DOES PATENTING IMPAIR COMMUNICATION?

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Abstract

In the age of economic globalisation, Intellectual Property Rights have become more and more important for industry.

The patent system has been developed since its origins in the 15th century to communicate technology that would otherwise remain as trade secrets.

Researchers in scientific institutes are not used to keep knowledge hidden from others and they are now being encouraged to change from a "publish or perish" to a "patent (and publish) or perish" culture.

This paper discusses how combining the aspects of technology watch, non-disclosure, protection and exploitation with open communication and worldwide co-operation can be an enabling instrument in the ever-continuing process of research.

1 FOREWORD

This paper is not a tutorial on the patent system, which is thoroughly addressed in other reports, textbooks and Internet/Web sites [1-5]. It is rather an attempt to address the concerns of some scientists who believe that the necessary evil of the introduction of patent policies in publicly funded organisations will impair the free exchange of knowledge they have enjoyed since universities were created. Scientific theories and discoveries cannot be patented and the problem, if any, is mainly bound to technology, namely: products, processes and knowledge having some market expectations. Therefore, the word "technology" will be used throughout this paper even though some developments may have strong ties with scientific discoveries.

2 TECHNOLOGY TRANSFER AND COMMUNICATION IN THE "PUBLISH OR PERISH" CULTURE

2.1 Technology Transfer from publicly funded Scientific Laboratories

The rationale behind technology transfer (TT) from publicly funded scientific laboratories is largely to ensure the exploitation of ideas and inventions made by the staff of these organisations in the execution of their duties [6,7]. It is now widely accepted that new ventures have over-compensated the lay-offs resulting from the merge of multinational companies competing on the global market. Publicly funded scientific organisations have therefore the duty of identifying and transferring to industry ideas and developments with some market potential. Any TT related financial returns, although useful, are often simply ploughed back into the further development of inventions and into funding of the TT activity itself. With the exception of life sciences, significant incomes are very seldom derived from patents, particularly in the physical sciences.

There are three basic TT mechanisms:

- Venture creation through entrepreneurship (resulting in spin-off and spill-over businesses),
- Licensing of intellectual property rights (IPR) to third parties, and
- Consultancy to transfer knowledge.

Venture creation remains the TT process most likely to generate a return in terms of image, for the organisation, and wealth, for the funding parties (nation or group of nations).

In general, a clear, unambiguous TT policy towards patents and copyrights is a key factor for success. In this respect, the academic enthusiasm to publish results before taking patent or copyright protection, common to Europe and the US, is a major issue. By readily publishing, scientists make technology publicly available hence exploitable by any party on the global market without any obligation for the receiving party to quote the source. Thus, even the image component is frequently lost.

The presence of a professional, pro-active, yet light weight Technology Liaison Office (TLO) within an institute provides not only a focus for the activity, but can actively encourage TT in both directions [8-11]. In addition, the responsibilities and duties of the TLO, and its support at a high level in the organisation, must be clearly established. The possibility of sharing the financial reward between the faculty member concerned, his department and the institute in one hand, and the funding agency on the other hand is often used to encourage the process.

The use of technology brokers is a successful model in exploiting inventions coming from scientific organisations [12]. In addition, several organisations have handed over the management of their TT activities to external not-for-profit structures [13, 14] thus preventing staffing and funding interference with the basic scientific mission of the laboratory.

2.2 The communication process in Academia

Communication is formally defined in the Oxford English dictionary as "to impart, to give a part or share of, to make another a part taker, to bestow, to give." It was only in 1928 that a good definition was given by I.A. Richards, a British literary critic, who said that: "communication takes place when one mind so acts upon

its environment that another mind is influenced, and in that other mind an experience occurs which is like the experience in the first mind, and is caused in part by that experience."

The issue of communication in a scientific environment is viewed here as an essential bi-directional process fostering technical progress and innovation.

Publicly funded organisations have been used to communicate/discuss their achievements openly through brainstorming sessions, informal discussions, notes and reports. At a late stage in the process, and when satisfactory evidence of the workability of the new technology has been achieved, it is reported in papers (conferences, workshops and scientific journals) covering the associated scientific activities rather than the technology proper. Such papers are delivered in varying formats and structures. They are frequently submitted to reviewers for approval which adds several months of delay to the publication (typically 6-12 months). Some code of honour and common sense determines the identification of the key authors, and the date at which the paper was submitted to the editor determines precedence. It is well known that scientists, and - by osmosis of the academic culture, their technical collaborators, are rated on their list of publications. As a result, and due to the somewhat late publication of the technology, a number of these papers have long lists of authors and it can be difficult for a third party to identify who knows and who was the real initiator. This process is illustrated in Fig. 1.

It will be shown in the following section that the main virtue of the patent system is to foster the swift disclosure of new technology at the expense of only 4-6 weeks of confidentiality in the early stages of the process.

3 THE PATENT SYSTEM

3.1 An incentive to disclose trade secrets

A patent is a grant by government of the exclusive right to make, use, or sell an invention for a limited period, against public disclosure of the technology. Thus, the prime goal of the patent system is to foster the communication of technologies which would have otherwise remained as trade secrets. For many years, trade secrets were the rule in art, music, science and technology. Leonardo da Vinci is often said to have developed his own short-hand and mirror writing to hide his inventions from nearby observers, thus concealing his trade secrets. Left handed, he was in fact more likely to have found a clever way to write with a nib without smudging the preceding words. It is interesting to note here that some scientists, who are for open communication often qualify him as engineer, thus as likely to be willing to market his inventions!

According to the Encyclopaedia Britannica, "the first recorded patent for an industrial invention is the one granted in 1421 in Florence to the architect and engineer Filippo Brunelleschi. The patent gave him a three-year monopoly on the manufacture of a barge with hoisting gear used to transport marble". Such privileged grants to inventors spread from Italy to other European nations.

In the United States, Article I, Section 8 of the Constitution authorises Congress to create a national patent system to "promote the Progress of Science and useful Arts" by "securing for limited times to … inventors the exclusive right to their respective … discoveries." Congress passed the first U.S. Patent Statute in 1790. France enacted its patent system the following year. By the end of the 19th century many countries had patent laws, and today there exist approximately 100 separate jurisdictions regarding patents.

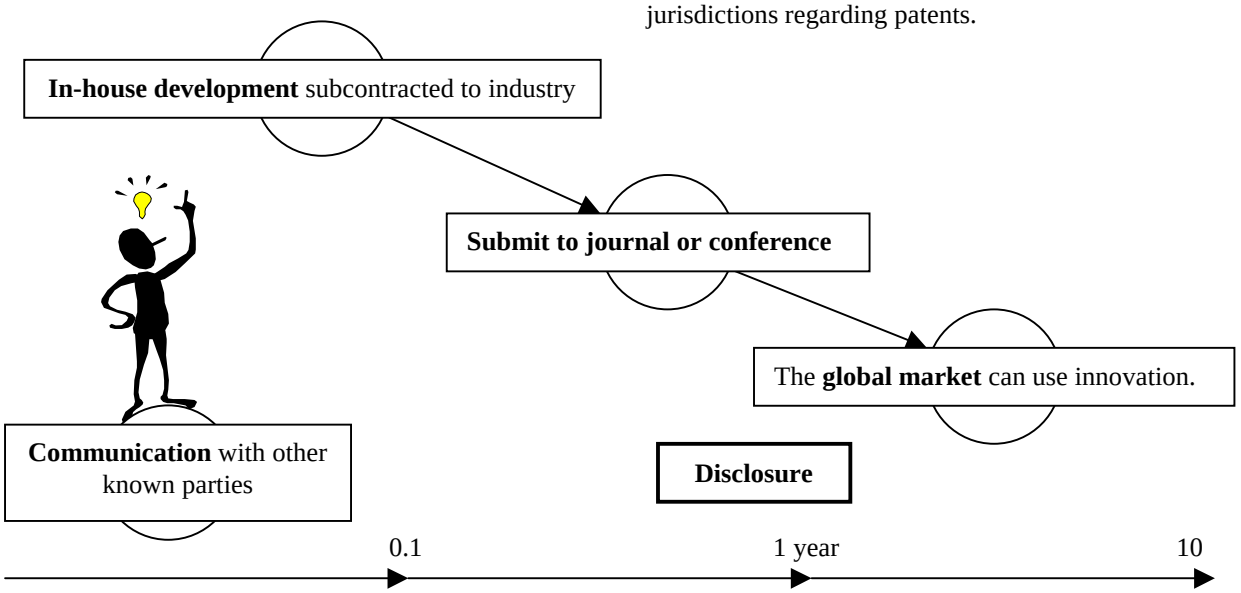

Figure 1: In the "publish or perish" culture technology is frequently published as part of scientific papers, hence made readily available to the global market (note the log scale of the time axis).

3.2 The patent system today

With the ever-increasing scope of commerce and international businesses, there has been a need for bilateral patent agreements between nations.

The signing, in 1883, of the Paris Convention represented a major step by industrialised nations to co-operate with one another in the field of industrial property for their mutual benefit. One of the most important aspects of the Paris Convention is the provision relating to "priority". Under this provision, anybody who has applied for a patent in one country can claim the "priority date" (= date of filing) of this first application when filing the same application in another contracting country within 12 months. Therefore, by applying for a patent in one country, an inventor does not suffer in other countries as a result of having revealed his invention in the original application.

The Paris Convention was revised at Brussels (1900), Washington (1911), The Hague (1925), London (1934), Lisbon (1958), and Stockholm (1967), and was amended in 1979. There are now 151 signatories to the Convention.

Similarly, the 1970 Patent Co-operation Treaty (PCT) simplifies the filing of patent applications on the same invention in different countries by providing, among other things, centralised filing procedures and a standardised application format.

By filing a single "International Patent Application", protection can be requested simultaneously in a large number of specified other countries, throughout the world. The PCT also allows a potential patentee to obtain an international preliminary examination report, which gives further information about the patentability of an invention before incurring the high cost of foreign procedures. The PCT also allows innovators to "keep their options open" by protecting an invention while investigating its commercial possibilities abroad. Thus, applicants can defer a decision concerning the countries in which they ought to seek protection for up to 30 months after the first filing. There are also the benefits of international standards applied by the International Searching Authorities and the International Preliminary Examination Authorities.

More recently, the European Patent Convention, implemented in 1977, created a European Patent Office that can issue a European patent, which acquires the status of a national patent in each of the member nations designated by the applicant.

Pending patents are published 18 months after the priority date and grant takes some 3-4 years. The patent system provides a standard framework for description and disclosure of technology. Patent databases can be easily accessed through Internet/Web pages [15].

3.3 The three basic requirements

Inventive step (“non-obviousness”)

To be patentable an invention should be “non-obvious”. An invention is obvious if: “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time that the invention was made to a person having ordinary skills in the art to which the subject matter pertains”. The term “prior art” [3] is to be understood as existing technology disclosed through patents and publications from anywhere in the world and anything commonly known and practised by third parties.

Utility

In order to obtain a patent, the invention must be useful or have “utility”. Basically, the invention should have industrial applicability and belong to a patentable subject matter. Thus discoveries, scientific theories, business models and algorithms are, in general, excluded.

More specifically, the invention must meet three requirements:

- The invention must perform some function,
- It must actually be operable and do what the inventor says, and
- It must be of some benefit to society.

The latter excludes inventions that are against morale and ethics.

Novelty

In order to obtain a patent, the invention must be new or “novel”. This means that it should not have been described in a publication or a patent anywhere in the world. Novelty is the requirement that, for a limited period of time before filing, impairs communication. This requirement aims at identifying the real, yet small, number of inventors.

As long as a technology has not been disclosed it remains as a trade secret and proactive technology watch strategies in industry tend to postpone patenting to the latest possible time in order to exploit the technology for more than the 20 years covered by a patent.

3.4 Communication

Today, trade secrets mainly apply to manufacturing processes which, in any case, include a significant component of know-how and are therefore difficult to decipher. Time to market has become a key factor of success since a typical product lifetime is of the order of 10 years (note that it is only 18 months for software!). Therefore industry files patents and it is unlikely that a start-up can raise funds without having a patented product.

Contrary to industry, publicly funded organisations have the duty to patent marketable inventions at the earliest possible time in order to secure the transfer to

eligible parties. This is why, subject to proper understanding of the patent system and management of the activities in the organisation, the confidentiality time must be limited to the absolute minimum (4-6 weeks, see § 4). Therefore, the author of this paper does not see a proactive intellectual property right (IPR) policy as significantly impairing communication in a basic science environment. Universities and laboratories in the US that have for long practised proactive patent policies give the very proof that communication can be kept at the required level, and that scientists can benefit from improved patent literacy.

4 RECOMMENDED STRATEGY FOR PUBLICLY FUNDED ORGANISATIONS

The four-stage strategy described in the following sections is illustrated in Fig. 2.

4.1 Confidential disclosure to the TLO

Patent filing should be handled centrally in the organisation by the TLO structure, which should be directly approached by the staff member who had "an idea" - the earlier, the better. At this stage of the process the TLO and the potential inventor may jointly conclude that prior art exists or that some aspects of the case impair patentability (e.g. prior public disclosure). In such a case, the author is usually urged to prepare a publication in order to secure authorship of the technology and prevent abusive patenting by a third party. This phase can be as short as a few days.

4.2 Search for prior art (technology watch)

The author should then demonstrate sufficient expertise to word a short and technically convincing description of his development thus permitting a thorough search for prior art in patent and publication databases (technology watch). In addition, it is advisable for the TLO to undertake a preliminary market survey to identify other areas of application, which are often very different from those initially considered by the author. Such service is also available on a paying basis from patent attorneys, patent offices or technology brokers who can satisfactorily guarantee confidentiality [12].

This takes less than two weeks, and the search report is given to the author who may then decide to withdraw his claim(s). It is interesting to note that authors always learn from this search report, which includes patents and publications covering the particular subject: typically twenty citations in each of the two categories. The report also gives a view at the competition such as companies that have filed patents in the same domain. The process contributes to the acquisition of additional know-how and it is usually cost effective.

4.3 Third stage: expert advice (optional)

If the inventor (or the TLO) is willing to proceed, he is then asked to reword his application in the light of the search report and to give an estimate of the market potential. The TLO may then seek the advice of the management of the organisation in which case the "idea" is submitted to experts who advise the executive authority on the merit of filing a patent. If the recommendation is negative, author is urged to publish (see §4.1). It is interesting to note that successful TLOs [8] bypass this stage.

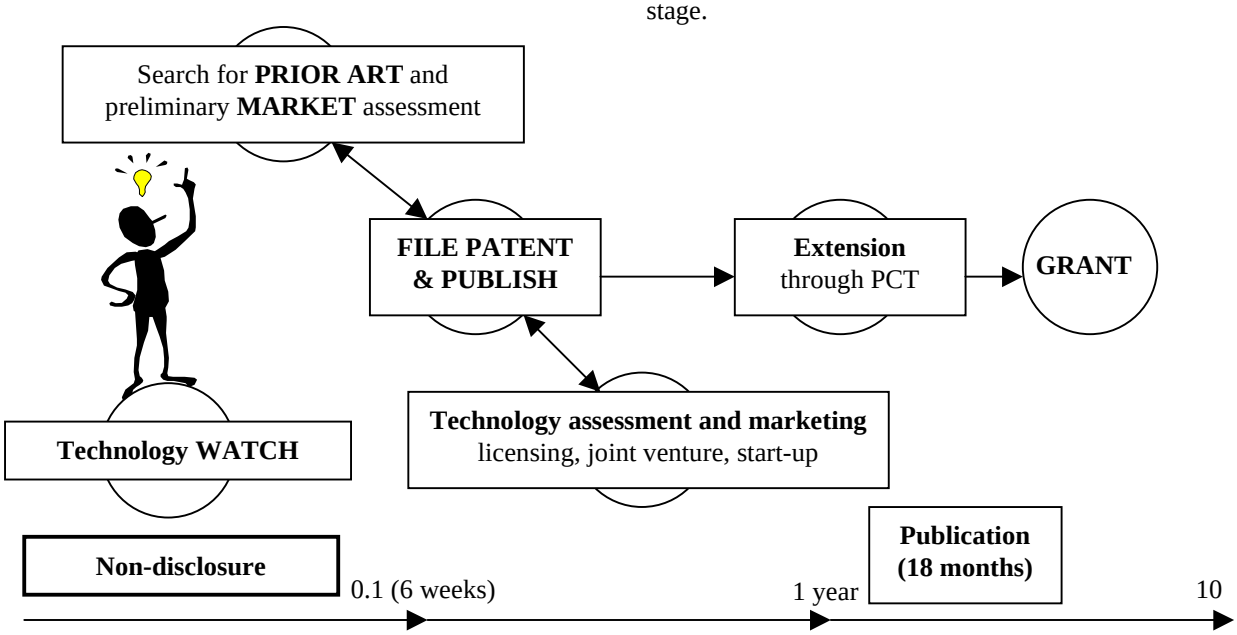

Figure 2: Publicly funded organisations can minimise the confidentiality period to 6 weeks when disclosing technology through the patent system (note the log scale of the time axis).

4.4 Waiving confidentiality through patent filing

The technical information and the search report are handed over to a patent agent with expertise in the particular field of technology. A patent attorney will finally word the patent in collaboration with the inventor. It is worth to note that good patent attorneys often have a MSc or a PhD degree in physical sciences supplemented with the compulsory 1-3 years of further education in patenting. In addition, registered European patent attorneys must master three languages (English, French and German): they are in all respect "skilled in the particular art".

The patent is then filed through a National patent system in view of later extension into the European or World (PCT) patent procedures (12 months maximum after the priority date).

As soon as the patent has been filed, the author has a good deal of freedom to write papers in journals and present his work in conferences and workshops. Hence confidentiality can be limited to the total duration of the four above stages: 4-6 weeks.

5 OVERALL BENEFITS INCLUDING COMMUNICATION

Some scientists and engineers in large organisations, whether publicly funded or private, suffer from the "Not-Invented-Here" (NIH) and "First-to-Invent" syndromes. In addition, basic science often uses technology to its limits or in forms that have not been experienced on the market. Communication is essential to foster the disclosure of such technology, yet preventing duplication, if any.

It must be admitted from the above that the patent system has developed as a unique tool to disclose technology on a world-wide basis. It is unfortunate to see that some designs presented in topical conferences have already been patented, sometimes long ago. Consulting patent databases is a must before undertaking a "new" development. It often gives a ready-made solution to the problem and leads to fruitful cross fertilisation between the inventor and the designer. In any case, it prevents from potential and costly patent infringements.

With the exception of the 4-6 weeks of confidentiality, a proactive IPR policy is globally beneficial to large organisations:

- It fosters communication between scientists and industry,
- It lends to a systematic and cost effective documentation of unused technologies: the many developments that remain too often loosely documented by lack of time and motivation,
- It helps in the early identification of the real and few inventors,
- It sets the ownership of the invention and secures the transfer of technology to eligible parties.

It is definitely wrong to infer that such a policy can result in an oversized and costly patent portfolio. In fact, the strategy proposed in section 4 aims at the cost-effective identification of the (very) few cases that deserve patenting. Similar strategies are in place in large companies such as Boeing thus reducing the initial number of patentable ideas by one or two orders of magnitude.

It remains that TT from physical sciences does not generate significant income: yet another reason to have a lightweight TLO and a sensible and cost effective IPR strategy.

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