# 11 Tools for Lowering Commercialization Barriers for Innovations in Universities and Industry in Japan and Europe : a Comparative Approach of Knowledge Transfer Activities with Some Novel Viable Solutions(*)

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*The innovative features of the present research, far from being a mere report on the status of current activities, lie in the fact that after a thorough comparison between the European, and Japanese systems, and an analysis of the tools that have been used so far to facilitate and enhance knowledge transfer activities, some conclusions will be drawn together with a proposal for the adoption of alternative tools for lowering commercialization barriers, and achieve a borderless exchange of knowledge. The study will explore the possibility to opt for novel possible ways to create linkages at all levels of research, especially between European and Japanese entities and researchers, that will constitute potentially viable routes for a sustainable and effective development and exploitation of knowledge.*

*The study is divided in two parts. First, a thorough examination of the two systems will be carried out. Second, a real-world proposal will be suggested to:*

*1. overcome the common barriers to the commercialization of innovations through novel partnering techniques and web-based tools for a quick, inexpensive, reliable and neutral exchange of data;*

*2. create novel communication tools allowing fast and effective interaction between Japanese and European public research organizations and companies like web-based applications and databases.*

## I Introduction

In this Chapter the major issues of the study are analyzed as well as the research method being utilized and the peculiar characteristics of the study, which ultimately aims not just at comparing two different systems but also at providing a solution to enhance the transfer of knowledge and tackle today's difficulties in this regard.

### 1 From technology transfer to knowledge transfer: starting from the basics

It is not a trivial question to provide a definition before starting a discourse with several argumentations. That is why it is necessary to draw a line and distinguish the so called "technology transfer" from "knowledge transfer". The layperson could think that we are talking about the same thing, and this would be wrong. Indeed, technology is defined as *the practical application of knowledge especially in a particular area*(*1) while knowledge is *the fact or condition of knowing something with familiarity gained through experience or association*(*2).

So, from the very beginning what we can infer is that the relationship linking the two concepts is of *genus* to *species* as not all kinds of knowledge lead to the implementation of a technology, whereas every technology is the practical application of knowledge.

### 2 Aims and scope of the study

The main aim of this study is to provide the audience with a non-exhaustive yet comprehensive picture of the knowledge transfer systems in Japan, and Europe, and at the same time compare the two systems by highlighting the pros and cons of each of them.

(*) This is a summary of the report published under the Industrial Property Research Promotion Project FY2009 entrusted by the Japan Patent Office.

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(*1) See the definition of the Merriam-Webster Dictionary, available at http://www.merriam-webster.com/dictionary/technology.

(*2) See the definition of the Merriam-Webster Dictionary, available at http://www.merriam-webster.com/dictionary/knowledge.

It is important to stress since the very beginning that the subject matter of the study is the system as a whole and that is why the different legal systems adopted by each Member State (in the case of the European Union) to regulate university inventions, for example, are not analyzed.

Eventually the study will propose a novel platform that should be able to effectively bridge the gap between research institutions (universities included), and industry, and facilitate a faster and easier way to exchange ideas and knowledge, globally.

## 3 Research methodology

The research to write this study has been mainly performed in Japan while at the Institute of Intellectual Property, but it started before that stay, and embraces prior professional experiences as well. The research in Japan has been split between the analysis, and study of documents and the personal contact, through interviews, with key people that operate in the Japanese IP system in academia, private companies, and public institutions.

## 4 The peculiarities of the study

The present study differs from some legal scholarly papers for one single yet critical reason: it tries to provide a solution to a myriad of problems that are legal, cultural, organizational, and sometimes systemic. The method I conceived, as it will be manifest to the reader, can be used at a global level, but it would be useful to test it at the beginning to bridge the gap between Japan and Europe.

## 5 General considerations about technology transfer and knowledge transfer activities

In 2009, a Report from the European Commission's Expert Group(*3) on knowledge transfer metrics has been released to address issues like the identification of indicators to gauge the quality and performance of knowledge transfer offices (KTOs). The most important considerations worth mentioning are the core recommended performance indicators, the supplementary indicators, and the identification of the data to be used when assessing the quality of the performance of KTOs of public research institutions (PROs).

The Report encourages Member States to measure and report the data relating to KTOs of PROs, and encourages the PROs to monitor their IP(*4). The Group also acknowledges the shift from technology transfer to knowledge transfer, and mentions the existence of 1400 technology transfer offices in Europe, but the figure is not accurate as it dates back to 2004 and considered also technology transfer institutions (TTIs), which included entities like science parks(*5).

Campbell, in her paper, states that *"there is no "right" way to set up a technology transfer office"*(*6), and adds that a Technology Transfer Office (TTO) should not be seen as a constant and significant revenue generator. Personally, I do not agree with this view, I do believe that this holds true when it comes to the early life of a TTO, but when the patents are granted and the license agreements executed, there must be a reasonable expectancy of serious income in licensing revenues. That said, everything has to be evaluated on the basis of the circumstances and different situations, but I do not think that we have to start from the assumption that a TTO has just to serve the public interest by making available the knowledge created within the university, and this is even truer where universities are accountable for their expenses

(*3) See the Report from the European Commission's Expert Group on knowledge transfer metrics " Metrics for knowledge transfer from public research organizations in Europe", available at http://ec.europa.eu/invest-in-research/policy/ipr_en.htm. See also the webpage of the European Commission dedicated to IP and technology transfer, available at http://ec.europa.eu/invest-in-research/policy/ipr_en.htm.

(*4) Another document worth mentioning is the "European Innovation scoreboard 2008 Comparative Analysis of Innovation Performance", Pro Inno Europe Paper n. 10, January 2009, available at http://www.proinno-europe.eu/EIS2008/website/docs/EIS_2008_Final_report.pdf.

(*5) The reference study was performed by Inno et al. in 2004.

(*6) See Campbell. A.F., "How to set up a technology transfer office: experiences from Europe", Chapter 6.3, Handbook of Best Practices, 559-565, at 559. The paper is interesting as it offers a general and specific (UK) overview of the technology transfer landscape, available at http://ipmall.info/hosted_resources/IP_handbook/ch06/ipHandbook-Ch%2006%2003%20Campbell%20Establishing%20TTOs-Europe.pdf.

and have budgets to observe. A TTO cannot be a black hole from a financial point of view by definition.

## Ⅱ Some figures as to the patenting activity

In this Chapter there are several graphical representations showing the patenting activities with a focus on Europe, and Japan to start making some considerations from objective evidence. What will be also discussed is the necessity to go beyond the analysis of purely statistical data as to patenting activities to really evaluate the effective commercialization of innovations as this step is way too far from the "mere" patenting of an idea.

### 1 Investments in research and development and patent statistics

The member States of the European Union agreed almost ten years ago during the Lisbon Strategy Summit that the overall investment in R&D expenditure should have equaled an intensity of 3% of the GDP by 2010. This proposition was unfortunately far from being realistic at the time, and it is still far from being attainable now, regardless of the global economic downturn. In fact, the overall gross domestic expenditure in R&D of the EU27 was stable in 2006 and 2007 around 1,85%. In the period 2000-2006, while Europe has always been incapable of passing the 2% threshold, the U.S. was firmly way above this level and Japan steadily above 3%.

Overall, even before the Japan Patent Office the top filers are the U.S., the most active (in terms of patenting) European countries, and Korea. That said, the final outcome of our overview of EPO, PCT and Japanese applications confirms that the most active countries are some European ones, Japan, the U.S., and Korea together with China, which is increasingly climbing the rankings.

## Ⅲ The European knowledge transfer system

First of all, the necessary premise to this Chapter is that Europe is spending all its energy in achieving the so-called knowledge triangle to boost innovation and the commercialization of research. The strong belief that it is necessary to build a virtuous circle (in this case a triangle) starting from higher education, which performs research, leading to innovation, is by now a cornerstone of the European policy of science and technology.

The most recent herald of this approach is the newly-formed European Institute of Innovation and Technology (EIT), which is one of the many initiatives promoted at the European level to speed up ideas towards the market and create innovation, ultimately. The idea is not new, and it can appear quite simple, but nothing is simple when it comes to the exploitation of research results. And this is even truer when at stake there is a multitude of different jurisdictions like in the case of the European Union.

### 1 The general framework for knowledge transfer activities(*7)

Since patent law is not part of the pillars of the EU legal system, every Member State autonomously decides how to regulate the subject, and also decides whether or not there should be aid for increasing the transfer of technology(*8) and how. At the community level, though, much has been done by the European Commission.

### 2 Online resources

The databases managed by the EU in terms of knowledge transfer activities are not the only resource of course as almost all Member States have their own online databases. In terms of offerings, in the EU there are some institutional resources, like the one directly

(*7) To retrieve many of the available documents on technology/knowledge transfer activities in Europe, see http://ec.europa.eu/invest-in-research/policy/ipr_en.htm in which the listed documents are categorized as follows:
1) European patent systems;
2) Specific R&D- related IPR issues;
3) Technology transfer and university-industry relations;
4) IPR awareness, training and assistance;
5) European Commission.

(*8) In terms of financial aid for technology transfer and seed financing, see the discussion document of the European Commission on "Financing technology transfer & seed finance" to have a quick look at the EU initiatives, available at http://www.pedz.uni-mannheim.de/daten/edz-h/gdb/06/tt_sf_discussion_paper_2006.pdf.

linked to the European Commission, and then a multitude of other projects stemming mainly from EU funding that deal with the themes of knowledge transfer.

### 3 The leading European example: the University of Oxford

In my view, the leading example in Europe of KTO, which fully embraces the principles that are suggested by the Commission, and integrates the three sides of the knowledge triangle, is the KTO of the University of Oxford (i.e. ISIS), which operates in three distinct business activities by exploiting the full potential of the institution it belongs to.

### 4 Conclusions

The European knowledge transfer system is developing a communitywide policy that will ultimately result in an increase of activities for the benefit of the research institutions involved and the public at large. The difficulties will keep being hard to overcome, especially for the very nature of the EU, which is a bundle of different countries and jurisdictions with different norms and decision-makers. There are some excellent examples though, like ISIS, which holds promise for the future of Europe.

### 5 Recommendations

In my view, having observed many of the initiatives that so far have been developed, the solution would be to create a central hub at the European level in which knowledge and technology are shared and transferred with the ease and speed that nowadays are necessary to compete at a global level.

## Ⅳ The Japanese knowledge transfer system

To understand the overall consideration in Japan of the IP system we should just take a look at the five basic goals that the Japanese government set in 2008 as to the management of the intellectual property system(*9):

"1) strengthening intellectual property strategies for promoting innovation;
2) strengthening global intellectual property strategies;
3) promoting growth strategies of soft power industry;
4) securinng of stability and predictability of intellectual property rights; and
5) establishment of the intellectual property system corresponding to the neds of users."

### 1 Measures for private companies

When it comes to government-driven measures for private companies and universities, Japan is leading the way with a myriad of activities. As to companies, and especially SMEs, the comprehensive support provided by the JPO starts from the conception of the idea all the way to the commercialization of the final product.

### 2 Measures for universities

Even in this context, the JPO supports universities with several initiatives. To enhance IP activities and the promotion of patent information utilization at universities, the JPO has adopted a huge amount of pro-IP, and especially pro-patenting initiatives.

### 3 Brief history of the industry-academia relationship

Industry-academia relationships in Japan went through different phases, and they became a bit more formal with the advent of the TLOs and the incorporation of public universities. Starting from the most recent events, in the report of the International Patent Licensing Seminar 2009 there are several interesting insights in this regard.

Mr. Yamamoto, for example, in his speech(*10), highlighted how the Japanese knowledge transfer system now is living a new era after the incorporation of the universities in 2004 and that for the MIT and Stanford it took almost ten years before reaching profit

(*9) Examining all the IP-related efforts and initiatives of the Japanese systems is not the focus of this study, so, I suggest the greedy reader to take a look at Part 2 of the JPO Annual Report 2009, in which the Government efforts in intellectual property activities are described in detail.

(*10) See the report of the International Patent Licensing Seminar 2009, at 83. The report is available at http://www.ryutu.inpit.go.jp/pldb/en/seminar_a/2009pro-e_report.htm.

targets. He also added that in the licensing to overseas companies, the TLO first performs a market research to see whether there could be Japanese companies interested in the available technologies(*11). This, in my view, is a sign of an interest that is still present in the Japanese economy, that is, to think about the welfare of the country first, and then to the profit.

### 4 Other online resources

The databases managed by INPIT are not the only resource for knowledge transfer activities. In fact, not considering the private companies operating in the field, the resources offered through the Japan Science and Technology Agency(*12) are massive.

### 5 TLOs' organization and the leading Japanese example: the TODAI TLO

As to the organization of the TLOs, the organization, which performs several activities in their favor is the University Technology Transfer Association(*13) (UNITT), whose members are the TLOs and other institutions of higher education. UNITT also publishes annually a report with statistical data which is very comprehensive, unfortunately though, is just in Japanese, so, it may be difficult for a non-Japanese speaking person have a full grasp of the data contained therein.

### 6 The results of the questionnaire

A questionnaire containing some statements as to the management of IP in PROs and relationship between university and academia has been sent out to many (about 65) universities and TLOs through the Institute of Intellectual Property in Tokyo, Unfortunately, very few forms have been handed in, but I think that some of the responses are worth mentioning as they show a peculiar attitude.

### 7 Conclusions

Knowledge transfer activities in Japan can count on an extremely advanced and capillary system that guarantees a full coverage of consultancy services and financial exemptions that are surely pro-patenting. The lack of general English proficiency, though, can be a problem when finding and dealing with potential foreign partners.

### 8 Recommendations

Japanese universities, and KTOs should be more open towards international relationships because the return to society of the knowledge generated within universities should be global, in my view. A knowledge-based society, by definition, should have no borders, as knowledge is intangible, and should easily circulate. In this regard, many efforts should be made in order to make the offerings available to a wider public.

## Ⅴ Barriers to the commercialization of innovations

In light of what has been introduced so far, we can try to establish the most common barriers that innovations face to enter the market, and these occur, in my view, regardless of the quality of the KTO/TTO/TLO or the available information, for now. I envisioned the most common barriers as follow:

1) Inability to show the real potential of the innovation;
2) Physical distance between the parties;
3) (lack of) ICT coverage;
4) Language;
5) Unmatched areas of expertise;
6) Costs;
7) Lack of incentives for the transfer;
8) Little attractiveness due to the lack of visual representations;
9) Misconceptions/ wrong information;
10) Lack of trust between the parties.

## Ⅵ The proposal to lower barriers to commercialization

### 1 SciencXchange™

SciencXchange™(*14) could provide an online service to help overcome these

(*11) *Id.* at 85.
(*12) For a full description of the JST and its services, see http://www.jst.go.jp/EN/.
(*13) For further information, see http://unitt.jp/. The English page contains a limited number of information as opposed to the Japanese one.
(*14) The domain "sciencxchange.com" has been registered and the website is under construction.

difficulties, connecting companies with universities, and other PROs through a network that will ease the exchange of information that is nowadays scattered in thousands of websites that most of the times are ignored, underexploited or not accessible.

### 2 Market opportunities

Worldwide, thousands of universities and PROs offer their technologies to third parties (usually through their websites). Technology transfer is a long-term activity, and the potential contributions, both financial and non-financial, that effective technology transfer can make to global economy are significant and often underexploited.

### 3 Open labs and social networking

SciencXchange™ will modify the conventional rules for the sake of research and will display for the first time ever on a single website the following databases: a) list of available technologies from PROs, and companies (basically, this data will be automatically retrieved from the web(*15)); b) list of ongoing projects from PROs (basically, this data will be manually posted by the users(*16)); c) list of KTPs with their rating from members that have been their clients.

### 4 Technology intelligence

Thanks to a search engine capable of retrieving patent data from the databases of the three major patent offices in the world and from the databases of all the technology transfer offices in the world, SciencXchange™ will be able to offer a picture of the current patenting activities around a given technology, together with the profiles of the inventors and the institutions they belong to.

### 5 User acquisition strategy

SciencXchange™ plans to acquire users through four distinct channels: (a) advertising on online communities (LinkedIn, etc.); (b) targeted advertising through emails and ordinary mail to the target audience; (c) advertising on scientific and professional journals focusing on science and transfer of technology; (d) personal meetings with the representatives of TTOs of universities and other PROs.

### 6 Business model

SciencXchange™ will monetize its services through three separate revenue streams: (a) pay per use, (b) subscription service—monthly or annual fee, and (c) advertising.

## Ⅶ Conclusions

Both the Japanese and European systems have their own peculiarities and they probably cannot be fully compared due to the profound differences in terms of business culture rather than legal systems, but what can surely be defined is the list of barriers that innovations face when moving from the bench to the market.

This study was meant not just to offer a comparison between the two systems but also a concrete solution to the recognized barriers. My use of the term “tools” instead of “tool” when introducing SciencXchange™ was deliberately made. In fact, SciencXchange™ encompasses a vast series of tools (databases, social network, analytics, etc.) that could help not just Europe and Japan but all the scientists and companies at a global level overcame the barriers innovations face while reaching the market.

The win-win situation of the system is represented by the high quantity of free and available data that is processed. In fact, since is not necessary to spend time and money on the retrieval of data (regarding patents and available technologies), SciencXchange™ will be able to offer the reports for a very limited amount of money and thus be affordable also for developing countries as well lowering the technical divide too.

(*15) Several conversations held during my interviews at JST, with Mr. Sekine, Namba, and others, and at INTPIT with Mr. Maeda and other colleagues, let me understand that in Japan it would be potentially feasible to partner with those governmental entities to retrieve the data necessary for SciencXchange™ to run effectively. Some concerns, though, were expressed with regard to the privacy of data and the necessary consent to use them and the copyrights attached to the governmental databases.

(*16) *Id.*