterprise that adds value to the University of Surrey's multicultural campus. In the Enterprise Academy the students are given £100 to use as an investment which they have to try to make a profit on. In the Social Enterprise Academy the students have an opportunity to interact with action groups that have social or environmental objectives, they then try to make an enterprise that adds value to that organisation. In the Values and Ethics Academy the students have the opportunity to explore and discuss their values aided by the use of SCEPTrE's Values Exchange website which provides cases and resources to facilitate discussion. Finally, the Xing Academy asks students to construct a business plan that will be assessed by a group of business representatives in the style of Dragon's Den. The students are expected to dedicate 10 – 15 hours each to their enterprise and to take pictures and film themselves undertaking its construction. They finally present their experience through a film in the second two to three hour workshop.

15.3.6 Impacts of the professional placement scheme

A key indicator of the success of the University is the employability record. As highlighted, in 2008 96.7 per cent entered employment or further education, compared to the national average of 91 per cent. At the moment, unemployment in graduates is running at around 20 per cent in the UK due to the economic climate. Surrey University is optimistic that its graduates will be much less affected than others. In comparison to the other universities in the region and of comparable strategic focus, employability is highest from the University of Surrey.

Figure 26 Rates of employability vs. equivalent universities



Source: HESA statistics 2008

15.4 Barriers to university business cooperation

Although not a barrier in the strictest sense, involving industry in curriculum development is always an issue. The development is a long process, and although there needs to be good market intelligence from industry, its involvement in curriculum design is more complex than in relationships such as placements. There are different ways of involving business; this can be through ad hoc advisory groups, or through more informal personal relationships. A mixture of methods is considered to be best by those interviewed at Surrey university. There will always be a time mismatch as formal changes to the course content take time to become embedded. Another key concern is that, although industry relevant courses are extremely important, it is the responsibility of the professors to manage expectations and balance the needs of the labour market with the needs of quality and excellence in the course. Industry, especially single employers have a much narrower understanding of what universities are expected to deliver and so therefore can be a guide but not a course developer. In the hospitality and tourism management division of the school of management at the University they are currently re designing the courses for undergraduates.

Another key issue is the pressures of measuring success in the professional development of staff. There is increasing pressure on research at the University of Surrey, not least due to the recent budget cuts of central government. Surrey University is focusing more heavily on research excellence at the moment due to its good education record. Surrey University has the strategic vision to be in the UK top 10 and the World top 100 universities.

It is also much easier to measure research output for a professor compared to business/industry links and their impact. It is possible to measure the number of relationships with industry but this is a poor measure of success, being output related rather than impact. On an individual basis there are clear examples of how relationships with business lead to good market intelligence, new networks etc which can be used for the education and research agenda, this is very difficult to measure and attribute to an individual.

In principle every academic at Surrey University can be requested to get involved in professional training and can be responsible for delivery, administration or involved in the think tank or committee. There is in fact a high level of support for involvement in the professional placements and the current Professor in charge of the programme is well recognised and rewarded for his commitment.

Managing the relationships with the businesses is currently done at the faculty and school level. This may mean that one company is administered by two different parts of the university. A central management system has the capability to manage the relationships more efficiently in the future and can include all the information on the students as well.

In addition, because the employability rates are so good and the university well regarded by students, there is little impetus to increase the measurement in these types of collaborations. This is more likely to happen if the popularity of the institution, or its employability figures started to decrease. There is also little impetus for professor mobility. This is not something which is rewarded in careers and so therefore does not really happen. If two track career paths became more common in UK institutions it could on the whole be detrimental to the flow of knowledge between research and education.

Cost is another consideration. This is an intensive approach to increasing student employability. There are significant rewards for the students and therefore for the economy in terms of qualifications and work based skills. Although professors and tutors may have a less traditional career path if involved in professional training, there are also significant benefits cited, including the relationships and knowledge they gain from the experience. There are moves to include one virtual visit a year to cut down on the travel costs, particularly to those placements overseas. This has to be done without reducing the quality of the support. The cost is also an issue in terms of transferability of approach: other interested institutions have approached Surrey, but were a scheme such as this put in from scratch, it would be difficult to replicate such a long-standing established system.

There has also been a decrease in the last few years in students taking up the placement opportunities. One reason for this is a growing number of international and mature students. International students tend to be studying for other reasons than employability and mature students often have valuable work experience. Another reason in the cost of studying, this is likely to increase as an issue now that student fees have gone up so significantly in the UK. Many students are now more reticent to increase the amount of studying time.

15.5 What are the key lessons which can be drawn out from this approach?

From the example of Surrey University, it would appear that university business cooperation is a high priority at the strategic level, but does not need to be organised or managed at the institutional level. In a large and complex university, the organisation is led at the School and Faculty level. Although Professional Training as a whole is monitored by the Professional Training and Careers Committee (PTCC), many groups work alongside each other to provide the best possible opportunities to students. The Careers Service, International Relations Office, the schools, faculties and SCEPTrE all contribute to the success of Professional Training at the University of Surrey.

The relationships with the businesses, particularly for the placements, are extremely important to the university and have to be nurtured. In new relationships there needs to be mutual trust and understanding. The Professional Training Scheme coordinator for each School or faculty works with the companies to ensure that the relationship works. There are very few reported failures in the placements, and if there are issues they tend to be with companies which students have found and wish to be placed in.

The approach to employability starts as the student enters the institution and Surrey appears to have a wide range of opportunities from part time jobs on campus, through lifewide learning awards and enterprise development to their placements in industry. All the incentives are there for the students to engage with their future careers. The incentives are however less clear for the academics.

Another key issue for the future is how to adapt the methods of teaching and curriculum in the final year, once a student has returned from a placement. The placement is an enriching and life changing experience for many of the students. Therefore there is a need to look at how

best to continue to address their educational needs whilst capitalising on the additional experience that the students have gained during their year in industry. There is also the issue of how to deal with those students who have not taken a year in industry. The current discussions are moving towards a solution where both sets of students can be catered for by ensuring that those students who remain at the university continue to have as much exposure to business skills and experience as possible.

It is difficult to exploit the relationships with businesses at both a research and education level at the same time. Research links tend to work at a much deeper level and be more directly related to the work of the university than to the undergraduate. In an idea world there would be a more connected approach to maintaining links to business for all purposes, research, education and knowledge transfer activities.

In order for this type of intensive and accredited professional training element to work there needs to be a strong commitment from the top. This type of scheme is resource intensive on the academic side. The tutors commit not only to visits but also to regular reports from the students and close linkages throughout the placement. The organisation of placements and the relationships with the businesses involved is also time intensive. In the school of management alone there is almost two full time equivalents working on the administrative side without including the commitment of the tutors

15.6 Contacts, references

Professor Gill Nicholls Depute V-C Academic Development

Professor Andrew Lockwood, Forte Professor of Management, Associate Dean (Learning and Teaching)

Lindy Blair Professional Development & Employability

Professor Neil Ward, Professor of Analytical Chemistry, Chair of Professional Training and Careers Committee

HESA Statistics

The University Website and Strategy

Learning and Teaching Strategy, 2010-17

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SCEPTrE Portal, 2010, http://sceptre2.drupalgardens.com/content/lifewide-education

16 UNIVERSITY OF TURKU (FI)

Summary of key points

The University

- The University of Turku, established in 1920 in southwestern Finland, is the second largest university in the country as measured by student numbers: there are approximately 21,000 students out of whom 16,000 are degree students, 2,500 post-graduate students and 2,500 visiting students. The University awards 1,000-1,500 Master's and Bachelor's diplomas and 140 doctoral degrees annually. The largest faculties are the Faculty of Humanities and the Faculty of Mathematics and Natural Sciences.
- In the recent reorganisation of higher education in Finland, the University of Turku merged with Turku School of Economics (TSE).
- The majority of the university's graduates do not enter industry, but are employed by municipal agencies and institutions and by central government.
- A regional development project (Korkeakoulut seutukunnissa) coordinated by the Centre for Extension Studies of the University of Turku supports regional development and strengthens SMEs' competitiveness through improving availability of higher education, research and development services of the seven higher education institutions located in Turku. The project looks for structural and operational models to enhance regional engagement of the HEIs

The Business Context

- The region's economy is dominated by food, maritime, pharmaceutical, metal and information technology industries together with biotechnological development. The sub-regions of the Southwest Finland region have different economic profiles. While the Turku sub-region has a strong focus on biotechnologies and half of Finland's medical development and diagnostics companies are located in Turku sub-region; the Salo sub-region builds on the traditionally strong ICT sector, with Nokia's main mobile phone manufacturing sites located in the city of Salo. The Vakka-Suomi sub-region is home to the only car factory in Finland and the archipelago, Åboland sub-region relies on tourism exploiting its natural endowments

16.1 Institution

Despite its small size, Finland has one of the most dynamic economies in the OECD. Finland's GERD as a percentage of GDP is significantly higher than the EU 27 average (in 2008: 1.83 per cent). Over the last decade, GERD as a percentage of GDP has increased from 2.7 per cent in 1997 to 4 per cent in 2009. Finnish GDP per capita (PPP) was $36,195 in 2008. The following table provides an overview of the main S&T indicators of Finland.

Figure 27 Overview of Finland S&T System (2008)

	Finland Data from 2008
GERD as a percentage of GDP	3.72%
BERD as a percentage of GDP	2.76%
Total researchers per thousand total employment	16.2
Total R&D personnel per thousand total employment	22.45
Export market share: Electronic industry	1.32
Export market share: Instruments industry	0.547
Number of patent applications filed under the PCT (2007)	1,469
Number of patent applications – in the ICT sector - filed under the PCT (2007)	687.2

Source: OECD, Main S&T indicators

For the purposes of planning and development of enterprise and education, Finland is divided into 19 regions, governed by regional councils. The University of Turku is located in the Southwest Finland Region, the third largest region in Finland in terms of population, with about 461,000 inhabitants across five sub-regions. The region contains an archipelago with

about 22,000 islands. Southwest Finland is a key agricultural and industrial production area, with tourism also playing a significant role in the region's economy. Turku (Åbo in Swedish) was the former capital of the country until 1812. The city is now the seat of the Southwest Finland region, with about 1/3rd of the region's population, around 176 thousand inhabitants living in Turku. It is an important educational city, hosting six higher education institutes: two universities, the University of Turku and the Swedish speaking Åbo Akademi University and four universities of applied sciences. The city has altogether approximately 40,000 higher education students. The Academy of Turku, the first university in Finland, was established in the city in 1640. The city also has a vivid cultural life, and in 2011 Turku is the Cultural Capital of Europe.

The region's economy is dominated by food, maritime, pharmaceutical, metal and information technology industries; biotechnological development has also crucial significance. The sub-regions of the Southwest Finland region have different economic profiles. While the Turku sub-region has a strong focus on biotechnologies and half of Finland's medical development and diagnostics companies are located in Turku sub-region[161]; the Salo sub-region builds on the traditionally strong ICT sector, with Nokia's main mobile phone manufacturing sites located in the city of Salo. The Vakka-Suomi sub-region is home to the only car factory in Finland and the archipelago, Åboland sub-region relies on tourism exploiting its natural endowments.

16.1.1 Higher education system in Finland

Nowadays, according to the Pisa ratings, Finland leads in education system quality, despite expenditures being not much higher than the EU average.[162] The current Education and Research Development Plan set ambitious targets in terms of the education level of the Finnish population, as Figure 28 shows.

Figure 28 Educational Level of the Population: Targets for 2015 and 2020

	2005	Target 2015	Target 2020
Share of those with a post-primary qualification			
of 25–34-year-olds	85.0%	92.5%	95.0%
of 25–64-year-olds	76.0%	85.0%	90.0%
Share of those who completed the matriculation examination			
of 20–24-year-olds	51.0%	52.0%	53.0%
of 25–34-year-olds	46.0%	49.0%	52.0%
of 25–64-year-olds	32.0%	41.0%	45.0%
Share of those with a vocational qualification			
of 25–34-year-olds	45.0%	45.0%	46.0%
of 25–64-year-olds	52.0%	52.0%	51.0%
Share of those with a higher education degree			
of 25–34-year-olds	28.0%	38.5%	42.0%
of 25–64-year-olds	19.0%	25.0%	30.0%
Share of those with a vocational qualification or a higher education degree			
of 25–34-year-olds	73.0%	83.5%	88.0%
of 25–64-year-olds	71.0%	77.0%	81.0%
Share of those with a postgraduate degree			
of 20–24-year-olds	0.5%	0.8%	1.0%
of 25–34-year-olds	1.1%	1.4%	1.7%
of 25–64-year-olds	0.9%	1.2%	1.5%

Source: Ministry of Education, Education and research 2007-2012, Development Plan, Helsinki 2008

[161] Source: Regional Council of Southwest Finland: http://www.varsinais-suomi.fi/

162 Karl Aiginger, Paavo Okko, and Pekka Ylä-Anttila: Globalization and Business Innovation in a Borderless World Economy, Evaluation of the Finish National Innovation System, 2008

The Finnish tertiary education system applies a dual model, comprising universities and polytechnics. The University Act in 1997 defined the four main tasks of the universities[163], including promotion of free research, scientific and artistic education, research based higher education and education of students to serve their country and humanity. The legislation was amended in 2004 to include the responsibilities regarding the universities' third task.

There have been further changes in the education system recently. In 2010 the Finnish government created a new entity by merging Helsinki University of Technology, Helsinki School of Economics and the University of Art and Design. The new university was renamed Aalto University and was established as a foundation under private law. Further mergers are planned between regional Universities in strategic alliances with polytechnics, with the purpose of aggregating resources and research capacity. The ultimate expectation is that in 2012 the Finnish education system will have no more than 15 universities and 18 polytechnics. Mergers are seen as a way to improve the international visibility of universities, to put together funding for research, but also to lower the barriers which hamper smaller universities in participating in research competitions because of the high administrative costs.

The 2009 Universities Act, intended to balance public and private funding to universities in future years, is a major shift in the autonomy granted to Finnish universities. In 2008, core funding allocated by the Minister of Education accounted for nearly 60 per cent of the total Universities expenditures.[164] The Act aims at enhancing university autonomy to supplement basic funding with donations and business activities. As a result, Finnish universities are detached from the state budget, although the Ministry of Education continues to grant core funding to the universities for their statutory public duties.[165] Universities are granted an independent legal status, either in the form of independent corporations (public law) or in the form of foundations (private law).

16.2 Institutional framework

In line with the national trends, the University of Turku reached its current organisational set up very recently, through the merger of the Turku School of Economics (TSE) and the former University of Turku. The university has a unique history dating back to 1920, when it was established as the first Finnish-speaking university.

Currently the university operates with seven faculties, 11 special units and other internal support services, such the project and innovation services. The Faculty of Humanities is the largest among the faculties with 400 students accepted annually, followed by TSE with 320 students and the Faculty of Education with 250 new students every year. The organisation of the appointment of department heads and deans is multi tiered, with the rector appointing the deans who then take responsibility for the appointment of heads of departments. This represents a change from the previous election-based, bottom-up approach.

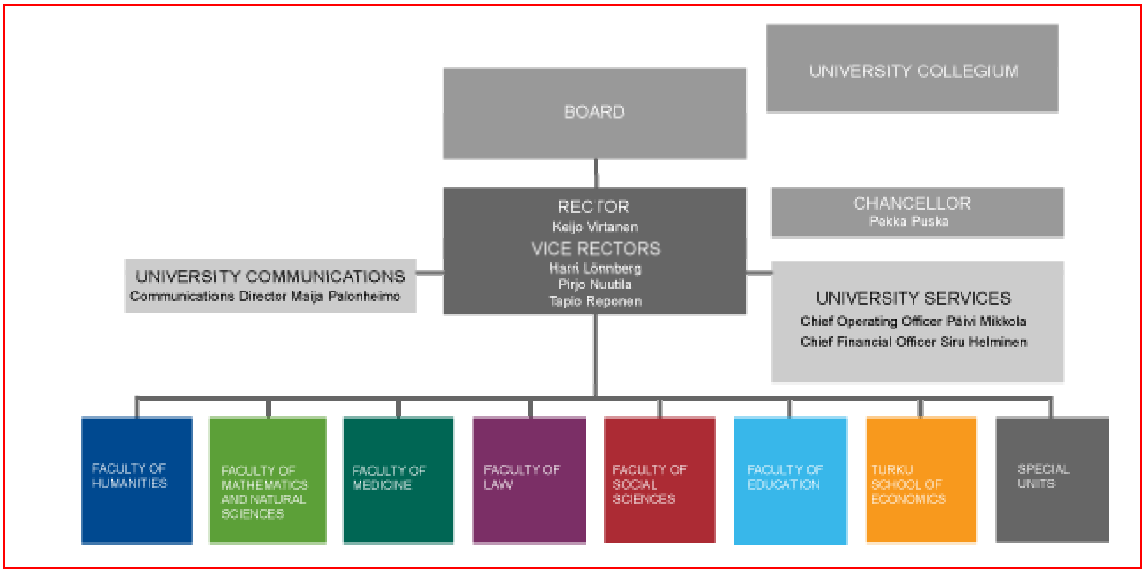
The special units are independent organisational units, under the direction of the rector and the central administration, but mainly carrying out their activities with external funding. Seven out of the 11 special units are fully run by the University, while the others are joint units with other universities.

163 Reinhilde Veugelers, Tanja Tanayama, and Otto Toivanen: Evaluation of the Finnish National Innovation System, Education, Research and the Economy, 2009

164 Joint Report by the Economic Policy Committee (Quality of Public Finances) and the Directorate-General for Economic and Financial Affairs, Efficiency and effectiveness of public expenditure on tertiary education in the EU, Annex: country fiche Finland, European Economy Occasional Papers No 70.

165 Proposal for the new Universities Act in Brief, 2009

Figure 29 Organisational Structure of the University of Turku



Source: the website of the University of Turku, http://www.utu.fi/en/university/administration/

The University's organisation comprises:

- The Board, which is the highest level decision making body of the University. It is a ten strong body that consists of: two student representatives; four representatives of the university: two professors and two other staff members; four external members including the chair the Board assigned by the University Collegium. The Board decides on the key topics regarding the University such as the number of students to be admitted, financing issues, which subjects to teach and the Board elects the rector of the University. The rector is not a member of the Board;
- The University Collegium has 50 members. It has the authority to decide on the non-university representatives of the Board and on the term of office of the Board;
- The Rector represents the university to the authorities and he has directs the activities and process of the university;
- Three vice-rectors support the rector with different responsibilities including teaching, learning and external relations; research activities and monitoring, evaluation and development of quality systems, postgraduate education;
- The role of the Chancellor of the institution is defined in the University's rules of procedure as 'the Chancellor shall promote science and the University's societal interaction as well as to supervise the University's common good and activities and that good scientific practices are followed and he acts as the chairperson of the University's advisory board on developing interest group cooperation and the University's ethics committee';[166]
- University Communications and University Services support the smooth daily operation of the University, fulfilling a broad range of tasks including administrative, personnel, financial, IT and communication activities, academic and student affairs, international relations and running the University's library;
- An Advisory Board, with 10 business representatives amongst its 24 members, recently began to operate at the University.

[166] Source: the website of he University of Turku, http://www.utu.fi/en/university/administration/Chancellor.html

Project and Innovation Services

The unit is part of the central administration of the University, under the direction of the Rector. It has a staff of nine in full-time equivalent out of which the wage of a colleague is funded by the Foundation of Finnish Inventions. The unit provides back-offices services to the University's research and other externally funded activities. They provide advice, help with the project application procedures, and support during the execution of the projects. Furthermore, the unit promotes the exploitation and utilisation of the research results generated at the University. There are many funding sources available nationally supporting the exploitation of research results, which is considered a key challenge area in Finland:

- *TULI Programme funding by Tekes, which targets researchers, research groups and students by offering funding for the exploration of potential business ideas of three different development phases*
- *Funding by the Foundation of Finnish Inventions that supports the generation of new start-up companies*
- *Funding provided by the Government Office supporting the establishment of new start-ups*
- *The Protomo project which is jointly funded by SITRA, the TE-Centres, the participating cities and organisations is a multidisciplinary project that aims to create business opportunities and jobs based on new innovations or service concepts s*

The innovation related activities of the unit also cover patenting and licensing, regulated by the University Inventions Act (1st January 2007) and since the University Act entered into force the establishment of spin-off companies. A network of contact persons located at the various departments across the University supports the Project and Innovation Services Unit.

The University's strategy for 2010-2012 defines the institution's main priorities. Strategic planning ensures continuity with the previous and forthcoming strategies and incorporates the views of the faculties and units of the University. The key points of the strategy are outlined in action plans[167]:

- Completion of the merger of the University of Turku and the Turku School of Economics
- Developing the areas of strength in research and the areas in a strong development stage
- Establishing the four-tier research career model
- Strengthening the research collegia i.e. the Turku Collegium for Science and Medicine (TCSM) and the Turku Institute for Advanced Studies (TIAS)
- Research-based education and lifelong learning
- Integrating societal interaction into the basic missions of the university

  'The University of Turku defines societal interaction as part of the University's basic mission integrated into research and education. The interaction becomes concrete in different ways: the new knowledge attained through research and development work, service research and utilising the research results, undergraduate and postgraduate education and the working life relevance of the degrees, educational export, alumni activities, services for lifelong learning and regional development projects.' Source: Action Plan, Integrating societal interaction into research and education[168]

- Intensifying internationalisation

[167] Source: University of Turku: Strategy 2010-2012

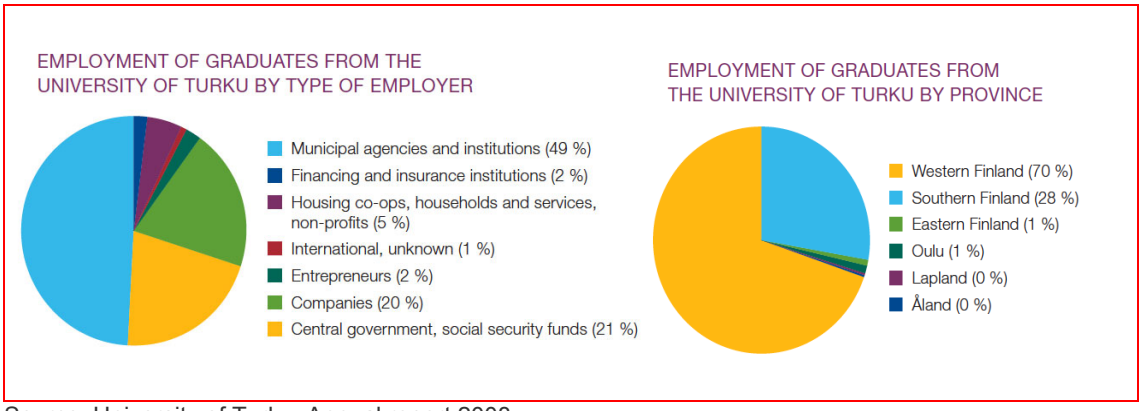
[168] Source: University of Turku: Action Plan, Integrating societal interaction into research and education, 14/12/2009

The strategy is implemented through the activities of the individual units, departments and faculties, but their involvement in the development of the strategy results in commonly accepted topics and priorities. The University can also provide incentives for the research groups to foster the alignment of their activities with the institutional strategy better by using strategic funding from a dedicated pot available (€3million for the current year.) Furthermore, there are monitoring and evaluation activities put in place that aim to ensure the efficient implementation of the strategy and twice a year 'Annual Strategy Days' are organised to stimulate discussions on the different aspects of the institutional strategy.

The current annual budget of the University of Turku is €221million, out of which 69 per cent is funded by the Ministry of Education leaving 31 per cent to be raised by the university. This means that all the university's teaching activities are funded by the state and the research activities have to be covered from external resources. In Finland basic education is free up to doctoral degree level. Students pay tuition fees for MBAs or for participation in other programmes that are not part of BA or MA degrees. The need for external funding in the University's operation is an important driver for promoting university-business relations. External funding sources ensure the employability of the University's own staff, mainly research related, who are employed from the different project funding.

The University has about 21,000 students out of whom 16,000 are degree students, 2,500 post-graduate students and 2,500 visiting students. The University awards 1,000-1,500 Master's and Bachelor's diplomas and 140 doctoral degrees annually. The number of applicants to the university is more than 15,000 annually, out of which 14 per cent is accepted. The majority of the graduates are employed by municipal agencies and institutions and by central government, according to the annual report of the University of Turku from 2008 (see Figure 30) The University runs graduate surveys every third year. The responses revealed that 83 per cent of the graduates got a job within two years after graduation, and the graduate unemployment rate is about 8.2 per cent. There are some differences between the different faculties regarding the graduate employability, with medicine and business studies having the highest employability ratios.

Figure 30 Employment of the Graduates of the University of Turku[169]



Source: University of Turku, Annual report 2008

16.3 Approaches to university business cooperation

The University's approach to university business collaboration can be described from many angles: through its educational or research activities or based on the University's regional or international engagements and role. The University's societal interaction and its quality management are defined in the University's Societal Interaction Matrix. The matrix covers the regional, national and international actions of the University and its interest group

[169] The charts do not contain data on the Turku School of Economics, data precede the merger of the two universities

coordination divided into tasks, responsibilities, executors, methods and means on one hand and objective setting, implementation, evaluation and development on the other.

There is a broad range of services offered to external partners by the University, including:

- Contract, commissioned research and development activities;
- Participation in collaborative, joint national or international projects;
- Use of the facilities of the University, including testing, measuring and analysis equipment and laboratories;
- Educational and development services for enterprises, organisations, and national and international public authorities;
- In-house development and training programmes and seminars for enterprises;
- Provision of state-of-the-art knowledge and expertise;
- Adult education;
- Alumni services;
- Recruitment services.

This section aims to provide an overview on the University's main business collaborations describing the broader context of the University's activities and the barriers and obstacles that had to be overcome.

16.3.1 International relations of the University of Turku

The strategy of the Ministry of Education puts large emphasis on increased level of internationalisation, which is also reflected in the university's strategic agenda. The University is very active in international relations through collaborative research projects and programmes; participation in international networks; participation in international conferences and receiving visiting professors; student and staff exchanges and also joint curriculum development and degrees. The International Office of the University facilitates the international mobility of students, researchers and teachers.

At the moment the University offers 16 international Master's degree programmes all but one taught in English. International relations are also important part of the executive education programmes organised by the TSE Exe. Recently, the language of education became English as well and international study weeks in, e.g. Texas or Hong-Kong, form integral part of the programme.

Although professor exchanges are not very common nowadays, due to the Erasmus agreements with other institutions, the number of exchanges is expected to increase in the near future. The Academy of Finland's distinguished professor programme provides incentives to attract highly-regarded researchers and outstanding professors to Finland for a limited time period, generally 3 years. There are ten positions funded by the Academy out of which one professor is now working at the Functional Food Sciences special unit at the University of Turku.

The university is member of the Coimbra group; it is one of the founding members of the Baltic Sea Region University Network; and it is also the coordinator of the Erasmus Mundus funded Triple I project, which aims to foster multidisciplinary and multilateral cooperation between European and Russian universities. Through the Turku Centre for Computer Science, which is a joint unit between the University of Turku, the Åbo Akademi and the Turku University of Applied Sciences, the University is also active in the ICT Labs KIC of the European Institute of Innovation and Technology.

The Baltic Sea regional networks have great importance for the University regarding both educational and the research activities. The Brahea Centre for Training and Development is one of the University's special units, focusing its activities especially on the Baltic Sea Region. Since 1997, the University has been running the Baltic Sea Region Studies programme focusing on multidisciplinary topics of inter-regional significance; furthermore, the University is the coordinator of the Baltic Sea Region University Network (BRSUN).

16.3.2 The University's role in the regional economy

In the past decade many universities in Europe have formally incorporated regional economic development into their mission statements, as did the University of Turku. The University has intensive cooperation with companies, NGOs, municipalities and public administrations and with the other higher education institutes in the region. In addition, the University has about 3,500 employees, making it the third largest employer in Turku. Hence, the institution plays a significant role in the development of the Southwest Finland region through numerous actions, programmes and networking activities.

The higher education institutes in Turku joined forces to promote regional development in the four areas set out in the Strategy for Regional Development 2006 – 2012[170]:

- Social responsibility: the HEIs work together to improve well-being, social and cultural capital and the prospects for sustainable development in the region;
- Internationality: the HEIs promote internationalisation of the region and develop international cooperation;
- Entrepreneurship: the HEIs work together to further entrepreneurship in the region;
- Cooperation between HEIs: the HEIs strengthen their mutual cooperation for the benefit of the region.

The University is involved in a large number of joint projects with for example the city of Turku or the former TE-Centre (Centre for Economic Development, Transport and the Environment), which is one of the 15 regional employment and economic development centres in Finland organised in a network. They serve the needs of SMEs by providing business support services, consultation and advice, as well as finance. The Turku Academic Career Services (Rekry) is a joint service of universities in Turku and the Turku TE-Centre. Rekry provides information on job openings and job seeking for students and graduates. Career counselling, seminars and info-days are also provided. In addition, Rekry serves companies and public authorities as a channel for finding interns and students to do their theses on subjects important to the company. They also organise employer visits on the campus, and offer the possibility of employer presentations.

Another joint service of the higher education institutes of the region is the HEI Partner Service, which, initiated by the Brahea Centre of the University of Turku, involves 6 HEI partners from the Southwest Finland region. The HEI Partner Service promotes collaboration, services and expertise for the SMEs in the region. The service acts as a broker in university business relations and provides a single contact point for local enterprises, helping to overcome the question of whom to contact, one of the main initial barriers of university business cooperation.

16.3.3 University business cooperation in the education related activities

Relationships with businesses take place both at organisational level through central initiatives and at the individual level. As curriculum development at the University of Turku is

[170] Ari Koski: Promoting regional engagement of universities, 'A.S.A.P. – Efficient administrative structures as a prerequisite for successful social and economic development or rural areas in demographic transition' project,

the responsibility of the professors, the departments and faculties, they have the freedom in deciding on the level and methods of business involvement in the curricula. Faculty members are encouraged to increase business involvement in the education, as business relations are considered as major catalysts for improved graduate employability. There is a variety of ways to provide more entrepreneurial and practice oriented education, including visiting lecturers from the businesses; involvement of the students in business related activities through their thesis work or collaborative projects; and collaboration with mentor companies. The former TSE Faculty applies business relations in its educational activities in the most systematic way. A common form of university-business collaboration takes place through the involvement of the professors on the various company boards.

Continuing education in Finland has traditionally been strong. The University Continuing Education Network (UCEF) was founded in 1990 as a cooperative organisation for the UCE institutions in Finnish Universities. It is a national network with headquarters located at the University of Tampere at the moment. The strong commitment to LLL activities of the University of Turku is reflected in its institutional strategy and in the many activities carried out throughout the whole University, with its first adult education strategy having been created in 1996. Nowadays, there is a legislative requirement (University Act) on the universities to promote lifelong learning activities. The University of Turku's lifelong learning activities are mainly executed by the different special units, primarily by the Brahea Centre for Training and Development and the Centre for Maritime Studies. However, the individual faculties, the Future Research Centre and TSE exe special units are also active in adult education. Annually about 17,000 people participate in adult education organised by the University.

Brahea Centre for Training and Development

The Centre has 80 staff members with an annual budget of €7.5million, mainly from external funding, and with an annual student number of 12,000. Brahea was established in 1985, nowadays it is divided into three departments: Open University, expert services and internal services. The Centre has recently changed its name from the former Centre of Continuing Education to reflect the shift in their services and the advanced promotion of networking and expert services.

Brahea's main tasks include creating a contact point between the academics and the society; planning and organising adult and continuing education in collaboration with the faculties and institutes; planning and coordinating regional development programmes; providing congress services and also participating in the University's staff development.

The Centre is the expert organisation of lifelong learning bridging scientific research and practical life for professional and human growth. Brahea targets with its diverse set of activities all different types of actors, including university professors and researchers, students and the University's Alumni, local businesses and authorities.

The LLL actions of the University of Turku cover a broad range of activities with many new and innovative ideas. The following list was not aimed to be comprehensive; it presents a selection of the lifelong learning related activities of the University:

- Open University promotes education to all, irrespectively the age group or educational background of the students. Its operation covers mainly the Southwest region but through its e-learning courses its services are more widely accessible. The education portfolio of the Open University includes all seven faculties of the University of Turku;
- Expert services, courses offered in continuing professional education in the field of education, social and health care; continuing professional development is organised by the Centre for Maritime Studies in the field of maritime, port and logistics industries;
- Executive MBA courses: internationally accredited (EPAS) part time courses organised by the former Turku School of Economics. The MBA courses target middle and top managers with the three-year long programmes. The MBAs are also offered

in a flexible e-learning form. MBAs are not recognised by the Finnish education system as third cycle education, such as PhD studies;

- Children's University is an innovative way to popularise science among children aged 7-12 years. In the frame of the Children's University science lectures and summer camp activities have been offered for children since 2008;
- Thematic events, excursions and programmes organised by the various faculties and departments of the University.

Department of Physics and Astronomy

The Department of Physics and Astronomy is very active in engaging the society in its activities, with a major emphasis put on raising the awareness of children. They would like to attract more talented students and to promote what physicists do. People are not aware in general about physics and its application areas. Physics Day that has been organised annually since 2005 aim at providing information of the research activities of the Department in a popular way. The Physics Days also contain visits to the laboratories and provide fora for alumni meetings and discussions.

The Department has active collaboration with local elementary and high schools and takes part in different national science competitions and networks to promote mathematics and natural sciences. It runs a special laboratory course for high-school students, which can be accredited as part of the students' future university studies if decided to enrol to related B.Sc. studies after finishing secondary education.

The Tuorla Planetarium attracts 9,000 visitors annually and the professors of the Department published several books to popularise astronomy. A recent project organised in the framework of the Turku Cultural Capital of Europe 2011 is 'Time Trek'. A 13.7km long hiking route was established between the Tuorla Observatory and the University that portrays the Universe's 13.7 billion years of evolution.

Bearing in mind the employability of the graduates and the PhD students the Department has changed its PhD study course to provide graduates with the best possible set of skills needed on the labour market. The Department is currently reforming its MA courses to provide a better fit to the needs of the industry.

16.3.4 University business cooperation in the university's research activities

The University of Turku has a very strong research focus. The university aims to combine scientific research and the principle of lifelong learning as it is reflected in the institute's mission statement. A study by Statistics Finland indicated that in 2005 39 per cent of universities' staff time was spent on research (10 per cent for polytechnics staff), while 43 per cent (74 per cent in polytechnics) was spent on teaching and 18 per cent (16 per cent in polytechnics) on "other tasks", including administrative tasks related to research or teaching activities.[171] These figures cover all research staff from professors to assistants. Statistics from 2009 indicates that altogether 28,900 people carried out R&D in Finnish HEIs. R&D efforts totalled 16,500 working years of which over 85 per cent was carried out in universities, 10 per cent in universities of applied sciences and 4 per cent in university hospitals. During the past decade the amount of research carried out has increased by a factor of 3.5 in the universities of applied sciences.[172]

The University of Turku has 23 per cent research staff, 34 per cent teaching staff and 43 per cent other staff members among its employees. The University hosts a large number of Centres of Excellence building on its key research strength including molecular biosciences; cardiovascular and metabolic research; ecological interactions and ecological genetics; learning and education research; future studies and institutional design and social

[171] Time use survey of university and polytechnic staff in the academic year 2004-2005. Statistics Finland, online: http://www.stat.fi

[172] Source: http://tilastokeskus.fi/til/tkke/2009/tkke_2009_2010-10-28_kat_004_fi.html

mechanisms. The University has more than 3000 scientific publications annually, with a high proportion (77 per cent) published in international publications.

Knowledge transfer between the university and businesses can happen many ways. In addition to the knowledge exploitation of the research results generated by the University e.g. commercialisation of IPR and collaborative research activities funded by either national (e.g. Tekes) or international sources e.g. EU; the University offers many innovation services to enterprises mainly through its special units and the units of the former TSE. The new University Inventions Act entered into force on the 1st January 2007. The legislation provides universities with the possibility to assume the rights of inventions based on specific criteria. Previously university researchers obtained the rights of their interventions, unless agreed otherwise. Since the new act, the ownership of the intervention depends on the type of the research such as external parties involved. The rights of collaborative research related inventions could be acquired by the universities, while the researchers can keep the result of open research activities i.e. with no involvement of external partners.

In 2009 the University of Turku (without TSE) had 245 valid research or related financing agreements, of which 88 represented participation in domestic collaborative projects, 59 domestic chargeable activities and 98 international collaborative projects including projects funded from the Framework Programmes. The most important funding sources of the research activities carried out at the University are the Academy of Finland (68 per cent), Tekes (13 per cent) and the various EU programmes (14 per cent). As the figures show international projects are less dominating in the University's research funding portfolio than the national ones.

University-business collaborations seem to have become more complicated during the last 10 years and there are many pros and cons regarding collaboration with industrial partners. The increased level of administration, the time devoted to marketing and advertisement of the research activities instead of actual research, IPR issues, the restrictions of the freedom of a researcher are major drawbacks considered when entering into collaboration with businesses. However, the motivation of the individuals to be able to attract the best talent, to provide better options and facilities, to create social impacts and last but not least the external funding are decisive factors in university-business collaborations.

The Laboratory of Industrial Physics has a long tradition of collaborating with industrial partners, the first collaborative activities dating from the 1970s. There have been some significant changes in the direction of the laboratory's research activities during the past decades, which reflect the need for c0rresponding to the requirements of the laboratory's changing environment. Nowadays, external income sources are crucial for the laboratory as there are only 3 internally funded positions available in addition to the 7-10 externally funded. During the last year the Laboratory had active collaboration with 15 business partners, predominantly with local high-tech SMEs. However, collaborative partners also include big multinational corporations accounting for the majority of external funding received.

Functional Foods Forum

The Functional Foods Forum is a special unit of the University of Turku with a staff of 50. The unit's research activities are focused on food safety combining multidisciplinary expertise in the domains of natural, human and medical sciences. The unit has very close collaboration with the Turku University Hospital including shared positions. The Functional Food Forum has three basic tasks: fostering excellence in research, distributing the knowledge generated locally and active knowledge transfer through research projects. FFF has one part of the cluster of a National Centre of Excellence in Food Development awarded and funded by the Ministry of Interior. The National Centre of Excellence programme promotes internationally known cutting-edge Finnish research. The unit was also granted the opportunity to host part of a Dutch professor for a three-year period within the Finnish Distinguished Professor Programme (FiDiPro) that is jointly funded by Tekes and the Academy of Finland.[173] *The*

[173] The University of Turku hosts in total four researchers funded by the FiDiPro programme

scheme aims to support long-term international collaboration. FFF is not directly involved in the educational activities of the University, but through the engagement of PhD students in the research activities and staff members contributing to graduate schools and PhD programmes the unit forms an active part of the University's structure.

The advisory board of the unit helps the researchers in assessing industrial needs, while the top-level scientific quality and the unit's strategic research direction are ensured and set by an internal scientific board. The scientific board comprises the research group leaders of the units. FFF carries out basic research in food and health and also 'contract R&D services - from idea to the finalized product; special projects – analysing composition and safety, clinical testing, marketing; multipurpose projects – applying knowledge from science to practise and fundamental research - collection and evaluation of new information[174]*. FFF has achieved many successful collaborations with its industrial partners in the past. Its collaborative research is carried out with SMEs mainly from Tekes funding, but major companies are also among the business partners of the unit.*

16.4 Types of university business cooperation in the institution and their impacts

16.4.1 Business and Innovation Development

The Business and Innovation Development (BID) unit belonged previously to the Turku School of Economics, nowadays it operates as a special unit in the University's new organisational structure. BID is an independent unit, with 95 per cent of its budget coming from external project funding, mainly from Tekes.

BID is active in a wide spectrum of services including education related activities such as MBA courses, entrepreneurship education or industrial economics; furthermore, it offers business development and commercialisation services. BID follows a philosophy of open innovation, it 'mixes' students, aims to accelerate entrepreneurship, change the mindsets to become more innovative and business oriented. BID has extensive relations at regional and international levels with representatives of both the academic and business world. BID's approach to internationalisation is to be active: it organises events and participates in conferences, runs many courses in partnership with international organisations and universities. The unit is also very active in different international networks. It is a member of the worldwide network of researchers in entrepreneurship, the International Council for Small Business and provides the secretariat for its European counterpart. Due to its partnership with the Aalto University the University of Turku will be involved in the curriculum development activities of the ICT Labs KIC at the European Institute of Innovation and Technology. BID is also participating in a project aiming to support universities in Russia to meet the Bologna standards.

The following table presents a short summary on the main activities of BID.

Figure 31 Activities of the Business and Innovation Development

Name of the programme	Target audience	Partners	Description
Innovation and Growth - MBA programme for PhD students	• PhD students	• Turku Centre for Computer Sciences • Turku Graduate School of Biomedical Sciences • UTU	The programme incorporates 3 modules of business studies to the ICT or life sciences PhD courses, with plans to offer the possibility for humanities from the next semester as well. The aim is to provide a highly competitive study combination that integrates business competences, specific industry related knowledge and entrepreneurship to the scientific curricula.

[174] Source: University of Turku, Functional Foods Forum website, http://fff.utu.fi/en/services/

Name of the programme	Target audience	Partners	Description
Business Development Laboratory You Generate New Business from Ideas!	• Researchers • Business or law students	• Turku Science Park • Faculty of Law and TSE from UTU • Business partners: Krogerus, PWC and Biocelex	The Laboratory combines business, law and technology skills of students and researchers under the guidance of industry experts to develop their business competences.
Innovation and entrepreneurship module (25ETCS)	• MA's students	• UTU	The study module comprises five courses using mixed methods of traditional learning sessions and independent distance learning: • Innovation and entrepreneurship in ICT Context • New Business Models • Business Competence and Innovations • Innovations and Global Growth • Plus an optional course
Nordic Master School in Innovative ICT	• MA's students	• Åbo Akademi University • Royal Institute of Technology • Technical University of Denmark • Tallinn University of Technology • UTU	A network of the International ICT Master Programmes at five universities in the Nordic countries with possible student exchanges between the universities as part of the studies. The Innovation and Entrepreneurship study module is an obligatory part of the NMS programme.
Business Intelligence and Foresight	• Businesses, other external organisations	• UTU	Financial and economic analysis for individual companies or groups of companies.
European Entrepreneurship Educators Programme (3EP)	• Educators • Other HEI staff • Student enterprise supporting organisations	• National Council for Graduate Entrepreneurship • J.J. Strossmayer University of Osijek • Aarhus University • UTU	The CIP funded project aims to support HEIs in developing enterprising and entrepreneurial students, graduates, and staff by organising three one-week long international entrepreneurship academies.

Source: Business and Innovation Development, http://www.tse.fi/EN/UNITS/SPECIALUNITS/BID/Pages/default.aspx

16.4.2 BioCity

The Turku Science Park, owned by the City of Turku, is a business incubator providing modern facilities and bringing together academic and business expertise at a shared location. The Science Park hosts the biotechnology and ICT clusters of the Southwest Finland region. BioCity Turku was established in 1984 to provide an umbrella organisation for the biosciences of the Abo Akademi University and the University of Turku. BioCity was created by the two HEIs to join forces, to share location and facilities and to create a bioscience hub in Turku. BioCity comprises research units of the two universities, and the campus also hosts Turku University Central Hospital, VTT's Medical Biotechnology Unit, the National Public Health Institute, and many businesses active in biosciences. The shared facilities offer the possibility of interaction between the different universities, with the business world and with other research units. The University of Turku has been traditionally strong in the field of life sciences and biotechnology and has had an intense collaboration with pharmaceutical and biotech businesses during the past few decades. The close collaboration of the two

universities also enables broad access to the knowledge base of the different faculties and promotes multidisciplinary research.

The Turku Centre for Biotechnology (TCB) was established in 1994 as a joint department between the Abo Akademi University and the University of Turku. It is a special unit in the University of Turku's structure. The aim of the joint facility was to share the expensive core facilities that are required to provide cost effective solutions and facilities for the research community. CBT carries out basic research with a focus on cell signalling and molecular systems biology. The Centre is involved in the universities' teaching, training and research activities, however it operates fully independently. TCB hosts the Centre of Excellence for Host Defence Research of the University of Turku.

TCB provides expert services and aims to facilitate university-business interactions. Professors teach at the universities and take active part in the training of the PhD students, while they also act as a research laboratory for the universities. In 2008 the income sources of the Centre were distributed as follows: universities (26 per cent), services (23 per cent), Academy of Finland (19 per cent), Tekes (4 per cent), EU (15 per cent) and other income sources (13 per cent). TCB is very active in international collaborations and networking in the field of education and research. It is an integral part of the international scientific community, participating in many collaborative research projects and publishing a large number of international publications annually.

16.5 What are the key lessons which can be drawn out from this approach?

There have been many changes in the university-business relations in Finland during the past 10-15 years. The increased emphasis on the universities' third task and the demand to ensure high levels of student employability required the universities to change attitudes and increase their understanding of, and relationship with, businesses. The University of Turku provides an example of a higher education institution where university business collaboration is carried out at all different levels in the organisation. Top-down central initiatives meet bottom up projects and ideas, in line with the main objectives and priorities of the institution's strategy. The activities of the university combine outward-facing services in line with the third mission of the University and inward-looking schemes aiming to improve internal procedures, knowledge and to develop the capabilities of the university and its staff, for example the internal training organised by Brahea. Enthusiasm of the University's staff and innovative ideas are combined with striving for excellence, both in research and education, which results in a highly attractive institutional profile. The diverse activities offer many possibilities for students, the staff or the University and for external organisations to get involved in either the educational or research activities of the institution.

However, there have been some difficulties in promoting university business collaboration including legislative limitations e.g. accountability on the time spent on non-education related activities or cultural barriers such as the mind-set of the teaching staff, very strong theoretical focus and lack of business-minded attitude in some cases. Despite the heavy emphasis put on the universities' third task by the Ministry of Education there are no metrics put in place to measure and reward these activities yet. The recent mergers of the University of Turku and the Turku Schools of Economics, and the very high level of autonomy of the special units, are decisive for the organisational structure. There seems to be still some room for improvement in exploiting the synergies of the activities of the special units and faculties. Improved understanding of the exact function and tasks of the other units might be beneficial to provide even more comprehensive and better-aligned services. Some anticipated activities such as an 'internal road-show' planned by BID aim to serve these purposes.

16.6 Contacts, references

Professor Tapio Reponen - Vice-Rector, Teaching and Learning, External Relations

Professor Harri Lönnberg - Vice-Rector, Research

Petteri Siika-Aho – Planning officer

Seppo Salminen - Director - Professor of Food Development

Mauno Kangasaho - Innovation Manager, Foundation for Finnish Inventions

Soile Haverinen - Head of Project and Innovation Services

Ms. Eliisa Särkilahti - Project and Innovation Services

Professor Sirpa Jalkanen – Professor Faculty of Medicine

Ari Koski - Project Coordinator, Brahea

Kari Seppälä - Director, Brahea

Kirsi Kostia – Director, TSE executive education

Professor Pasi Malinen – Deputy Director of Business Innovation Development

Professor Jarno Salonen - Department of Physics and Astronomy, Laboratory of Industrial Physics

16.7 Appendix A: Statistics

Figure 32 Basic data: University of Turku, Finland

Type of information	University of Turku
Type of university	Strong research focus
Region/ capital city	Regional location
Quacquarelli Symonds, World University Rankings Results 2010	Not ranked in the top 200
Webometrics Ranking of World Universities 2010	198th in the ranking of European universities
Other university ranking	221st university according to the THES – QS World University Ranking
Number of students	Students 20,773 Postgraduate students 2,309 Foreign degree students 450 Adult students: 17,000
Degrees awarded in 2010	Data from 2010 Master's degrees 1,295 Doctorates 140
Training	
Staff	Data from 2008, excluding the TSE Number of employees about 3,000 31% teaching staff 27% research staff 42% other staff members
Facilities, organisational units	7 faculties

Type of information	University of Turku
	11 special units
International cooperation	Strong focus on international cooperation both in the field of education (16 International Masters) and research.
Number of internships in enterprises each year	About 200 each year (estimation)
Average job searching period	1.4 months
Description of the first job	

16.8 Appendix B: Special Units of the University of Turku

- Brahea Centre for Training and Development
  - Business and Innovation Development (BID)
  - Centre for Environmental Research
- Archipelago Research Institute
- Kevo Subarctic Research Institute
- Satakunta Environmental Research Centre
- Centre for Maritime Studies
- Finnish Centre for Astronomy with ESO
- Finland's Future Research Centre
- Functional Foods Forum
- Language Centre
- Research Unit for the Sociology of Education, RUSE
- Turku Centre for Biotechnology
- Turku Centre for Computing Science
- Turku PET Centre

16.9 Appendix C: Societal Interaction Matrix of the University of Turku

DUTIES	RESPONSIBILITY	EXECUTORS	METHODS, MEANS
Setting the aims	• Rector • Board • Heads of faculties • Heads of departments • Societal interaction cooperation group	• Rector • University Services • Heads of faculties • Heads of departments	• Preparing the strategy – Hearing of the university community – Taking into account the strategies and expectations of the interest groups

DUTIES	RESPONSIBILITY	EXECUTORS	METHODS, MEANS
Implementation	• Rector • University Communications • Heads of faculties • Heads of departments • Societal interaction cooperation group • Special personnel – Coordinating bodies – Projects' responsible leaders	• Faculties • Departments (also special units) • Project organisations • University Services – University Communications – Career Services	• Interaction with the interest groups – Increasing reciprocal knowledge, influencing, creating synergies – Planning and realising joint projects (e.g. research projects) – Cooperation based on cooperation agreements – Other cooperation related to education or research (practical training, theses, etc.) – Alumni activities
Evaluation	• University Services – Career Services – University Planning and Development • Faculties • Departments (and special units)	• University Services – University Planning and Development – Career Services • Faculties • Departments (also special units)	• Defining the set of evaluation criteria – Dividing up operations and placing them into the set of evaluation criteria • Compiling information – Reporting requests – Analysing the answers • Evaluating new societal interaction openings
Development	• Rector • Board • Heads of faculties • Heads of departments • University Services – University Planning and Development	• Faculties • Departments (also special units) • University Services – University Planning and Development – University Communications – Career Services	• Comparing the actual societal interaction with the aims set by the University • Analysing the information • Hearing of the units and the interest groups (feedback from the units) • Taking societal interaction into account when evaluating the functionality of the quality system

Source: University of Turku