DIFUSE Handbook

A guide to Transnational Collaboration in Knowledge Transfer

ECIU
European Consortium of Innovative Universities

TuTech INNOVATION

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DIFUSE Handbook

A guide to Transnational Collaboration in Knowledge Transfer

Edited by Diane McDonald

Forward

The European Union sees its greatest potential for economic and social development through the *knowledge-based economy*. This was set out in the Lisbon Agenda agreed by the Heads of the Member State Government in 2000. Production and transfer of knowledge is the core business of universities, traditionally through the activities of research and teaching, but over the past decade especially, a third stream of activity has emerged, namely, pro-active involvement in the transfer of knowledge for wealth creation and regional economic development. This has led to a huge expansion in *knowledge transfer* activities.

For the most part this has been a welcome move and is now accepted as part of the core mission of universities, but it is challenging in terms of resources and expertise required. It requires new skills that are partly alien to the academic culture. University managers face huge pressures in balancing priorities between the politically desired involvement with local companies and demands to see high-profile revenue generation through entrepreneurial activities, while at the same time educating students for the global economy and providing adequate resources and stimulus to perform top-class research!

The universities belonging to the European Consortium of Innovative Universities (ECIU) recognised more than a decade ago that collaboration and sharing of best practice would greatly enhance their individual chances of meeting these challenges. The DIFUSE project, funded by the European Commission, provided an opportunity for the activities of these universities to reach a wider audience.

This handbook has been prepared by the project team with this in mind. It is hoped that it will provide practical advice which can be adapted for use in different contexts. Europe needs all its universities in their hugely diverse forms to make their own unique contribution to economic and social policies for the benefit of all.

On behalf of the project team that has worked on DIFUSE from July 2006 to June 2008, I thank you for your interest in this work and hope you find this a worthwhile read. The ECIU may be contacted should you wish to follow up on issues raised.

And finally I should like to thank all my colleagues for their contributions and willingness to genuinely share experience on what has been a very amiable project.

Monica Schofield
DIFUSE Project Coordinator
June 2008

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1. DIFUSE: Investigating Transnational Collaboration in Knowledge Transfer

The DIFUSE handbook presents the findings of the EU funded DIFUSE project - 'Driving Innovation from Universities into Scientific Enterprises'. This project was put forward as a proposal under the INNOV7 Framework 6 call in June 2005. The theme of the call was 'Identification of New Methods of Promoting and Encouraging Trans-national Technology Transfer'. At this time DG Enterprise was interested in establishing new types of networks to complement the Innovation Relay Centres, a network of largely regional development and business support agencies across Europe that were funded to assist small and medium-sized enterprises (SMEs) in particular with cross-border technology cooperation. In 2008 these were replaced by a network funded under the Competitiveness and Innovation Programme, the Enterprise Europe Network[1].

The specific goal of the DIFUSE project was to explore new ways for the joint exploitation of university knowledge in targeted domains using best practice and individual experiences of the partners. To address this goal, the project explored models for collaboration between university knowledge transfer support functions to provide mutual support for more effective exploitation of research results. This is not as simple as it may sound. The different organisations and legal structures used by universities to perform this task, together with the different traditions within academia across Europe, mean that there is no common knowledge transfer support infrastructure. Thus the emphasis within DIFUSE was to explore which models are workable in practice, taking into account the different forms of organisation that exist.

The DIFUSE project proposed to take an established university network to use as a 'think tank' to analyse and identify those areas that might lend themselves to cooperation. The network was provided through the European Consortium of Innovative Universities (ECIU), whose members were interested in deepening their collaboration in the area of University-Business interaction, having been successful in developing cooperation in establishing a joint European Graduate School and in facilitating staff and student mobility.

The ECIU was formed in 1997 when a number of progressive European universities decided that in an increasingly globalised world there was a need for universities to engage in a strong European strategic network. The aim of the ECIU is mutual support in order to benefit from best practice in member institutions, to address jointly some of the pertinent issues of higher education in Europe and to master the challenge of an increasingly international market in research and education. Its membership currently comprises eleven members from nine EU countries, plus three associated members located in Australia, Mexico and Russia.

The DIFUSE project ran from 1st July 2006 - 30th June 2008. The work has led to some specific recommendations to the ECIU Executive Board. The purpose of this Handbook is to disseminate those finding which might be of wider interest, and to act as a good practice guide. As such, the handbook's primary aim is to provide senior university managers and strategic thinkers involved in the development of universities with an overview of the issues and advantages of transnational collaboration in knowledge transfer activities. It is hoped that through the DIFUSE findings others outside the ECIU may be able to develop bespoke knowledge transfer collaborations more effectively.

[1] http://www.enterprise-europe-network.ec.europa.eu/index_en.htm

The handbook may also be of interest to Knowledge Transfer professionals as it provides an analysis of current practice across a broad range of institutions, all with extensive and innovative experience in Knowledge Transfer support.

The project was instigated and coordinated by the EU Office of TuTech Innovation and the work was carried out by a subset of ECIU members who were able to sign up to the project at short notice in May 2005: Aalborg University, Denmark; Université de Technologie Compiègne, France; Dortmund University of Technology, Germany; Hamburg University of Technology (through TuTech), Germany; University of Strathclyde, Scotland; Politecnico di Torino, Italy; University of Twente, the Netherlands and the University of Warwick, UK. Contact details for the DIFUSE Project and participants are provided in Appendix A.

The handbook is organised as follows. First, to set the context, in section 2 the drivers for a transnational approach to knowledge transfer and the key constraints which will affect how this might be realised are highlighted. Next, section 3 considers the types of knowledge transfer activities that could be used as 'tools' to stimulate and implement transnational knowledge transfer. Section 4 then describes how DIFUSE envisages transnational collaboration in Knowledge Transfer could be implemented among the ECIU partners. The handbook finishes in section 5 with concluding remarks summarising the success of the project and lessons learned. The core of the handbook is supplemented by 4 appendixes which provide more detail of the DIFUSE project (Appendix A) and its methodology (Appendix B) and capture specific examples of the innovative knowledge transfer practice currently undertaken by DIFUSE partners (Appendix C) and legislative issues (Appendix D).

2. Transnational Knowledge Transfer

2.1 Knowledge Transfer

Knowledge transfer versus technology transfer

The term *knowledge transfer* describes the activity of transferring knowledge, skills and intellectual property from universities to external enterprises and is often termed the 'third mission', complementing the traditional education and research remits of universities. Knowledge transfer encompasses many activities; research contracts, consultancy, young researchers spending periods in enterprise working with developers, and new company start-ups all facilitate the flow of knowledge from academia into the business world. The term *technology transfer* is normally applied where there is a patent, assigning the rights to a specific new technology, to be 'transferred' from universities to external enterprises. Thus technology transfer, in this sense, can be considered as a subset of knowledge transfer.

While the original EU FP6 call and hence DIFUSE terms of reference and earlier reports used the term technology transfer, it is this more general sense of k*nowledge transfer* that is being studied within the project. This handbook therefore uses the term *knowledge transfer* unless it is specifically discussing the transfer of technology.

Knowledge transfer activities

Knowledge transfer activities typically build on education and research expertise, contributing to economic development by transferring academic knowledge to society through a variety of processes. *Figure 1* below captures the interrelated nature of education, research and knowledge transfer, illustrating the knowledge transfer activities which were investigated as part of DIFUSE.

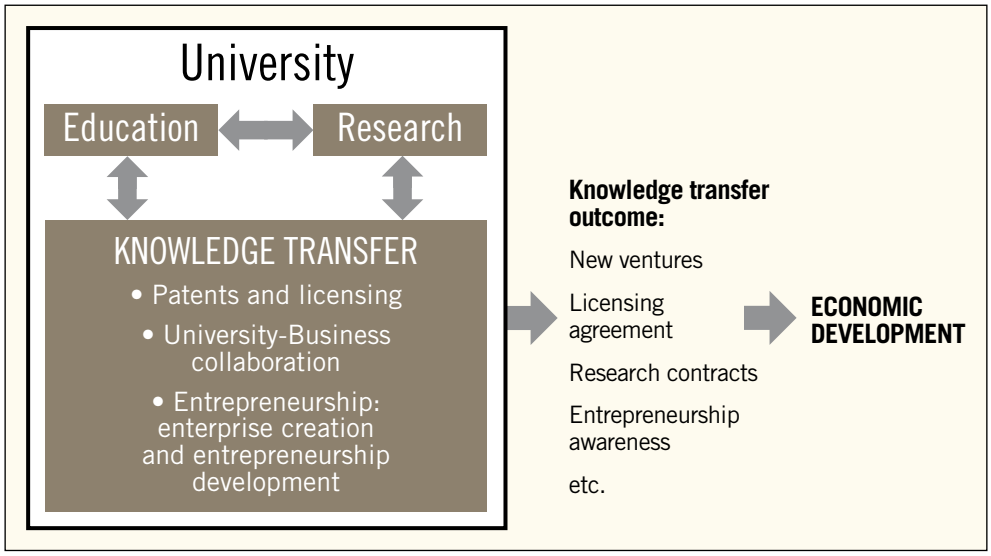

Figure 1: Universities' knowledge transfer activities

'Patents and licensing' can be considered as the traditional technology transfer activity and involves the exploitation of intellectual property. *'University-Business collaboration'* encompasses the various knowledge flow formats described above (e.g. research contracts, consultancy) and has direct links with the university's research agenda.

'Entrepreneurship' captures both the hard and soft aspects relating to development of business creation and is divided into two subdomains. *'Enterprise creation'* activities concern the university's facilities for fostering new companies, e.g. science parks, incubators. *'Entrepreneurship development'* encompasses entrepreneurship training and support, and awareness activities. As the ECIU universities are committed to encouraging their students and faculty to be entrepreneurial in order to increase knowledge transfer and business development, *'entrepreneurship development'* is explicitly included within the knowledge transfer discussion. It is two-dimensional: on the one hand it seeks to develop a broad range of entrepreneurial skills, attitudes and behaviours such as risk-taking and creative thinking. On the other hand, it focuses on developing knowledge about entrepreneurship. Where it is interpreted as developing a set of behavioural characteristics, such as the willingness to take risks, opportunity-spotting, or developing leadership and team-building skills, it is often referred to as *Enterprise Education* in the broad sense. When the students or academic staff are trained in specific skills on how to start a business, such as accessing finance, legal liabilities of starting a business, hiring staff and tax law, it is commonly referred to as *Entrepreneurship Training*.

2.2 The Impact of Legislation on Knowledge Transfer Activities

National legislation has a strong impact on knowledge transfer activities, since it directly influences a university's knowledge transfer strategy and hence its approach towards its 'third mission'. From the mid-1990s onwards, the majority of EU Member States progressively introduced new legislation transferring the ownership of inventions from the hands of the inventor(s) to the university. (Of the countries represented by the DIFUSE partnership, Italy is the exception[2].) Therefore, as with the landmark Bayh-Dole Act of 1980 in the US, the primary motive was to accelerate the further development and commercialisation of ideas and inventions emerging within universities.

While this new legislation has clearly stimulated knowledge transfer activities, as the overview of legislation on intellectual property (IP) in the countries of the DIFUSE partners in Appendix D illustrates, there is significant divergence. For example, unlike most of the other partners where IP is held by the universities, Italian legislation allows inventors to own their intellectual property, but entitles universities up to a maximum of 50% royalty income from commercialisation. Thus while IP legislation can be used to support and stimulate knowledge transfer and innovation processes at a national level, the lack of harmonisation of IP legislation across Europe makes this problematic at a European level.

2.3 Knowledge Transfer Office Models

The participating DIFUSE universities display a range of knowledge transfer infrastructures. Some partners such as the University of Hamburg have long-established knowledge transfer mechanisms -- TuTech Innovation was formed in 1992. For others, formal developments are more recent. While the formation of formal Knowledge Transfer Offices was driven to a large extent by the new IP exploitation legislation, the specifics of the knowledge transfer infrastructure has been heavily influenced by the universities' internal organisation and regional or national role. Thus while each partner has developed a knowledge transfer infrastructure, each has its own unique set of characteristics and structure. These can be grouped into centralised, partnership and decentralised approaches which are discussed on page eight.

[2] Sweden which was not represented within DIFUSE is also an exception, with researchers still retaining the right to ownership of their outputs.

Centralised Approach

About half of the DIFUSE partners provide centralised knowledge transfer services. Aalborg (AAU Innovation), Dortmund (Transfer Office) Strathclyde (Research & Innovation) and Warwick (Warwick Ventures) have dedicated offices that are wholly owned by the universities. These offices are positioned as 'support' or 'service' departments similar to other central university services such as 'Finance', 'Alumni' or 'Student Services'. TuTech Innovation was set up originally as a wholly owned company of Hamburg University of Technology, but has evolved a role which encompasses regional development aspects and is now jointly owned by the City of Hamburg and the Technical University.

On the other hand, Compiègne formed both a central office – Direction for Industrial Liaison – and several other private subsidiaries, each with a specific remit. For example, UTEAM Divergent is a company set up by the University of Technology of Compiègne (UTC) and the University of Picardy Jules Verne at Amiens (UPJV) which provides services, professional education, short courses and assistance to industry, SME's and start ups in collaboration with the staff of the universities and a team of internal and external consultants.

Partnership Approach

Not all universities have a single central knowledge transfer office; alternatively regional networks with common knowledge transfer offices (Torino) or public-private partnerships (Hamburg) may be utilised to manage and promote their knowledge transfer activities. Using TuTech as a base, a sister company to provide knowledge transfer services for all Hamburg's universities, Hamburg Innovation GmbH, was set up in 2004. It is co-owned by all the universities and aims to share resources and expertise with TuTech which is also a shareholder. At Torino, a common Industry Liaison Office, which spans three universities in the Piedmont region, grew out of involvement in many common activities, while each institution (Politecnico di Torino, University of Torino and University of East Piedmont) maintains its autonomy.

Decentralised Approach

Twente is the only DIFUSE partner that assigns responsibility for knowledge transfer to each of its six research institutes that operate across five faculties. Three of the research institutes have their own business accelerator staff to fast-track technology commercialisation. However, all knowledge transfer activities are monitored centrally by the InnovationLab while Nikos – the Dutch Institute of Knowledge Intensive Entrepreneurship, based in the Business faculty – also provides practical advice and support to all faculties in addition to carrying out its own research.

Further details on the cross-analysis of Knowledge Transfer Offices of DIFUSE partners can be found in the *'Report on consortium members' technology transfer practice'*. A summary which highlights good practices from across the DIFUSE partners is provided for reference in Appendix C.

2.4 A Transnational Approach to Knowledge Transfer

Transnational knowledge transfer, as envisaged by DIFUSE, extends beyond the simple notion of international cooperation in knowledge transfer activities. Rather it builds on Bartlett and Ghoshal's (1992)[3] assertion that 'transnational' collaboration is founded on close cooperation, facilitated by a coordinating body - the ECIU in the case of DIFUSE. The aim of DIFUSE's transnational approach is to leverage the IP, knowledge and expertise within a a group of collaborating universities through the organisational benefits of a coordinating body.

[3] Bartlett, Christopher A. and Sumantra Ghoshal (1992). Transnational Management: Texr, Cases and Readings in Cross-Border Management. McGraw-Hill. ISBN 9780256084856.

Such close cooperation in knowledge transfer activities is not an easy task. While transnational cooperation within Europe is well-established within educational activities (student exchanges, visiting professorships, etc.) and research projects, this is not the case within knowledge transfer, due in large measure to the differing legislative and organisational contexts. The ambitious goal of the DIFUSE project is to identify knowledge transfer processes that can be carried out transnationally.

One way of envisaging transnational knowledge transfer is through a network of nodes (where each university is a node) coordinated by a virtual pan-EU Knowledge Transfer Office. So, if, for example, a university in one country has technology in which a company based in another country is very interested, the company could call on the virtual Knowledge Transfer Office to access the technology. By coordinating the different local nodes of the network, the virtual Knowledge Transfer Office could provide a straightforward and efficient service, using competencies from all participating universities.

A virtual pan-EU Knowledge Transfer Office appears a promising model given the diversity of existing knowledge transfer infrastructures and legislative domains. Developing such a virtual Knowledge Transfer Office requires a staged, 'bottom-up' approach that begins with specific collaborations in areas of mutual interest. By developing this within the context of the ECIU, there is a pre-existing coordinating body which can initiate and support fledgling activities.

DIFUSE makes one other important stipulation - transnational knowledge transfer should where possible be built on collaboration rather than cooperation. Collaboration captures the idea of sharing and actively developing whereas coordination simply implies the synchronisation of devolved subtasks. This means that the knowledge transfer activities should involve participants working together to develop new knowledge transfer services rather than simply cooperating on tasks.

2.5 Issues for Transnational Collaboration

The diversity of knowledge transfer infrastructures demonstrates that a common basis for transnational knowledge transfer cannot be assumed. This has three major impacts for transnational collaboration in knowledge transfer.

Firstly, common knowledge transfer services cannot be assumed. Therefore the starting point for discussions of future collaborations should be based not just on the three broad areas of knowledge transfer activities of *Figure 1* on page six, but on the various processes which constitute these activities. Hence, the context for collaboration should be specific and clearly defined.

Secondly, the transnational solution developed must be highly flexible, allowing the transnational initiatives to be locally implemented through individual institutions support infrastructures. Flexibility must also extend to participation, enabling individual ECIU members to opt in or out of individual transnational knowledge transfer collaborations depending on their strategic aims and objectives.

Thirdly, the lack of harmonisation of IP laws across European will restrict the types of knowledge transfer activities that can be realised transnationally.

3. Tools for driving Transnational Collaboration in Knowledge Transfer

Central to the DIFUSE approach was the development of 'tools' - a set of collaborative knowledge transfer activities - that could be used to drive transnational collaboration in knowledge transfer.

The issues highlighted in section 2.5 suggest that these tools should be flexible and cover a range of different activities, thus providing a pool from which particular tools might be chosen given the specific context for transnational collaboration. From earlier discussion between the DIFUSE partners, it was clear that there was considerable expertise and significant interest in three key areas of knowledge transfer activity: *'Patenting and Licensing', 'University-Business cooperation'* and *'Entrepreneurship'*. These interests are perhaps unsurprising given the innovative nature of ECIU universities and emphasise that the knowledge transfer envisaged extends beyond the typical activities of a Knowledge Transfer Office to include the development and transfer of entrepreneurial skills - a key asset in stimulation of business development.

The two-stage 'tool' development process therefore focussed on these areas of interest. These processes are described in subsections 3.1and 3.2 below and are of general interest to those wishing to undertaken transnational collaborations. The specific vision for ECIU collaboration is presented in subsection 3.3 and the lessons learnt from the development process are discussed in subsection 3.4.

3.1 Identifying Potential Transnational Initiatives

In the first tool development stage DIFUSE examined different aspects of knowledge transfer to identify initiatives that would form a set of common methods and possible interactions for a Knowledge Transfer network.

The first step was to identify potential knowledge transfer initiatives within the three broad areas of interest. The second step drew on best practice and professional expertise within the DIFUSE partners to undertake a brainstorming activity which identified potential opportunities for ECIU cooperation and collaboration on knowledge transfer. The initial discussions identified 23 potential initiatives. The advantages and disadvantages of each were then discussed and the opportunities ranked in terms of achievability and interest by each DIFUSE partner. This led to 11 viable knowledge transfer initiatives, listed in *Table 1* opposite, which may be used to drive transnational collaboration.

Broad Knowledge Transfer Area of Interest	Initiatives
Patents and Licensing	Expert Group
	Common Portfolio
	Model Contracts
University-Industry Cooperation	Human Resources
	Facility Sharing
	Lifelong Education
	Expert Directory/Expert Group
Enterprise and Entrepreneurship Training and Education	Human Resources
	Cooperation across Incubators
	Training across Universities
	Masters Courses

Table 1: Potential initiatives for driving transnational collaboration

Full details of the initiatives and development process can be found in the DIFUSE report: *Recommendations for Common Knowledge Transfer Activity Areas*. See Appendix C for publication details.

3.2 From Initiatives to Transnational Collaboration Tools

In the second stage, the feasibility and implementation of the initiatives were then further examined to investigate how they might be utilised within a network to build a virtual Pan-EU Knowledge Transfer Office.

This was achieved by small subgroups investigating how the initiatives could be realised through specific tools that would stimulate transnational collaboration. Tools ranged from *an ECIU business plan competition through a virtual transnational 'yellow pages' of knowledge transfer professionals to biannual meetings of knowledge transfer professionals*.

The small groups then analysed the type of cooperation involved in implementing these tools, highlighting which were likely to be effective and which were not. For example, the lack of legislative harmonisation meant that all the Patents and Licensing initiatives were unlikely to succeed. Synergies were also examined to ascertain the likely interest in uptake.

3.3 A Vision for ECIU Transnational Collaboration in Knowledge Transfer

Table 2 below provides an overview of the tools that were eventually selected and the type of cooperation between DIFUSE partners they would entail. These distilled into two major visions – ***Creating a ECIU Programme on Entrepreneurship and Creating an ECIU Knowledge Transfer Identity***. The first vision touches upon the collaborative development of human capital, while the second is concerned with the exchange and development of *know-how capital*.

Vision 1: Creating an ECIU Programme on Entrepreneurship		
Cooperation/ Collaboration	**Initiatives**	**Tools**
Teaching	Master's Courses in Entrepreneurship	• Creation of a Joint (Digital) Entrepreneurship Course Index • Staff and student exchange • Summer schools • Certificate programmes • Joint classes
Training	Extracurricular Activities	• Business Plan Competitions • Joint training sessions and camps
Vision 2: Creating an ECIU Knowledge Transfer Identity		
Cooperation	**Initiatives**	**Tool**
Directory	Common Portfolio	• Expert directory • Facility Sharing • Joint Database of Patent Profiles
Exchange & Partnering	Exchange Expertise	• Database of Model Contracts • Biannual Meeting of Knowledge Transfer Professionals • Staff exchange for knowledge transfer experts

Table 2: Summary of Vision and 'tools' for ECIU collaboration in knowledge transfer

The vision *'Creating a ECIU Programme on Entrepreneurship'* groups the tools for the training and education of students and staff for business creation. It combines specific master classes with expert directories, course material repositories and summer schools. The long-term vision is a common entrepreneurship programme in which complementary courses are conducted across the ECIU. Ultimately, the goal would be to set up common programmes whereby students are recruited to a range of ECIU programmes with each university providing a module in line with its academic or business strengths. The number of topics could expand in future and an official ECIU Master Programme be established. Such collaboration creates synergies by combining complementary resources from collaborating universities.

As a first step, education and practical training of entrepreneurial skills may offer the widest scope for collaboration among ECIU members. Entrepreneurship training is an area in which cooperation could be easily implemented since this involves non-degree or non-credit courses for students and entrepreneurs. Cooperation in this domain is on the exchange of concepts and formats for training programmes, and training materials. Together with education in entrepreneurship, practical training of entrepreneurial skills targeting PhD students involved in cutting-edge research could be a useful stepping stone towards more advanced transnational collaboration in enterprise creation and technology transfer.

The vision *'Creating a ECIU Knowledge Transfer Identity'* centres around the exchange of best practice, setting up mechanisms for the creation of an expert community across the ECIU network and the appropriate web based tools for information exchange. A common identity will enable knowledge transfer practitioners to comprehend the ECIU as an active network of experts. A common identity also allows an SME to easily navigate and identify skills and expertise across Europe that may not be available locally.

This second vision captures the processes traditionally associated with Knowledge Transfer Offices. For transnational collaboration, consultancy services and cooperation to boost enterprise creation hold the greatest promise. As partners become more comfortable sharing not only human resource information but best practice, creating a common portfolio of patent profiles and shared scientific facilities, and participating in common knowledge transfer research projects may become easier to implement.

All ECIU universities are involved in University-Business cooperation and Entrepreneurship and have gained a substantial mass of know-how; sharing this know-how will lead to synergies and improvements in the workflow. However this exchange will best be supported through a scheme for regular interaction between knowledge transfer professionals, for example, by establishing a biannual meeting of all ECIU knowledge transfer professionals. Collaboration will also be facilitated through a virtual platform for sharing experience. Creating an active network of visible and easily accessible experts is one of the major goals of this vision.

In this vision there is an emphasis on 'know-how' capital: combining and integrating resources is the ultimate form of cooperation ('structural cooperation'). Universities have resources, human and facilities, that can be made available to each other. A directory of resources available for others is the simplest form of cooperation.

3.4 Conclusions from the Tool Development Process

In many respects the process of developing the tools was just as informative as the resulting visions. Key points are highlighted below.

Two key factors influenced the particular vision developed for the ECIU. Firstly, encouraging enterprise and entrepreneurship has a high priority within the ECIU. Secondly, given the disparate nature the ECIU it was felt that in order to achieve true collaboration rather than simply calling on the existing ECIU network structure the creation of an ECIU knowledge transfer identity was required. Such an identity would help both build collaborations internally and present an identifiable brand to business. Other transnational collaborations may form different visions depending on the expertise and strategic interests of the collaborating institutions.

The visions that emerged are wider than a 'virtual Pan-EU knowledge transfer office', extending collaboration into Entrepreneurship education and research activities. While the first vision concerns human capital and the second know-how capital,

the emphasis in both is on exchanging and developing. This emphasis is key if true collaboration rather than simple cooperation is to be achieved. Any practical implementation of these visions should focus on supporting exchange and development.

Many of the collaborations are likely to be on an project basis with different partners participating as expertise, interest and external demand dictates.

Potential tools need to be carefully assessed to for feasibility. For example, ensuring the provenance of tools based on collating and sharing information such as the 'Expert Directory' will be extremely difficult.

In summary, specific implementations should build on the strengths and strategic directions of the institutions wishing to develop transnational knowledge transfer. However, the DIFUSE development method, visions and range of tools provide a generalisable basis for developing transnational collaborations in knowledge transfer. Further details can be found in the DIFUSE *'Report on proposals for common infrastructure and services of an ECIU knowledge transfer network'*. How DIFUSE envisions the realisation of these visions for the ECIU is presented next.

4. Putting transnational knowledge transfer into practice

Although the DIFUSE project acted as a think tank as opposed to an implementation forum, it was important to develop methods that could be implemented. Thus the next stage was to address *how the visions for transnational collaboration in knowledge transfer could be implemented*. As the discussion of 2.4 highlighted, collaboration, as opposed to central provision, was a recurrent theme which developed in the course of the project. This emphasis on collaboration and the fact that the ECIU wanted to build on and extend existing expertise in knowledge transfer know-how found across its member institutions strongly suggested a Community of Practice approach. How this might be implemented is discussed in subsection 4.1. This is followed in subsections 4.2 and 4.3 with a discussion of how the two visions might be realised in practice. Finally, in subsection 4.4, the issues surrounding how the effectiveness transnational knowledge transfer implementations might be assessed are highlighted.

4.1 A Community of Practice Approach

Figure 2 below illustrates how the Community of Practice will provide a channel to achieve the two visions.

Figure 2:

Overview of how Community of Practice will facilitate the realisation of the visions for transnational collaboration in knowledge transfer

'Community of Practice' refers to the process of social learning and mutual support that occurs when people with a common interest in a subject or problem collaborate over an extended period to share ideas and develop innovative solutions. The development of transnational Communities of Practice in knowledge transfer could thus be used to share existing good practice between members, provide an informal training ground for less experienced practitioners and, through working on shared problems or projects, develop new and innovative services to support knowledge transfer.

In the case of the ECIU, all universities are involved in active University-Business cooperation and entrepreneurship teaching and have gained a substantial mass of knowledge and expertise; sharing this know-how through Communities of Practice will lead to synergies and improvements in the knowledge transfer workflow.

Requirements for an Effective Community of Practice

Communities of Practice are in general self-organising, organic collaborations where individuals come together for mutual support and problem-solving. However, if a successful Community of Practice is to be developed as a means of driving transnational collaboration, careful planning and facilitation is required. For example, community buy-in must be generated and having a practical focus rather than simply acting as a talking shop will help develop and deliver truly transnational knowledge transfer services.

On a practical level, an effective Community of Practice requires:

Facilitation: Communities of Practice are first and foremost a product of their members, with facilitation and personal contact being key to their success. Therefore the first step in development of a robust and lively Community of Practice is to assign a facilitator to engage the practitioner community in its development. This facilitation will be crucial not only in the community formation period, but will be an ongoing commitment if the momentum is to be maintained.

An interactive virtual forum for keeping the knowledge transfer professionals connected. This will additionally provide a valuable information resource which can be both used and generated by the knowledge transfer professionals' community.

Face-to-face meetings to give knowledge transfer professionals the opportunity to share experiences and build networks for future collaboration, which can then be further cultivated through the virtual community. Given the transnational agenda and the widespread locations, biannual participant meetings are suggested.

Collaborative knowledge transfer activities to focus the community on developing and supporting transnational knowledge transfer services. Initial activities should serve as a pilot and be relatively easy to implement, help develop a sense of community, expand the community skills and offer practical returns in knowledge transfer terms.

Ensuring Success of the Community of Practice

To ensure that good practice in knowledge transfer is achieved, potential tools should be evaluated and prioritised to ensure tangible benefits to Knowledge Transfer professionals and practitioners will be derived and that there is a significant and sustainable impact on university-business interaction. The Community of Practice therefore should undertake both quality assessment and evaluation of its activities on an ongoing basis.

By ensuring good and transferable practice, a transnational Community of Practice for Knowledge Transfer professionals can provide a role model for other transnational collaboration in knowledge transfer across Europe.

The ECIU Approach: A charter for collaborative knowledge transfer across the ECIU

The best way for an organisation like the ECIU to achieve the required buy-in, planning and facilitation is to develop a charter for participating institutions to sign up to in advance which explicitly details the rationale for the Community of Practice and the specific steps that must be taken to achieve it. While the charter developed within DIFUSE was specifically for the ECIU, it provides guidelines, based on the preceding considerations, that may in time and with experience be applied more generally across Europe. Details on obtaining the *Charter for Common Knowledge Transfer across the ECIU* can be found in Appendix B.

4.2 Realising a Transnational Programme on Entrepreneurship

The Role of the Programme on Entrepreneurship

The role envisaged for the ECIU Programme on Entrepreneurship is to develop the human capital of university staff and students to further entrepreneurship development. It builds on the vision presented in section 3.3, concentrating on the softer aspects - *enterprise education and entrepreneurship training* while indirectly supporting some of the harder aspects such as spin-out and enterprise creation.

Entrepreneurship within universities typically takes a number of forms ranging from postgraduate level degrees in entrepreneurship through skills training course for students and staff to mentoring schemes and incubator support for those wishing to take their ideas to market. This is complemented by an active research field within dedicated Enterprise and Innovation Centres and Institutes for Innovation and Enterprise. Involvement with entrepreneurship ranges from academic staff through mentors and drop-in entrepreneurs whose roots are within business to Knowledge Transfer Office staff. Student introduction to entrepreneurship is increasingly at both undergraduate and postgraduate levels.

A key role of the ECIU Programme on Entrepreneurship, which distinguishes it from existing local institutional programmes, is the **embedding of a culture of international enterprise**. Setting up a transnational programme to deliver this using the various constituents of Entrepreneurship will need to be a staged process. Potential initial cooperation and collaboration activities are briefly discussed below.

ECIU exchanges between students, academic staff and entrepreneurship support staff offer the opportunity to benefit from differing perspectives and learn about parallel experiences in other countries. This transnational exposure to different contexts is extremely important given the global environment where trade, enterprise and opportunity lie across borders. For academic staff these exchanges offer the chance to introduce new classes or research findings into partner institutions.

Exchanges between mentors offer the opportunity to exchange best practice in start-up processes and practice. As a minimum, there should be exchange visits between institutions to learn more about their respective experiences in setting up enterprise programmes, or facilities such as incubators. There could be an opportunity to recruit entrepreneurship teachers in specialist areas of the curriculum, enabling institutions to share 'good people' and specialisms. From an individual's point of view, exposure to another entrepreneurial environment can be reinvigorating and may lead to cross-trading for start-ups, or joint summer schools for staff and students of entrepreneurship.

Drop-in entrepreneurs and established business people ('high net worth individuals') lend their names, kudos and occasionally sponsorship to the entrepreneurial process. This category of people may be encouraged in a secondment or at least a visit to another ECIU university to offer their experience or time to similar start-up entrepreneurs.

Pan-European entrepreneurship summer schools for students and staff offer the potential for globalisation of training. They could include intercultural competence seminars/workshops (how to deal with cultural differences in business, awareness building, sensitising towards cultural differences in enterprise, exchanging experiences, 'cultures' within the university or within enterprises).

Transnational collaboration through an ECIU Programme on Entrepreneurship holds the potential to deliver significant benefits. *Table 3* below summarises the potential impact of the Programme.

Impact of an EUIC Programme on Entrepreneurship
Embed a culture of international enterprise
New, innovative classes on entrepreneurship
Cross-fertilisation of entrepreneurship research results
Pan-ECIU access to local specalisms and expertise
Enhance the value that graduates bring to business

Table 3: Impact of an ECIU Programme on Entrepreneurship

Implementation Considerations

The success of the ECIU Programme on Entrepreneurship will depend on a number of factors.

Piloting of transnational entrepreneurial training needs to achieve four key objectives. Firstly, pilots must extend the skill set that participants would gain from traditional training. Secondly, they must provide a practical demonstration of transnational collaboration. Thirdly, through the collaboration they must bring together knowledge transfer professionals from different ECIU universities to help build the Community of Practice. And finally they must illustrate the benefits to stakeholders of transnational collaboration in knowledge transfer.

Resourcing must be sufficient to make the pilots viable; otherwise, not only will the pilot fail but the negative experience may dissuade both academic staff and students from becoming engaged in the programme. This suggests focussing on self-financing conferences and leveraging Erasmus funding for exchanges as a first step.

Migrating cooperation to collaboration: In, for example, the case of certificated courses, cooperation through sharing of resources seems the best starting point. Care should be taken to develop migration paths to more substantial collaborations where relevant.

Course materials and delivery: One of the main advantages of transnational collaboration in entrepreneurship is cross-border exposure to different business contexts. However case studies need to be localised; a case study in Italian is of little value to non-Italian speaker. It is not simply a case of translation however, as the legislation and policy varies between country. The challenge will be to balance internationalisation with relevance to specific contexts.

In the context of joint courses, the choice of language of delivery may restrict participation. Language support should be considered.

Recruiting for exchanges may be problematic due to cultural and language barriers. Language support and incentives may be required.

Alignment and compatibility of courses must be considered as accreditation schemes, dates and fees (Master's) may differ and there may difficulty of recognition of each other's credits, or assessment schemes. However the ECIU's experience in establishing a collaborative European Graduate School and its work to facilitate student mobility suggests that with its support solutions may be found.

In summary, the ECIU Programme on Entrepreneurship will need to grow gradually. Exchange, be it of staff, students or teaching materials, is a promising starting point. These exchanges need to be actively supported by the ECIU and Community of Practice Coordinator with scheduled meetings, *conferences for exchanging best practice* (on courses, mentoring, student-led activities) and the development of a *common repository of e-materials*. Exchanges should be used to embed a culture of international enterprise which could be further stimulated by events such as a *pan-ECIU Business Plan Competition or Enterprise Festival*. Initial c*ooperation across Incubators and creativity labs* and *skills and master programmes* may eventually lead to new collaborative projects and *Joint or Dual Courses in Entrepreneurship*.

4.3 Realising a Transnational Knowledge Transfer Identity

The Role of a Knowledge Transfer Identity

A common identity can assist knowledge transfer. Knowledge transfer works best when there is a shared purpose, a common language and mutual trust. A common identity can foster a sense of belonging and an obligation to reciprocate and encourage contributions. The development of such an identity is particularly important in transnational collaborations given the geographic distribution of participants, diversity of contexts, lack of shared strategic aims and ad hoc nature of many of the potential activities.

Because the range of Knowledge Transfer activities is so vast and the manifestations of a proposed Knowledge Transfer Identity are so diverse it cannot normally be managed as a whole unless active steps are taken to do so, therefore any transnational Knowledge Transfer identity must imply the explicit management of all the ways in which the Community of Practice would present itself to all its audiences through experience and perception.

To realise a transnational Knowledge Transfer Identity four key questions must be answered: (1) Who we are? (2) What we do? (3) How we do it? -- and finally -- (4) Where do we want to go? To be successful, a Knowledge Transfer Identity must project a clear concept of what it is and what its aims are.

In recent years 'Identity' has been adopted as a management resource by many organisations involved in behavioural change and it is envisaged that a transnational Knowledge Transfer Identity, and any accompanying visualisation, would work better and faster to motivate behavioural change among practitioners and key stakeholders within the knowledge transfer community.

Table 4 below summaries the effect of a robust Knowledge Transfer Identity.

Impact of a robust Knowledge Transfer Identity
Help stimulate change and emphasise that change has occurred
Release energies – driving cooperation
Influence participants in the 'community of practice'
Be used as a marketing, design, communication and HR tool
Coordinate what already exists

Table 4: Impact of a robust Knowledge Transfer Identity

Implementation Considerations

Key to success will be the **practical explicit management** of the transnational Knowledge Transfer Identity. When creating the identity the following points need to be carefully considered:

Symbols have been used the world over to encapsulate identity. This visual representation can present a central idea with clarity, impact and immediacy to both internal and external audiences.

Formal and informal support systems need to be put into place to maintain the required effort and enthusiasm to introduce or manage a new Knowledge Transfer Identity. Formally, an individual or team is required to support and maintain the appropriate standards. Informally, an all-pervasive spirit is required throughout the various communities of practice that creates and sustains a feeling of belonging and demonstrates a consistency of purpose among its members. This 'respect' for the identity needs to come from the senior university managers as well as the Knowledge Transfer practitioners.

Flexibility needs to be built into every identity. A transnational Knowledge Transfer Identity should be adapted and modernised from time to time to reflect the changing circumstances.

Throughout its creation and implementation, any Knowledge Transfer Identity will need to be carefully **controlled and costed**. Decisions will need to be taken early on to define lines of responsibility, communication channels, location, liaison between groups and geographical locations, and finally who is going to pay for it. In addition, the size, scope and the speed of implementation of the Knowledge Transfer Identity need to be carefully controlled.

Finally, there are four main risks with the creation and implementation of any Identity programme. Firstly, many think Identity means a logo. Visual imagery is only part of a much larger identity programme which has more to do with behavioural change than graphic design; it acts as a catalyst to guide behaviour and bind practitioners. Secondly, promising too much from an Identity programme and then failing to deliver is a danger. Creating and sustaining a new identity takes time, patience, persistence and commitment. Thirdly, new identity is sure to fail if it is treated with scepticism, ridiculed or ignored by the people it is supposed to bind. Without substance and buy-in for its creation and support, it will remain a superficial exercise. And finally, the identity risks failing if senior management do not support this buy-in and endorse the new identity whenever possible.

In summary, the transnational Knowledge Transfer Identity must be of real substance and practical value in order to generate sufficient buy-in to foster transnational collaboration. The *'biannual meetings'* and *'exchanges of knowledge transfer experts'* tools will both add internal substance and generate buy-in while the *'expert directory'* and *'facility-sharing'* tools will help build the external identity offering valuable services to business. When sufficiently resourced, these tools combined with the support of Transnational Knowledge Transfer coordinator and the ECIU should ensure success.

4.4 Assessing the Effectiveness of Transnational Knowledge Transfer

Implementation of the vision must be accompanied by assessment of its impact if development is to be tuned to meet needs and suitable resourcing secured. This presents many challenges.

Knowledge transfer is notoriously difficult to measure. While there are some direct measures such as the number of licenses issued or businesses receiving CPD training, or the turnover from collaborative research or consultancy contracts, many informal knowledge transfer activities, especially those relating to tacit knowledge, are difficult to measure directly.

Measuring the transfer of the soft skills and mindsets involved in Entrepreneurship vision will be even more problematic. Metrics such as the uptake of places on enterprise education or entrepreneur skills merely measure the potential for transfer, offering little concrete insight into their impact within the economy or society. Similarly, assessing the effectiveness of any transnational Knowledge Transfer Identity will be equally problematic.

So while establishing metrics is important, it must be remembered that these are, in general, indirect measures of knowledge transfer. The following issues should be borne in mind.

The goal of the measurement must first be established before the metrics themselves. It is the impact of knowledge transfer activities on local or European economies that is being measured or is it whether transnational collaboration has actually been used to achieve the economic impact? Or are you measuring the sustainability of the transnational mechanism? All have a place in any assessment of the implementation of transnational knowledge transfer.

What factors other than transnational knowledge transfer activities might affect the results of the metric? Given the complex socioeconomic environment, it is often difficult to establish whether improvements are the result of a new knowledge transfer intervention or whether environmental factors such as policy, economic situation or managerial changes have been the principle drivers. Indeed it is likely that any measure will be the result of complex factors but metrics should be found to cross-check and subtract other influences where possible.

Measures drive behaviour, but not necessarily the desired behaviour. As metrics are one step removed from what they are supposed to be measuring, human nature often results in behaviour designed to meet the target of the metric rather than achieving the overall objective of the intervention. This further complicates matters because **multiple, potentially competing metrics** are likely to arise as the transnational knowledge transfer activities will take place within both ECIU and local institutional contexts. Even when individual metrics are highly tuned to drive desired behaviour, competing influences may make outcomes unpredictable.

Thus the development of a suitable set of metrics which can be used to drive development of a valuable, transnational knowledge transfer is a research programme in itself. However, this will need to be tackled if the vision is to succeed and deliver the potential benefits that are anticipated. The ongoing UK research programme on the *'Impact of Higher Education Institutes in Regional Economies'*[4] or the OECD study *'Globally competitive, locally engaged' - Supporting the contribution of Higher Education Institutions to regional development*[5] may offer some guidance on addressing this.

[4] **http://www.ewds.strath.ac.uk/impact/home.aspx**

[5] **http://www.oecd.org/document/16/0.2340.en 2649_35961291_34406608_1_1_1_1.00.html**
[5] **http://www.cfp.upv.es/oecd/inicio/presentations.jsp**

5. Concluding Remarks

The aim of DIFUSE was to act as a think tank on transnational knowledge transfer and, as is the nature of EU projects, was of finite duration. DIFUSE has established significant foundations for future transnational collaboration in knowledge transfer.

The DIFUSE methodology of developing transnational knowledge transfer tools and collaborations from the bottom up proved successful. The analysis of how knowledge transfer processes might be implemented transnationally and what advantages these would deliver to participating institutions was particularly valuable. This approach avoided the pitfalls arising from preset political agendas and through the embedded interaction has helped to build a fledgling community from which future collaborations can be built. For those wishing to develop transnational collaborations, active engagement with this bottom-up development process through examination of the possible contexts for collaboration and how such collaborations might be implemented is highly recommended.

Priorities shifted through experience as the project progressed. Collaboration in the more established area of patenting and licensing proved too problematic, and so this original priority was downgraded. However, working on the project strengthened the desire to collaborate in emerging fields such as entrepreneurship.

The organisation of Knowledge Transfer Offices is not the most important prerequisite for transnational cooperation; the KT processes – the what, why and how aspects – are more relevant. This is in large measure due to the impact that national policies and legislation have had on individual universities' knowledge transfer models. This, along with the interest in the emerging field of entrepreneurship, led to an evolution of the initial idea of a virtual pan-EU knowledge transfer office.

Opportunities to collaborate transnationally are considerable, but are likely to be realised, initially at least, on a project basis. Opportunities span education and research as well as the traditional remit of Knowledge Transfer Offices, highlighting the interconnectedness of the three missions of universities.

A coordinating body such as the ECIU will be vital for success although it should be emphasised that this does not imply a shared knowledge transfer strategy; collaborating institutions should instead work to a shared ECIU knowledge transfer vision which offers members the opportunity to retain their own individual strategies and priorities.

For the DIFUSE participants, the social network of contacts that developed as part of the project and the exposure to knowledge transfer practices in differing institutions and regions have been a significant asset. The next step is to utilise these assets to both build transnational activities and to further develop local knowledge transfer services.

Appendix A: DIFUSE Participants and Contact Details

Project Coordination

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The DIFUSE project website (**http://www.difuse-project.org/**) provides a repository of published information regarding the project.

Appendix B: DIFUSE Project Activities and Outputs

DIFUSE was designed to develop the elements of a pan-European technology transfer network in four phases.

DIFUSE began, in phase 1 – **Assessment of Current Knowledge Transfer Practice** – by assessing the existing situation at the participating universities to identify the best elements and any shortcomings of current practices. This was achieved by first defining a common framework for the description of current technology transfer practice. Subsequently, each partner described knowledge transfer at their universities using this framework. These contributions were then edited into a common reference document which also constitutes the deliverable '*Report on consortium members' knowledge transfer practice'*. A summary highlighting best practice across the DIFUSE partner institutions is provided for reference in Appendix C.

The best practice baseline served as input to phase 2 – **Development of Knowledge Transfer Methods and Interactions**. Here DIFUSE examined different aspects of knowledge transfer to develop the report '*Recommendations for Common Knowledge Transfer Activity Areas'*. The feasibility and implementation of these methods were further examined in phase 3 – **Definition of a Knowledge Transfer Network** – to investigate how they might be utilised within a network to build a 'virtual Pan-EU knowledge transfer office'. This resulted in the deliverable *'Report on proposals for common infrastructure and services of an ECIU knowledge transfer network'*.

The final phase – **Development and discussion of an ECIU Charter for Common Knowledge Transfer across Europe** – proposed *'A Charter for Common Knowledge Transfer across European Universities'*. The charter describes the steps required for the ECIU to implement transnational knowledge transfer collaboration. While the charter was specifically designed for the ECIU, the lessons learned during the DIFUSE project and the models developed are applicable to any groups interested in transnational collaboration in knowledge transfer.

Dissemination of the project outputs was a key element in addition to the four development phases. There were two major activities. Firstly, the DIFUSE conference *'Innovation in a regional context for a global economy - how can universities find the balance?'*, held on 27th May 2008, provided dissemination within the ECIU. Secondly, this handbook – *'A Handbook of building pan-European knowledge transfer collaborations'* – disseminates the project findings to a wider audience.

The public versions of the reports and outputs can be found on the project website **www.difuse-project.org.**

Appendix C: Excellence in Knowledge Transfer Mechanisms across ECIU

The starting point for exploration of transnational collaboration in knowledge transfer is to identify good practice at the local and national level. As befits their profiles as innovative universities, DIFUSE partners demonstrate excellence in knowledge transfer activities. Key areas with the potential to inspire future transnational collaboration include technology commercialisation, consultancy, enterprise creation, students and graduates and international connections. The information presented below describes key knowledge transfer activities as of the beginning of 2008. The full DIFUSE exploration of knowledge transfer practices across its partners, as found in 2006, is presented in its *'Report on consortium members' knowledge transfer practice'*.

C.1 Patents and Licensing

Technology commercialisation relates to the exploitation of intellectual property, codified in clearly identifiable information packages that can be the object of commercial transactions.[6]

Commercialisation Champions Programme: University of Strathclyde, UK

In partnership with: Research & Innovation, SEEKIT and ERDF funded

The objective of the Commercialisation Champions Programme is to stimulate commercial activity through the strategic matching of University IP with the talents and expertise of the 'Entrepreneurial Community at Strathclyde'. The programme aims to attract and engage entrepreneurial alumni (as individuals or in teams) and make available a predetermined selection of IP for them to select commercial opportunities which 'best fit' the individual's/team's competences. Upon engagement, the individual/team will present a proposal setting out their commercialisation strategy including routes to market, product development plans, team skills, milestones and budgets. The champion(s) would then develop the commercialisation plan within a given time period. Each project would be evaluated on its own merits and reviewed for impact at regular intervals.

Year Launched: 2007

Impact: One start-up and one licence deal, two more deals in progress, one 'failure'; five participants to date.

What next: Programme will continue through to May 2011, with yearly review points, targeting five successes from eight projects.

Consultancy from a university refers to the advice of academic staff that could be based on factual knowledge, familiarity with research tools or a theoretical understanding of practical problems. This set of activities would also include invited speeches and lectures given to non-academic audiences (Mollas-Gallart et al 2002).

[6] Mollas-Gallart et al, 'Measuring Third Stream Activities: Final report to the Russell Group of Univesities', *Science and Technology Policy Research*, April 2002

UTEAM Divergent: University of Technology Compiègne, France

In France, faculty may spend 20% of their work time consulting or engaging in external economically viable activities. Some of Compiègne's staff thus actively intervene as experts in innovation processes and technology transfer. To assist them, the company UTEAM Divergent has been set up by the University of Technology of Compiègne (UTC) and the University of Picardy Jules Verne at Amiens (UPJV) which provides services, professional education, short courses and assistance to industry, SME's and start ups in collaboration with the staff of the universities and a team of internal and external consultants.The consulting services department counts major manufacturers such as Renault, PSA and Valeo amongst its clients as well as service industries such as the EDF and Lyonnaise des Eaux and many smaller companies.

The Education department provides 'tailor made' courses for many companies such as Bertin, Clariant, Colgate, Sagem and Rhodia and the Assistance department is available to help any inventor or a person with a commercial idea to develop the concept, search for partners and funding and provide expertise and services to enable the creation of a company.

Year launched: 1989

Impact: Divergent has been involved in most of the consultancy contracts undertaken by university staff since its foundation as well as many short courses and aid to start-ups.

What next: UTEAM has recently been reorganised and the number of external consultants has increased to respond to the needs of clients over a wider range of multi-disciplinary projects.

C.2 University-Business Interaction

Continuous Professional Development (CPD)

Continuous professional development in the context of knowledge transfer refers to professional development courses and other training activities tailored to meet the needs of industry, government, professional groups and the community. Such activities are usually short-term, highly targeted to address a limited range of issues and do not in general lead to the award of a degree. However, a new range of professional programmes which offer accreditation has emerged in recent years. CPD activities do not include vocational and continuing education courses which are considered to be part of a university's core teaching mission (and not knowledge transfer). (Mollas-Gallart et al 2002).

Continuous Professional Development University of Warwick, UK

Continuing Professional Development (CPD) is Warwick's major academic activity at the business interface and comprises a wide range of 600 specialist short courses, including postgraduate programmes. CPD provides one of the highest sources of external income to the University.

A new short postgraduate award has been introduced to make quality accredited CPD more accessible to business. Most subjects are available, e.g. professionally recognised programmes in management, engineering, medicine and health care, social work, education, and languages at levels from an MBA to one-to-one language tuition, social work to SixSigma, CADCAM to virology. The largest providers are Warwick Manufacturing Group, Warwick Business School (Executive Programme), Biological Sciences, Health and Social Studies, the Medical School (notably Warwick Diabetes Care), the Institute of Education and the Centre for English Language Teaching.

Impact: The impact of Warwick's CPD is primarily as a result broadly of the courses run in three areas: Warwick Business School Executive Programmes, Warwick Manufacturing Group's Advanced Manufacturing, Engineering and Engineering Management programmes and the health and medical programmes, notably in Diabetes care. It also has major contracts for training global companies in foreign languages.

What next: Warwick is notably expanding its short courses in the health and medical care fields, while consolidating its programmes in the other areas. Its next steps are to move its unaccredited programmes into accredited versions, which will ultimately lead to the award of Master's degrees in the chosen subject. Not all wish to follow this route but the accreditation process is seen as a quality control measure that can assist the development of the course to a higher level.

Students and Graduates

Teaching related activities may be considered part of knowledge transfer when they bring students in contact with non-academic users and beneficiaries through student placements and when they include stakeholders from outside academia in the development of academic curricula. (Mollas-Gallart et al 2002).

Knowledge Transfer Partnerships: University of Strathclyde University of Warwick, UK

In partnership with the UK Government

Funded by government organisations led by the Technology Strategy Board, Knowledge Transfer Partnerships (KTP) involve forming a three-way partnership between a company, an academic institute (known as the knowledge base partner) and a recent graduate (KTP Associate). The aim of KTP is to help businesses improve their competitiveness and productivity through better use of knowledge, technology and skills found in higher education institutions, further education colleges and research institutes in the UK. The KTP associate is responsible for researching and solving an important business problem for the company and facilitates the transfer of skills and expertise from the academic institute into the company over a period of one to three years.

The University of Strathclyde is host to the West of Scotland KTP Centre, which works with universities, colleges and research organisations in the West of Scotland including the universities of Strathclyde, Glasgow Caledonian, Glasgow, the West of Scotland (formerly Paisley), and Central College of Commerce.

Year Launched: West of Scotland KTP Centre formed in 1996

Impact: 156 KTP projects over the last 10 years, of which 94 were from Strathclyde.

International Connections

In a global economy, the markets for a university's intellectual property, skills and expertise are not restricted to its immediate region. Permanent international connections with research or commercial partners help to accelerate knowledge transfer. Thus, universities are increasingly identifying expansion of their global presence as a strategic objective, devoting considerable time and resources to its attainment.

University of Aalborg, Denmark

The University of Aalborg's mission statement is internationally oriented:

"Aalborg University intends to contribute to the knowledge of global society as well as the prosperity, welfare and cultural development of Danish society. This will be achieved through research, research-based education, and exchange of knowledge with society in general, and always to the highest international level."

Aalborg University has departments in the cities of Esbjerg and Copenhagen, Rome (Italy), Birla (India) and Bandung (Indonesia) and has numerous collaborative agreements in other cities around the world. To establish a worldwide research center Center for TeleInFrastruktur (CTIF) has headquarters at Aalborg University (Aalborg) and departments in Copenhagen, Rome (2006) and Bandung (2007). Instead of establishing cooperation between the universities, CTIF departments have been founded. Future plans include setting up PhD scholarships and exchanges, the establishment of a research centre with its own laboratory, common grant applications for economic funding and a general expansion of the professional environment for the scientists.

CTIF's aim is to meet a new paradigm shift in innovative research and higher education in the area of next generation mobile communication. The establishment of overseas departments is seen as part of Aalborg University's globalisation strategy, which is to exchange knowledge with the rest of the world. A CTIF centre will be established in Tokyo in October 2008.

Common US Office: University of Technology, Dortmund, Germany

The three universities in the Ruhr area (Bochum, Dortmund, Duisburg-Essen) operate a common office in New York: 'ConRuhr' USA (Consortium of the Ruhr-Universities), a non-profit office based in New York City that was established to promote the region and its universities and to enhance academic contacts between students and researchers from the US and the Ruhr area.

Year Launched: October 2004

Impact: Marketing of the Ruhrarea as a region of academic excellence (website: **www.conruhr.org**, four brochures on the Ruhrarea and study opportunities, press coverage in German and American newspapers, events, six electronic newsletters for friends and alumni of the Ruhrarea in German and English); Fostering of Student Exchange (Study Abroad Fairs in the US, RISE research internships, Summer Academies, formulation of standards for the mentoring and support of exchange students, telephone counselling on studying in the Ruhrarea); Research Collaborations (joint research, advice on potential research collaborations; conferences, delegation visits); Alumni Network (data base on 1,500 'RuhrFANs', alumni dinners with representatives from academia, business and exchange organizations, networking events, internet platform **www.ruhrfan.net** which serves as a network of the RuhrFANs worldwide).

What next: Since the three universities have recently formed the University Alliance Metropole Ruhr, ConRuhr is establishing new partnerships between excellent universities in the USA and the Alliance as a whole. ConRuhr supports by its expertise strategies for international marketing of the Alliance. In addition, Conruhr is in the process of expanding the RuhrFAN network by building an on line expert directory which will foster the collaboration of academia and business within the US and with the Ruhrarea. These activities strengthen the role of the Alliance in the field of research and higher education in an international framework.

C.3 Entrepreneurship

Enterprise Creation

Enterprise creation refers to a wide set of entrepreneurial activities at a university that encompass mentoring and support for staff and students, assistance with networking, access to innovation infrastructure such as incubators and provision of funding opportunities.

Hep: Hamburg University of Technology, Germany

In partnership with Hamburg Innovation (a sister company of TuTech Innovation), Hamburg universities and industry.

The Hamburg business creation programme 'hep' addresses the needs of all students, graduates and researches wanting to start their own business. They receive process-oriented support from hep and are mentored during the critical initial years. Through 'founders jobs' they receive financial support for up to twelve months and a business plan competition gives them the necessary skills to approach potential financiers. Regular workshops are held on a specific topic every second Wednesday of the month. Hep also establishes contacts with coaches and business angels.

Year Launched: May 1999

Impact: As of the beginning of 2008, 70-80 founders have been funded in 38 companies, 90% of which are still operating in the market.

What next: hep is an ongoing initiative. In 2007 it received funds from the EXIST programme of the German Federal Ministry for Business and Technology to improve the local support at the different universities in Hamburg.

I3P: Politecnico Di Torino, Italy

In partnership with the Province of Torino, the Chamber of Commerce of Torino, Finpiemonte, Torino Wireless Foundation and Turin Municipality

I3P or the 'Innovative Enterprise Incubator of the Politecnico di Torino' is a non-profit company, that promotes the creation of new enterprises by taking advantage of the creative potential developed at research centres in the Piedmont territory. I3P consists of equipped premises able to host new enterprises for a maximum of thee years. I3P provides essential centralised incubator services at affordable prices.

Access to I3P is reserved for newly-established companies which have existed for less than one year. To enter the Incubator, the enterprises must demonstrate that they are able to develop knowledge-based projects, on an entrepreneurial basis and which are deemed interesting for the market.

Year Launched: 1999

Impact: thirty two successful enterprises have completed their incubation period. In 2004, I3P was awarded 'Best Science Based Incubator', after Tsinghua Science Park, Pecking (2002) and BioBusiness Centre, Oxford (2003).

What next: Fine-tuning of the process: idea-scouting, pre-incubation and incubation; international collaborations.

Temporary Entrepreneurial Positions (TOP): University of Twente, Netherlands

The University of Twente started the TOP programme to help graduates, university staff and people from trade and business to start their own companies. Someone who wants to use the TOP-programme must fulfil the following criteria:

- A concrete idea for a knowledge-intensive or technology oriented company that can be linked to the fields of expertise of the university;
- Available for fulltime a minimum of 40 hours a week;
- A business plan that meets a number of set requirements.

As a rule, the future entrepreneur makes contact with one of the coordinators of the TOP programme. In a first meeting, they check whether the business idea fits within the TOP programme. An important criterion is the link between the company and the expertise of the university. After admission the entrepreneur is expected to work full-time on the company. After six months there is a mid-term evaluation by the TOP committee and after one year the support from the TOP programme ceases; the TOP committee has one final meeting with the entrepreneur to discuss the future development of the company. During the one-year support the TOP entrepreneur receives office space and facilities, access to networks, a scientific and a business manager, and an interest-free loan (€20,000), to be repaid four years after the entrepreneur leaves the TOP programme.

The TOP programme is open to all members of the academic community and to all others who meet the eligibility requirements.

Year Launched: 1984

Impact: Between 1984 and 2007, some 410 entrepreneurs participated in the programme, establishing 390 companies. The first-year survival rate is 99%, the five-year survival rate is about 89% and the overall survival rate since 1984 is 76% (data from 2000).

What next: The TOP programme is (being) introduced at other universities.

Enterprise Education

Enterprise education refers to the development of a set of behavioural characteristics, such as the willingness to take risks, opportunity-spotting, or developing leadership and team-building skills.

Master's programme Innovation and Entrepreneurship: University of Twente (UT) and Aalborg University (AAU)

The ECIU partners University of Twente (UT) and Aalborg University (AAU) cooperate to offer a two-year, international, double degree Master's programme Innovation & Entrepreneurship, targeted at students from all over the world.

At UT the focus is on 'Entrepreneuring with radical new technology', its processes of identifying and assessing opportunities and developing and implementing business concepts. Such processes involve, for example, market orientation, financing new ventures, and knowledge management.

The starting point is that the enterprise influences its environment. At AAU the emphasis is on 'Globalisation and knowledge, innovation and competence systems', from a regional environment perspective. Topics include, among others, network stimulation and clustering and their impact on innovation, knowledge, learning and competencies.

Entrepreneurship Training

Entrepreneurship training refers to the training of students or academic staff in specific skills on how to start a business, such as accessing finance, legal liabilities of starting a business, hiring staff and tax law.

G-DUR Start-up network: University of Technology, Dortmund, Germany

G Dur is a network of partners who want to support knowledge-intense start-ups in the region of Dortmund. The network includes five regional technology centres, the City of Dortmund, and the two universities in Dortmund (University of Applied Sciences, University of Technology). The network offers a wide range of services, including entrepreneurship teaching, training, business plan coaching, competitions and incubators.

Year Launched: 2002

I**mpact:** support of 80 start-ups, 60 placements in incubator offices, 400 business plans, 5.000.000 seed capital organized, creation of a new chair at TU Dortmund (Start-up and Innovation Management)

What next: In October 2007, a new project received funding from the so-called EXIST-initiative (sponsored by ESF and BMWi); the new project, kultur. unternehmen.dortmund, supports students who want to start up their own business in the creative industries (theatres, museums, performances, design, music, art, advertisement etc.); in the future, G DUR wants to continue to expand its services and aims at developing more specialized offers for start-ups in different branches.

Appendix D: National legislation on intellectual property

The commercial exploitation of intellectual property, for example patents, is an important component of knowledge transfer. From the 36 most successful European patents filed between 1990 and 2000, 50% came from public research institutions and the proof of principle of another 25% was made in partnership with public research institutions[7]. However, until recently, European public research organisations (with the exception of the UK) did not own any intellectual property generated within their institution. Therefore, patents filed by universities represent less than 3% of the total.[8]

From the mid 1990s onwards, the major EU Member States progressively introduced new legislation transferring ownership of inventions from the hands of the inventor(s) to the university (with the exception of Italy). Therefore, as with the landmark Bayh-Dole Act of 1980 in the US, the primary motive was to accelerate the further development and commercialisation of ideas and inventions emerging at universities. See *Table 5* opposite:

The major considerations for transnational collaboration, in the context of evolving EU legislation (see footnote 7 above) are:

- **Language:** Major language (English, French, German) patent applications are being addressed by the London Protocol, a voluntary code expected to come into force in 2008 to significantly reduce translation costs. Subsequently, the use of English as a standard, good practice for patent profiles could greatly facilitate collaboration.

- **Singular Enforcement:** If the European Patent Litigation Agreement comes into force, the value and security of each university's patent will increase dramatically. Although universities do not normally commercially exploit patents by themselves, and are less likely to be involved in litigation, it will be much easier to licence patents across borders to business or even among European universities.

- **Grace Period:** Universities in Europe face the dilemma of serving the public interest by publishing innovations, while trying to maximise their commercial potential by protecting them (patenting). However, one option cannot coexist with the other under the current system where there is no grace period to allow any feedback from industry or further development before filing a formal patent application. If a grace period is introduced under the European Patent Convention, there will be greater incentive for universities to interact with each other and businesses across Europe at an earlier stage of the innovation.

- **The UK Advantage:** Provisional patent applications are accepted in the UK and not in the rest of Europe. Provisional applications allow inventions to be improved further, allow for contact with licensees with an appropriate level of protection (or deterrence) and delay the greater costs of regular patent protection. Europe is operating in a non-level playing field which could hamper transnational collaboration with the UK.

- **Costs:** If legislation is introduced to reduce patent filing and maintenance costs in Europe, there could be greater incentives to protect intellectual property and thus make it easier (safer) to collaborate on marketing innovations to business. Duplication of procedures at the national and European Patent Office level is also contributing to the high cost of patenting and this is very likely to change, consistent with a Single Community Market.

- **Culture and Tradition:** The reluctance to share sensitive information with other universities could be a major stumbling block, given that many academics still view interaction with the economic world as a threat to their academic freedom and the filing of patent applications as a misappropriation of public good.

[7] 'ProTon Europe recommends improvements to the Patent System in Europe in order to facilitate Knowledge Transfer from Public Research', 31st August 2007, Brussels. Full report at **http://www.protoneurope.org/news/PatentPolicyStatement**

EU Member	DIFUSE Partner(s)	Name of Legislation	Year	Notes (updates, share of income)
UK	Strathclyde Warwick	Patents Act Copyright, Design & Patents Act	1977 1988	Ownership with employer (University). University staff have the right to earn royalties; Students generally own their own IP.
Netherlands	Twente	Dutch Patent Act	1996	Ownership with universities. In case of sale or licensing of the patent, the inventor receives 1/3 of the generated income (minus costs); 1/3 flows to the research institute and 1/3 to the university patent fund.
Denmark	Aalborg	Law on Inventions	1999	University is entitled to take ownership of patentable inventions. The remuneration is typically split 1/3 to AAU, 1/3 to the department and 1/3 to the scientist.
France	Compiègne	Law on Innovation & Research	1999	Since the new law on innovation was passed in France the government has delegated the management policy on IP directly to the individual universities. The university and the inventor are entitled to share the rights to patentable inventions, but companies financing the research and development can negotiate the terms when establishing the project contract.
Germany	Dortmund Hamburg	Inventors Law	2002	Until 2002, German university professors had what was known as 'professor's privilege' of owning the patent rights of their inventions. A new law, the 'Arbeitnehmer Erfinder Gesetz' (ArbEG) or 'Inventors' Law' changed the situation. Employees of the university are now obliged to give written notice of a technical invention. The university can either claim the rights to the invention or cede them back to the inventor. Revenues that result from the invention are shared on the basis of a complex legal framework.
Italy	Torino	Industrial Property Code	2005	Ownership with inventors but university has right to royalties, up to a maximum of 50%

Table 5: Summary of commercial exploitation related legislation across DIFUSE partners

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