

How to improve patenting at universities in Europe

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Abstract:

The article starts with an assumption that patents have a role to play in the knowledge transfer process as facilitators of the exchange between university and industry. Based on this, the article addresses the issue of university patenting in Europe, especially in the framework of efficiency of public research and development funding. Following, a concrete measure to improve patenting in European universities proposed by the European Patent Organisation and targeted especially to countries with lower innovativeness is illuminated. The proposal concentrates on the implementation of comprehensive patent service centres, which provide specialist link between university and industry.

Key words: university patenting, patents, innovation, knowledge transfer, patent-related services, technology transfer.

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1. Introduction

"Everyone can publish a scientific document. However, the challenge for a researcher is to have an impact on society: to create jobs and wealth"

Antonio Camara¹, CEO of YDreams

University patenting is analyzed within the broader context of technology and knowledge transfer and the general European Union policy framework of knowledge-based society. Knowledge transfer is understood to consist of "the range of activities which aim to capture and transmit knowledge (either explicit, such as in patents or tacit such as know-how), skills and competence from those who generate them to those who will transform them into economic outcomes. It includes both commercial and non-commercial activities such as research collaborations, consultancy, licensing, spin-off creation, researcher mobility and publication. Knowledge transfer is a wider concept than "technology transfer": it includes other transfer channels, such as mobility of staff or publications" (European Commission, 2007b).

A subset of knowledge transfer is the phenomenon of university - industry technology transfer, of which an important part is the university patenting. In particular, patents are a key tool for protecting innovation in a number of science-based technologies. "Academic scientists contribute to these technologies both indirectly, by widening the science base, and directly, by producing inventions susceptible of industrial application, and therefore protected by patents" (Lissoni et al. CESPRI pg. 2).

The goal of this paper is to present an initiative of the European Patent Office to improve university patenting in Europe. This is done in several steps. First, a link is drawn between university patenting, technology transfer, and research and development funding. Next, differences in capacity to innovate between the new EU-12 Member States and the EU-15 are discussed. Following, conditions under which patenting at universities can be improved are considered. In order to facilitate a systematic analysis, a model of university patenting proposed by ProTon is used. The model tries to answer the following:

- 1) Who are the actors involved?
- 2) What are the necessary conditions for university patenting?
- 3) What competences are required?

On the basis of the model, the article highlights one possible approach, chosen by the EPO, whereby the national patent offices play an important role in stimulating university patenting. The EPO pilot project on Knowledge Transfer Offices foresees the establishment of comprehensive patent centres at universities with expertise input from the national patent offices, especially in those Member States of the European Patent Convention, where patenting in general, and university patenting in particular, is low. The article postulates that better patent-related services offered to the universities will increase the patenting rate. This will be due to the fact that the pilot knowledge transfer offices will employ high-quality, customer-oriented specialists, who will provide services to link the researcher and the industry needs.

It is important to acknowledge that there is an ongoing debate on the extent of the contribution of patenting to the improvement of the innovative capacities of an economy. Moreover, some researchers find evidence that university patenting may be

hindering or at least slowing industrial innovation (Fabrizio). On the other hand, there are recent studies, which show how university patenting and technology transfer positively influence the quality of work in academia (Breschi et al. showing that academic inventors publish more and better quality papers than their colleagues with no patents, and increase their productivity after patenting). It is possible to conclude that the issue of the importance of patents in the innovation policy will remain a point of discussion for some time. In this paper, patents are seen as catalysts of the university-industry technology transfer. This, however, does not imply that the authors are proponents of blind push for more university patents. Rather, the general recognition that patenting as a phenomenon should be welcome at universities is accompanied by the assumption that only high quality university patents, flanked by appropriate transfer mechanisms can indeed be beneficial for the university and society at large.

Furthermore, there is a clear political guidance from the European Council to be active in the context of technology transfer from universities to industry. This is by now identified as a key issue for the strengthening of innovation, and of the European economy in general, as stated in the Presidency conclusions of the European Council meeting of 8-9 March 2007 in Brussels (European Council). Furthermore, the communication from the Commission to the Council "Improving knowledge transfer between research institutions and industry across Europe: embracing open innovation" dated 4 April 2007 gives clear recommendations and includes several points, such as:

- promotion of trans-national dimension of knowledge transfer;
- establishment of "Voluntary guidelines for universities and other research institutions to improve their links with industry across Europe";
- dependence of success of knowledge transfer offices on skills and competencies of their staff;
- increase of staff mobility between the public and private sector;
- promotion of an entrepreneurial mindset based on a professional management and understanding of intellectual property issues.

Also WIPO acknowledges that university patenting has increased in importance and provides policy considerations as to the next steps in development of a framework aimed at fostering a greater interaction between public research and industry in order to increase the social and private returns from public support to R&D" (WIPO).

2. Academic patents

"Universities and other higher education institutions are key elements in the science system in all EU countries. They perform research and train researchers and other skilled personnel. The role of universities and scientific research in the innovation system has broadened in recent years. For example, according to the OECD, there is a 'growing demand for economic relevance' of research, and 'universities are under pressure to contribute more directly to the innovation systems of their national economies' (OECD, 1998). In particular, universities are becoming more dependent on output and performance criteria and academic research is increasingly mission-oriented as well as contract based (European Commission 2003c; OECD, 1998). At the same time, universities have established closer links with business through

cooperative research, networks and exchange of information" (European Commission 2004, pg. 48).

Despite this broader role of universities in innovation, university patents worldwide represent only 5% of all inventions. While the top US university patent assignee - University of California - had almost 600 patented inventions in 2005 and in Asia, the University Quinghua, China, had 900, in Europe, the best university patent assignee - the CNRS (Centre National de la Recherche Scientifique) took the lead with just over 130 inventions (Trotter and Yeatman).

At this point it must be acknowledged that the literature on university–industry relationships is mainly empirical and based on case studies, patent and bibliometric analyses, or large surveys. In most current research on university patents in Europe Lissoni et al (2007) point to the fact that there might have been an underestimation of patenting based on research in universities due to appropriation problems. Nevertheless, the closing of the gap between Europe and the United States is supposed to occur due to the inclusion in the statistical analysis of those patents, which were obtained by companies from activities performed by university researchers. However, the article argues that this correction of the statistical information does not contradict a recent observation included in the EU communication that "compared to North America, the average university in Europe generates far fewer inventions and patents. This is largely due to a less systematic and professional management of knowledge and intellectual property by European universities."(European Commission, Implementing the Lisbon Agenda).

While it may be true that overall patents produced on the basis of publicly-funded research are similar in number in the US and Europe, it is also acknowledged that in Europe these patents are, to a certain degree, applied for, retained and exploited by companies. Universities seem to support research but appear unable to profit from it.

If that highlighted observation is then analysed in terms of efficiency of publicly funded research and development, and it is assumed that patented inventions are outcomes of academic research, it is possible to conclude that whether or not patents were counted correctly, the issue of universities owning the patents remains problematic.

Additionally, it must be observed that to date analysis of the academic patenting in Europe has almost exclusively concentrated on the "old" EU-15 countries. This is also the case of the Lissoni et al (2007) study. Such situation provides a skewed view of Europe. If by Europe, at least the European Union is meant then the analysis has, up to date, only focused on the Western part of that geography. In the following, the two issues raised here: economic efficiency and specificity of Central and Eastern European university patenting are discussed.

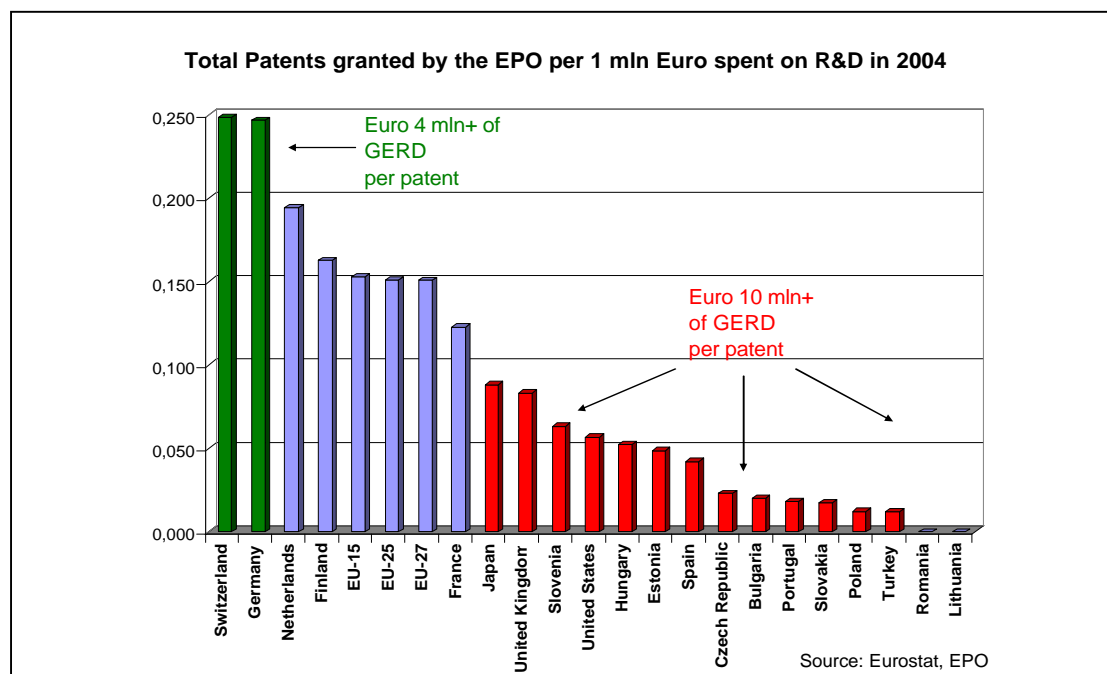
2.1. Economic efficiency of R&D investment

The broader policy of technology transfer from university to industry, based on transfer of explicit knowledge in form of patents and implicit know-how is linked to the idea of recouping public money invested in the research and development process through licensing income, positions offered to qualified graduates and more business funding of R&D.

Public activity in the area of R&D can be discussed from two angles. First, it is possible to describe the actions of the public sector, i.e. to measure the degree of public intervention. This includes a discussion of direct R&D expenditures by the public sector (for example expenditures for higher education or civilian and non-civilian R&D) as well as government instruments aimed at raising the economy-wide degree of R&D activity (for example tax subsidies, tax credits and matching grants). Secondly, it is equally important to assess the impact (or effects) of public R&D. These impacts concern both the additional R&D activity induced in the private sector and the impact of public R&D efforts on outcomes such as patents, new products and labour productivity (European Commission, 2004, pg. 47).

In this paper, efficiency of funds directed towards R&D is defined by number of patent applications per 1 million euros spent on research at a given institution and/or number of patents granted per 1 million euros.

On average, in EU-27, 6.7 million Euros have to be spent on R&D, in order to obtain 1 patent filed at the EPO. In some countries, like Germany, each 4mln Euros, on average, invested in R&D result in an EPO patent, however there are also countries like Hungary, Spain, Portugal, and Poland, where 1EPO patent requires more than 10 million GERD investment.



Graph 1. Total Patents granted by the EPO per 1 million Euro spent on R&D in 2004.

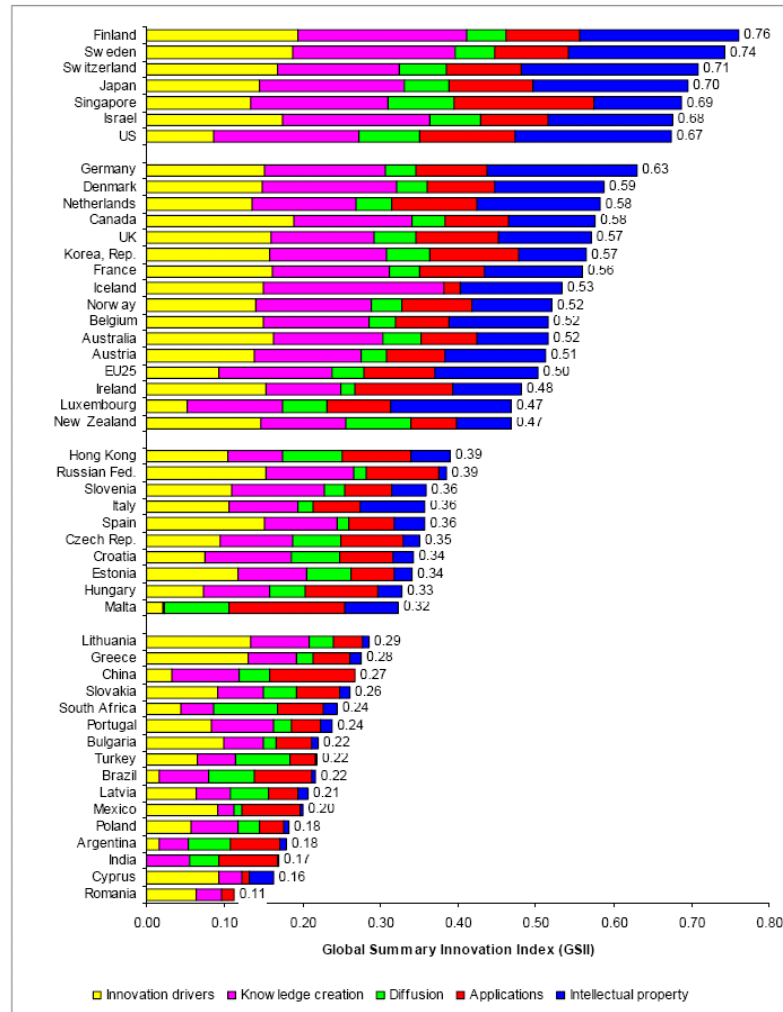
It is difficult to define what level of patenting is an efficient way of using public funding. However, graph 1 clearly shows that of those European Union countries, where 1 EPO patent requires more than 10 million Euros investment, 8 are the new European Union Member States.

3. Specificities of Central and Eastern European university patenting.

As mentioned in the section on academic research, Central and Eastern European Members of the European Union are very rarely an object of study within the context of technology transfer.

From the available sources, the European Innovation Scoreboard provides an overview comparison of EU-27 countries in the global summary innovation index, illustrated in the graph below.

FIGURE 8: GLOBAL INNOVATION PERFORMANCE



Graph 2. Global Innovation Performance. Source: European Innovation Scoreboard.

On the general, comparative level, it can be observed that all new EU-12 Member States score below the EU-25 average, while 8 of the old EU-15 Member States score above it. Moreover, 3 of the 5 countries with lowest scores are the new EU-12

Member States. One of them is Poland - a country with 17 universities and 18 universities of technology (Polish Information and Foreign Investment Agency).

In addition to the comparative data provided above, all governments of the Central and Eastern countries with membership in the European Union admit that they need to improve their performance in the innovation area, in order to reduce the gap with the EU-15. Furthermore, a brief survey of technology transfer offices in Poland provides an impression that although several of these institutions have been established in Poland in the second half of the 1990s and thus have about a decade of experience, patents are not in their focus. Aims of the Technology Transfer Offices are represented by the example of the Wrocław Centre for Technology Transfer (WCCT), established in 1995, which counts among its successes training, consultation, project assistance, and organisation of business idea competitions. It must be noted that WCCT also mentions arranging 20 international technology transfer agreements. However, it is not specified what type of transfer it was.

Moreover, the article by Morkvenas (2006) points to the issues, which are generally a source of concern in the region. He states: "Lithuania has a lot of problems with the transfer and diffusion of new technologies. It is proved by the statistic of European innovation. Universities are not normally known for their entrepreneurial attitude and flair. They are recognized, however, as major knowledge and research centres. One of the main problems of the Lithuanian technological sector is the interaction between universities and businesses, which is a casual and uncontrolled process." (Morkvenas, 2006).

4. Model

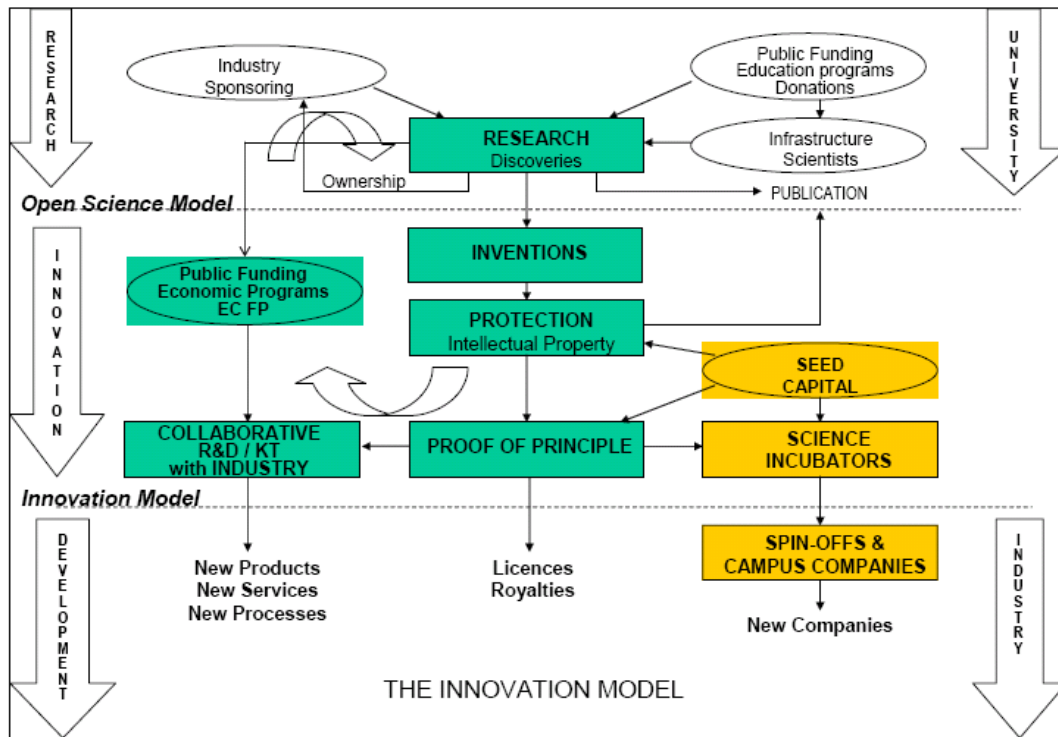
The model, developed by Protonⁱⁱ is a framework for establishing linkages between the different factors contributing to the university patenting.

4.1. Actors

There are two types of actors: institutional and individual. In the process of university patenting, universities and policy-making bodies are the most significant institutional actors, while researchers employed by the universities and companies negotiating patent licenses and transfers are the individual actors.

4.2. Conditions

The conditions forming part of the model are those aspects that govern the relationships between the main actors. Thus, legal framework defines who can own IP in a given state. Cultural set up defines the propensity to patent and acceptance of patenting by universities. Finally financial framework influences the capacity to research and ability to patent. As acknowledged by the EU, "efficient knowledge transfer in European research institutions is hindered by a range of factors, including: cultural differences between the business and science communities; lack of incentives; legal barriers; and fragmented markets for knowledge and technology"(European Commission, 2007a).



Graph 3. The Innovation Model. Source: Proton (Haywood).

4.2.1. Law

"Encouraging universities to commercialize research results by granting them title to IP can be useful but it is not sufficient to get researchers to become inventors. The key is that institutions and individual researchers have incentives to disclose, protect and exploit their inventions. Incentives can be "sticks" such as legal or administrative requirements for researchers to disclose inventions. Such regulations are often lacking in many countries, even in those where institutions can claim patents." (WIPO)

A number of aspects in the research regulatory framework in Europe make university patenting uncertain. Firstly, approaches as to IP ownership differ throughout Europe. This especially negatively influences possibilities of European-wide research initiatives. It also contributes to the ambiguity on the licensing scene. Secondly, for some areas, there exist EU guidelines. However, these have only advisory character, which only further contributes to the unstructured approach. Finally, there are areas of research, such as stem cell research, which have not been included in laws and advisory documents.

4.2.2. Culture

In this part, we posit that some EU Member States have a well established innovation culture, while in others it is still very limited. Moreover, the framework and methodology for comparing innovation culture is missing.

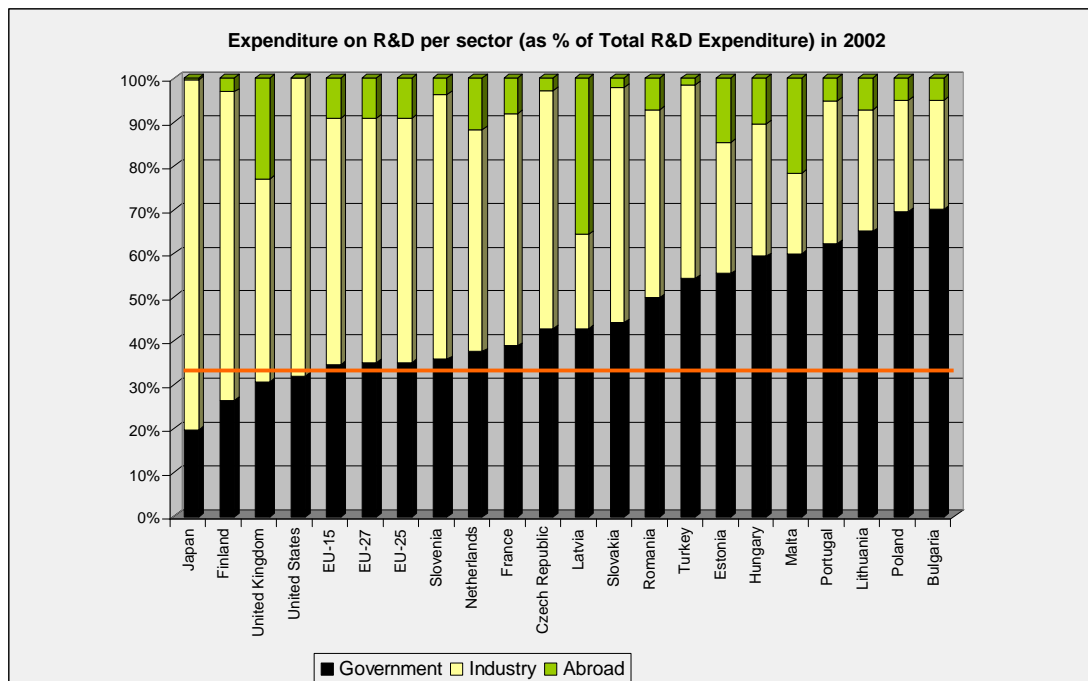
It can be argued that ability to innovate depends largely on two factors:

- (1) The people, organizations and institutions in society and
- (2) System of values and incentives and the ways they guide our behaviour, collectively and individually. It is, therefore, an issue dependent on

soft and horizontally spread factors such as profiles of the researchers and university professors, perceptions of the public, values of the society - all of which combine into the concept of culture. Especially the attitude of university professors and researchers, who value research for the honour of contributing to the greater human knowledge, can play an important role in the innovation process.

4.2.3. Financing R&D

The Member States of the European Union have agreed to strive towards the 3% GERD by 2010. With 1.88% GERD spent in 2002, the EU-27 is far behind Japan and the US. Few countries will fulfil their pledged rates. Moreover, providing money is not the only core issue. Grants and financial aid need to be coupled with incentives or requirements to patent and become less and less dependent on the granting institution. One of the striking features of the European R&D financing is the predominance of public funds, in particular in Central and Eastern Europe. In the long-term, the goal is to reverse the proportions of public and private contributions to the financing of research. Nevertheless, in the short-term, the high proportion of public money leads to a concern about how the society benefits from it. Increasing the university patenting will help promote innovation and raise efficiency of publicly used funds.



Graph 4. Expenditure on R&D per sector.

5. How can change happen? - the EPO pilot

5.1. The European Patent Organisation in a nutshell

Established by the Convention on the Grant of European Patents (EPC) signed in Munich 1973, the EPO is the outcome of the European countries' collective political determination to establish a uniform patent system in Europe. The EPO is the centralised patent grant system administered by the European Patent Office on behalf of all contracting states. The European Patent Organisation comprises the legislative body, the administrative council and the executive body, the European Patent Office. The European Patent Convention provides a single patent grant procedure, but not yet a single patent on the point of view of enforcement. After grant, the European patent becomes equivalent to a number ("bundle") of national patents. The Administrative council consists of delegates from the 32 member states and performs the following functions:

- adopt the budget
- approve the President's actions
- implements and amend the budget
- Regulations and Rules relating to Fees

5.2. EPO Pilot

In view of the discussed issues, and on the initiative of some member states of the European Patent Organisation, the European Patent Office proposed to the Administrative Council an initiative to improve knowledge transfer from universities to industry by making optimised use of intellectual property expertise available in the National Patent Offices.

This is also in response to the observation of the European Commission that "many European research institutions have set up knowledge transfer offices in recent years, aiming to improve collaboration and exploitation of research results and their uptake by business. Their success is largely dependent on the skills and competencies of their staff as well as the strategic role assigned to them and their managerial autonomy. The personnel working on knowledge transfer must possess a wide range of skills in order to carry out their tasks effectively. However, relatively inexperienced staff is often appointed to such positions." (European Commission, 2007a). It should be noted that the EPO does not offer the pilot in order to compete with national or supranational initiatives in knowledge transfer but rather to complement those capacities and target a very specific group of services, namely those linked to the patenting process and licensing of patents.

In the official document, CA/110/07, adopted by the Administrative Council of the European Patent Organisation on June 08, 2007, the pilot constitutes a significant part of the Cooperation Programme on "The Role of Patent Offices in Knowledge Transfer and Patent Promotion in Universities". In that document, the Administrative Council has acknowledged that "a more efficient and faster transfer of knowledge and technology from universities to industry is being recognised as an essential element to improving Europe's competitiveness and economic performance. The contribution of the patent system and the patent offices can, in some countries, facilitate significant improvements." Among other objectives, the representatives have agreed to "test the proposed concept in a pilot project with a number of selected European universities."

The initiative of the EPO aims to provide a solution within the European political dimension and EPO's particular area of expertise. To the former, the pilot is designed as a single project for several partners, some of which have experience in knowledge transfer, such as Portugal and some which need support in launching such initiative. Moreover, the goals of the EPO's pilot are in line with EU goal to increase innovativeness. As regards expertise, the EPO is in the unique position to facilitate the exchange of experiences and expertise of the National Patent Offices staff and develop new ways of dealing with the patenting process and the information generated from it.

This proposal focuses on how to create local one-stop-shops at universities for all patent related matters, and how such Comprehensive Patent Service Centres can be linked with the innovation support centres to form a regional network. At the most fundamental level, the pilot project aims to shape or restructure the profiles and services of the existing technology transfer offices at universities to move from the position of information provider (patent libraries) to a profile of a pro-active actor in the technology transfer process, who offers a palette of expert services. Moreover, in countries where few or no technology transfer offices exist, introduction of the functional link between university researchers and industry is aimed at.

Foreseen activities include training of staff, building up a common services scenario and defining minimum standards for the services, qualifications of staff and documentation at the Comprehensive Patent Service Centres. Moreover, extensive collaboration on including intellectual property topics into the general curriculum and defining standard minimum requirements for IP courses. Exchange within the pilot participants, following the European Council emphasis on "the significance of exchanging best practices in the context of multilateral surveillance and calls for increased cooperation (European Council)" is also aimed at gathering information and providing analysis of the technology transfer from universities to industry, as well as university patenting, especially in the Central and Eastern Europe.

6. Conclusion

The differences in innovation performance between EU-15 and new EU-12 countries have been cursorily pointed out. Additionally, the paper points to the limited academic consideration of university patenting in Central and Eastern Europe. It is pointed out that one of the aims of the proposed EPO initiative is to stimulate the analysis of the technology transfer and university patenting landscape in the region.

The EPO initiative as such aims to improve the weak link between university patenting and industry. This link is normally provided by technology/knowledge transfer offices. In the EPO project, Comprehensive Patent Service Centres will provide professional services and will proactively seek patent opportunities in order to foster the exchange between the inventor and the business. This, in turn, is hope to bring a new highlight for the university, more income other than public funding, and improved relations with industry sector.

ⁱ Comment during a workshop on Knowledge Transfer organized for National Patent Offices in Lisbon in March 2007.

ⁱⁱ The model has been included in several documents. One of the earliest sources is the presentation given by Martin Haywood, Chair of ProTon Europe Steering Committee in April 2004. This document is referenced. Another source is a presentation given by Gilles Capart, chairman of ProTon Europe, at WIPO in 2005 and European Commission in 2006.

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