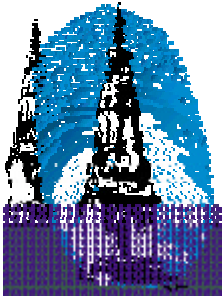


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PATENTS AND THE INTERNET

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PATENTS AND THE INTERNET¹

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“Intellectual property is the Web’s war zone.”
- *Business Week*, 5 June 2000

1. Introduction

In recent years, the Internet has become both a major front in the “battle” between proponents of open access to new technologies versus proponents of the protection of proprietary rights, and a key source of patent-related information. Developments in Internet technology have been accompanied by an increasingly strategic view of patents by firms seeking to maximize the overall value of their intellectual property (Knight, 1996, Grindley and Teece, 1997, Davis, 1998, Ransley and Gaffney, 1997, Rivette and Kline, 2000a,b). While it has long been recognized that the costs of patenting go hand in hand with the benefits (cf. Penrose, 1951, Machlup, 1968), the explosive growth of the Internet has extended the ways in which firms can use patents strategically, and amplified the broader policy debate as to what inventions should be patentable, and how strong patent protection should be.

This chapter explores some of the implications of these changes by focusing on two questions. First, to what degree can Internet business methods be patented, and what are the implications of these patents for firms and society? For example, Amazon.com, Inc. has U.S. patent on its one-click technology, offering Internet shoppers an easy-to-use online tool. British Telecom has a U.S. patent on hyperlink technology. As of this writing, such “software-implemented business methods” are not patentable outside the United States. Many U.S. patents on Internet business methods may well be found invalid in coming years. The

extension of patent protection to Internet business methods in the United States has led some observers to fear a “crisis” in the patent system. Writes Seth Shulman (2000: 75):

It was never the object of patent laws to grant a monopoly for every trifling device, every shadow of a shade of an idea...Such an indiscriminate creation of exclusive privileges tends rather to obstruct than to stimulate invention. It creates a class of speculative schemers who make it their business to watch the advancing wave of improvement, and gather its foam in the form of patented monopolies, which enable them to lay a heavy tax on the industry of the country, without contributing anything to the real advancement of the arts. It embarrasses the honest pursuit of business with fears and apprehensions of unknown liability lawsuits and vexations accounting for profits made in good faith.

Some fear that if patents on Internet business methods are generally found to be valid, extended into other national jurisdictions and strongly enforced, they could threaten the traditionally open access of the Internet. Countries outside the U.S. also need to decide whether or not to permit patents of this type.

Second, how does the Internet, as a rapid, highly efficient, global communications and distribution medium, affect firm patenting practices? The proliferation of information on the Internet clearly helps firms to analyze who has taken out what patents in their area and when, and how central these patents are to their own R&D efforts. Patent-holders deemed “in the way” can become targets for take-over, or perhaps be invited to form a joint venture (another means of extracting the rents). New business tools, like web-enabled exchanges for patents and licenses, have been created, linking potential buyers and sellers of intellectual property, but often also providing a range of other services. These include evaluating the patents on offer and insurance policies to mitigate the risk of buying a patent that later is found to be invalid. In sum, the Internet considerably enhances the innovating firm’s ability to access patent-related information posted on the World Wide Web, to signal its activities and intentions to other market participants, and to exchange patent-related information.

Our arguments in this paper are based on sources from the literature, conference presentations, and interviews. Since the development of the Internet is so recent, and the focus of investigation has not yet, to my knowledge, been subject to rigorous analysis in the business and economics literature, the paper should mainly be seen as a preliminary effort to reflect on the answers to these two questions, given the nature of the Internet and the economics of the patent system.

Our tentative conclusions are as follows. As regards the first question, it is important to differentiate between the U.S. situation, and the situation of countries that have not yet

permitted patents on software-implemented business methods (for reasons of space, we will mainly confine our discussion of the latter to the European Patent Convention). In the United States, given the recent, almost “chaotic” developments as regards what can and cannot be patented in this area, it is urgent to define more clearly which kinds of Internet business methods fulfill the criteria of patentability, and which do not. We will argue that the definition of what is patentable in the U.S. should be raised, to avoid the issuance of so many trivial patents, and reduce the costs of these patents to innovating firms and society. Outside the U.S., permitting the patentability of Internet business methods raises fundamental issues, not only for this particular group of inventions, but also for to the criteria of patentability more generally. In Europe, an invention must have some sort of “technical effect” to be patented; in the U.S., the requirement is only that the invention is industrially useful. Thus if Europe adopts the U.S. approach to business method patents, it would have significant implications not only for the patentability of software-implemented business methods, but also with regard to the definition of what constitutes a patentable invention according to the European Patent Convention more generally. Ideally, these issues should be resolved through a new international agreement.

Turning to the second question, the advent of the Internet means that patent information in databases and related sources can far more easily than in the past be collated, systematized and transmitted electronically whenever and wherever desired. Easier access to patented information should – ideally – improve the general level of innovation in society, since it (*ceteris paribus*) will cost firms less to generate this information themselves. The Internet also positively affects the ability of patent authorities to gather, store, systematize, interpret, and transmit information, and the ability of other market participants to gain access to, and use, the patented information developed by innovators. But access to information is not the same as the ability to use this information efficiently, indicating the need for the development of new tools and systems to this end.

The paper starts with a brief review of the economic rationale of the patent system. In Sections 3 and 4, we investigate the two main questions, as briefly introduced above. The paper ends with a broader discussion of the issues raised.

2. Benefits and costs of the patent system

2.1. The economic rationale of the patent system

The economic rationale of the patent system is based on the problem of appropriability (Arrow, 1962, Nelson, 1959). New knowledge is valuable because at least initially, it is private to the innovator. When the knowledge is revealed (as when the product is marketed), its value decreases, since other firms can exploit all or part of the knowledge to their own ends, without having to pay for its creation. Thus the ability of the innovator to appropriate the rents from its investments in R&D will inevitably decline over time, unless the innovator takes measures to prevent this.

One such measure is to apply for a patent. By taking out a patent, the inventor can exclude others from making, selling, or using the invention for a specified period of time, typically twenty years (or license out the rights to another). In return, the firm agrees to publish the details of the invention in the patent, so that others can build on it in their own innovative activities, furthering technological progress (Penrose, 1951, Machlup, 1968).² A further dimension of the incentive effects of the patent system was noted by Kitch (1977) in his analysis of the patent as a “prospect.” Not only was the patent a reward to innovative work, he contended, it also enabled the firm to explore, and perhaps commercially exploit, the possibilities of a promising technological area free from the interference of others.³

It has long been recognized that patents are only imperfect instruments of appropriability. For one thing, it is not possible to describe the invention sufficiently in the patent so as to appropriate all the rents. The more details revealed, the greater the chance that imitators will build on the knowledge for their own gain – without patenting it, but without paying for its creation either. But the fewer the details revealed, the greater the chance that rivals can patent their own marginally different versions. This also means that the degree of information disclosure associated with the patent depends on what aspects of the new product or process the firm seeks to patent. Parts of the invention may be patented, others kept secret.

2.2. The costs of the patent system

The patent system also imposes a range of different costs, both on the innovating firm and society more generally.⁴ The innovator incurs costs in determining what is patentable, applying for the patent, and paying the relevant fees – throughout the life of the patent, in all countries in which protection is sought. To protect the invention fully, the firm may need to obtain dozens or hundreds of patents on related technologies. The uncertainties of patenting impose further costs: the patent might later be declared invalid, competitors might take out patents on marginally different versions of the good, and/or the patent might be infringed.

Five social costs of patenting may be identified. First, government patent examiners must devote resources to processing applications and maintaining patent files, along with offering services to the public such as patent databases, answering questions, updating home pages, and the like. Second, as a temporary monopoly, the patent enables the seller to choose the level of price and output that maximizes overall profits (and covers its initial R&D costs), which increases its incentive to invest in R&D but also imposes a deadweight loss. Third, the patent system is characterized by other forms of rent-seeking, such as “patent races” (Harris and Vickers, 1985), where several firms compete to patent an invention or area of technology, with the result that too many resources are devoted to applying for and defending patents, and not to actual innovative work. A related phenomenon, “pre-emptive patenting” (Gilbert and Newbery, 1982), refers to the practice of applying for patents simply to obtain priority to the legal rights to the invention, but without (necessarily) intending to exploit the invention commercially. Fourth, as Scotchmer (1991) has pointed out, the broader the patent protection provided to the “first generation” innovator, the weaker the incentives to invest in R&D will be for the “second generation” innovator that builds on the first patent – and vice versa. A final group of social costs are associated with the enforcement of patent rights: the costs of maintaining the legal system within which patent lawsuits are pursued.

2.3. The increasingly strategic use of patents

In recent years, firms are applying for more patents, and using them in new ways. In the year 2000, the U.S. Patent Office granted around 182,000 patents, up from around 100,000 a decade earlier. In 2000, it *received* 315,000 patent applications. The European Patent Office received 140,000 patent applications in the same year.

Earlier, patents were viewed mainly as the province of the legal department; today, they are considered an integral part of corporate strategy (Rivette and Kline, 2000a,b). A firm might take out one, several, or hundreds of patents to assert its claim to a new technology, blanketing a wide territory and blocking competitors from entering the protected area. Patents can also function to “enclose” a rival’s patents, blocking them from proceeding without paying license fees. A patent application can send a “signal” to would be stock market investors that the firm possesses the juridical basis for continued future growth, and that it will not face a lawsuit from a market rival that possesses the patent rights to the technology. Patents can provide the legal basis for a take-over or an R&D collaboration. They can serve as indicators of the productivity of individual inventors, or individual firms. Alternatively, the innovating firm might decide to publish the information instead of patenting – often in a scientific work in an obscure language – effectively preventing any other firm from subsequently patenting the idea, since it is no longer novel.

3. Patenting Internet business methods

3.1. Background

Since the patent law has traditionally been under the jurisdiction of national governments, there have been key national differences concerning what can, and cannot, be patented.⁵ In many countries, for example, patents were initially not granted for pharmaceutical products, given the importance to public health of their widespread availability at affordable prices. Over the past few decades, these national differences have been reduced, as countries have sought to reach international agreement and standardize the criteria of patentability, not least through the TRIPS (Trade-Related Intellectual Property Rights) agreement under the auspices of the World Trade Organization (e.g. Primo Braga, 1995).

Even so, crucial differences remain, particularly as regards Internet business methods. To be patentable in the United States, an invention must be novel, non-obvious, and industrially useful. In Europe, the invention must also be of a technical character. Thus in America, the mere fact that an invention utilizes a computer or software makes it eligible for patentability, while in Europe, the invention must involve an advanced technical creation. This means that in the U.S., the restrictions on patenting business methods are negligible, whereas in Europe,

they are substantial. The Japanese position is very similar to the European (Hart, Holmes and Reid, 2001).

Broadly speaking, in all countries, inventions involving mathematical methods, administrative improvements, teaching methods and book-keeping systems have not been seen as satisfying the criteria of patentability. As a result, firms that developed new business methods found it difficult to prevent imitation, and have had to devise other approaches to appropriability. For example, Ikea's innovation of selling easy-to-assemble quality furniture at a lower price than store assembled and delivered furniture initially won the firm a wide customer following – but was so easy to copy that Ikea's competitors were soon able to offer the same service. (Yet Ikea was able to maintain its competitive edge by effective brand name advertising combined with rapid global expansion, with the result that imitators consistently lagged behind.)

Even so, in the United States, according to a recent White Paper (January, 2001, available on the Internet) by the U.S. Patent and Trademarks Office (USPTO), patents have been granted for certain types of financial and other business methods for over two hundred years. The first financial patent was granted in 1799 to Jacob Perkins for an invention to detect counterfeit notes. For more than a century, patents have been granted on various types of mechanical business methods. Among the earliest were a series of patents for method and apparatus patents automating the tabulating and compiling statistical information for businesses and enterprises, taken out by a company that in 1924 was renamed the International Business Machine Corporation.

Pressures to allow patents on Internet business methods derives, to a large extent, from developments in the patentability of software. Originally, computer programs fell under the purview of copyright law. But copyright law protects only the expression of an idea, not the underlying invention. As a result, a software firm could obtain a copyright on the written source code for the concrete version of its program, but if another firm marginally changed the source code, it could obtain its own copyright. Software producers argued that it should be possible to patent the principle underlying the program, as long as there was a demonstrable technical effect. During the 1980s, U.S. patent examiners began to issue such patents; later, patent examiners in many other countries followed suit.

Currently in the United States, electronic business methods are seen, in essence, as a form of process patents, or more precisely, “automated business data processing technologies.” According to American patent law, the class “processes” includes methods for operating computers, sending data over a network, or displaying information on a screen (Lee and Davidson, 1997). Electronic business methods are generally regarded as patentable as long as the claim is structured in a manner acceptable to the U.S. patent authorities or the courts. In 2000, the U.S. Patent and Trademark Office received 7,800 applications for software-implemented business method patents, up from 700 in 1996. It issued 899 business method patents in that year (USPTO, 2001).

The viability of patent claims on Internet business methods in the United States was considerably strengthened in 1998 with the final Supreme Court ruling on the so-called *State Street* decision, brought by State Street Bank and Trust Co. against Signature Financial Group, Inc. In 1993, Signature Financial Group patented a “hub-and-spoke” data processing system that enabled multiple mutual funds to pool their assets in a single investment portfolio organized as a partnership, both reducing administration costs and providing tax advantages. State Street Bank and Trust Co. had developed a similar administrative system of multi-tiered partnership financial services. When the bank learned that Signature had patented a business method closely resembling its own, the bank negotiated with Signature for a license to use the patent. When negotiations broke down, State Street brought suit in a Massachusetts district court, asserting that Signature’s patent was not new – and therefore invalid. The court agreed. Signature then appealed the decision to a federal court, which reversed the lower court decision. In 1998, the patent was upheld by the U.S. Supreme Court. This opened the door to a flood of patent applications on software-implemented Internet business methods.

In Europe, by contrast, as mentioned earlier, to be eligible for patent protection, an invention must have a technical character. Thus software-implemented business methods are not excluded from patent protection *per se*, as long as they otherwise fulfill the criteria of patentability. Many such methods have, in fact, been patented in Europe (and Japan). But software-implemented business methods do not, necessarily, possess the required technical effect. The question then becomes: Should the European Patent Organization make an exception to the “technical effect” requirement of its patent law for software-implemented business methods?

If so, this would mean establishing a special category for these inventions, since they, alone, would not have to demonstrate a technical effect. This would lead to two problems. First, how, exactly, would the criteria of patentability for these inventions be defined in Europe? The change in the patent law would have to be extremely well-defined, to avoid the inevitable differences in interpretation that would inevitably otherwise result. And second, why should an exception be made for these particular inventions – why shouldn't the exception be extended to all kinds of inventions under the European Patent Convention, bringing broader European practice into harmony with broader American practices? The specific issue at hand thereby raises a much larger issue of principle. One might ask, for example, whether a more optimal approach might be to bring the American practice more in line with European practices.

3.2. Economic dilemmas posed by Internet business method patents

Proponents of the extension of patent protection to Internet business methods argue that their patentability is a natural development in the emerging global network economy. During the Industrial Revolution, it was important to be able to patent physical products and processes. During the Information Revolution, it is correspondingly important to be able to patent concepts and ideas. The incentive effects, it is contended, outweigh the costs of administering the system and the other social costs.

Outside the United States, this logic has thus far not been accepted. A main reason European patent authorities have taken a different approach from their American colleagues has been social policy: patent monopolies should only be granted where it is possible to ascertain the subject and scope of the monopoly with a high degree of certainty. To the European patent authorities, not only to Internet business methods lack the requisite degree of inventiveness or technical effect, it is also very difficult to determine whether they are original or novel. This raises both the uncertainties among the parties involved in any dispute, and problems in adjudicating disputes (Davies, 1999, pp. 16-19). We will return to this question below.

An illustration of the economic dilemmas posed by patents on Internet business methods is Ipsil LLC's patent-pending technology which it claims will make it possible to link anything to the Internet, including building controls, sensors, industrial measurement devices and

medical devices. Manufacturers could build tiny, low-cost devices that could communicate with each other over the Internet. Ultimately, they could be knit together to form an intelligent network (Copeland, 2000). Such a technology – if it proves commercially viable on a wide scale – can potentially extend the reach of the Internet into virtually every aspect of life. To what degree would it “matter” that the patent rights to such a basic technology governing access to the Internet are controlled by one firm? Or is the promise of this control a necessary incentive to R&D?

To take another example, Henry C. Yuen of Gemstar-TV Guide International Inc. has accumulated nearly two hundred patents on an interactive program guide which, he hopes, will eventually be the first screen all American viewers see when they turn on their TV (just as AOL is the first screen most Americans see when they turn on their Internet connection). The program would not only help viewers sort through the hundreds of different channels on offer to find what they want to see, it would also enable them to click into other opportunities such as recording the news, buying movies, or accessing the Internet. By using this portal, viewers would pay a fee – either indirectly, through advertisements, or directly through their cable TV charges. Both Microsoft and AOL, along with over one hundred cable companies, have licensed the technology. Yuen reportedly aggressively ferrets out and sues those who do not buy license rights, and was characterized by one magazine as a “patent terrorist.” (see Grover *et al.*, 2001). Should this approach to the patent system be encouraged?

3.3. Benefits and costs for the innovating firm

According to the rationale of the patent system, the opportunity to patent Internet business methods should both give firms the incentive to invest in these technologies, and lead to more information disclosure than would otherwise be the case. If we consider the “prospect” function of the patent system (Kitch, 1977), the extension of patent protection to such business methods should additionally give innovators the time and opportunity to try out different methods in a broad area of technology and choose the best to pursue commercially.

Dell Computers is an example of a modern firm that has thoroughly and aggressively patented its basic method of doing business. Over forty patents cover its build-to-order direct sales model, including both its on-line customer-configurable ordering system, and the way this

system is integrated into Dell's manufacturing, inventory, distribution and customer service operations (Rivette & Kline, 2000a). This use of patents is widely regarded as a key factor in Dell's continuing competitive success. Had Dell not patented its business model, rivals might later have imitated it and themselves appropriated a higher percentage of the rents.

Patents carry a range of strategic benefits to firms; this is no less the case for Internet business methods. For example, Priceline.com Inc.'s patent on its buyer-driven ("name-your-own-price") electronic airline ticket auction system was reportedly crucial both to its ability to attract Richard Braddock as its CEO, and to raise venture funding worth \$100 million, an enormous amount for a start-up Internet company (Rivette and Kline, 2000b, p. 8). Similarly, Internet business method patents can form the linchpin of business partnerships. In 2000, for example, AT&T Wireless announced that planned to form a wholly owned subsidiary with Japan's NTT DoCoMo, the global leader in wireless data, to develop multimedia applications. Under the agreement, AT&T Wireless would receive the exclusive rights to NTT DoCoMo's brand and method patents; no other operator in North America would be allowed to use the technology (Luna, 2000). Firms have allegedly also utilized their patent holdings as weapons to "scare" online retailers into paying license fees (normally around \$30,000), to keep their cases out of court (Messmer, 2000).

Even so, firms face substantial costs in applying for and enforcing these patents. The degree to which companies will be able to use their patents to establish fully enforceable monopoly rights over the use of their business method patents remains to be seen. Consider British Telecom's patent on hyperlink technology. First, the company must establish that its patent covers the basic enabling technology for hyperlinks. Since the patent dates back to the 1980s, and was only "discovered" recently due to a routine administrative check (Friedman, 2000, Rohde, 2000), this may not be possible. Second, the patent claims must be broad enough to preclude the development of rival systems. Third, the patent must survive challenges in court. Thorny jurisdictional problems (to be discussed below) mean that the company's authority to enforce its patent will vary considerably from country to country.

Of crucial importance is the issue of patent validity. To what extent are Internet business methods really new? Many, according to critics, simply represent a set of software-coded instructions to automate commonly known business processes in the physical world. Thus Priceline's electronic ticket system is similar to the way car buyers and dealers haggle.

Similar uncertainties surround Amazon's one-click patent. When Amazon's archrival, Barnes & Nobel, sought to use its own single-click system, Amazon sued. Barnes & Nobel claimed that Amazon's patent was invalid. Initially, the court issued a preliminary injunction against Barnes & Nobel. In February, 2001, the court overturned the injunction, finding that Barnes & Nobel had mounted a substantial challenge to the patent. Among other things, company lawyers had argued convincingly that existing CompuServe technology represented prior art. Nevertheless, the court emphasized, its ruling in no way resolved the question of invalidity (Parker, 2001), as the case was yet to be decided. Such court costs are a drain on both companies resources. Might not they have been used more productively?

A related problem is that many Internet business method patents assert too broad claims. E-data, for example, recently sued a dozen Internet firms for patent infringement. The firm argued that its patent (which had been issued six years before the creation of the World Wide Web) covered any form of Web commerce where software, music or other products were downloaded directly into a user's computer. But the court denied E-data's claim. Then too, a large percentage of patents on software technologies – estimates run as high as 50% - do not cite prior art. (Prior art is seen, on the patent application, as references to patents or other written work on which the application builds.) Such patents will probably be found to be invalid, if tested in court (Rivette and Kline, 2000b, pp. 19-21).

Another cost is that it can be quite difficult for Internet business method patent-holders to determine whether infringement has occurred, since the Internet is used by so many firms and individuals. Even where an infringement is discovered, it does not always make sense to pursue it. Much depends on the subject matter and its importance to the firm, and the speed of technological advance. Only as a last resort do firms take infringement cases to court, due to their expense and uncertainty. Given the adverse publicity that could arise from such a lawsuit, in light of the "open access" ideology of most Internet users, pursuing such a course might well cause the company to lose money over the longer run. Differences in national patent policies and judicial systems create further unknowns (see Section 3.5).

Even so, the costs of the uncertainties of *not* applying for a patent are also high. Thus Priceline's founder, Jay Walker, has been quoted as saying that that he could not have started

the company without the patent, which preventing the airlines from freely copying his idea (quoted in Harmon, 2001).

3.4. Implications for society

The main societal benefit of patents is to encourage invention and innovation. But to what extent does this logic really apply to Internet-related technologies? First of all, many key discoveries have been conceived in government and university laboratories, neither or which were profit-motivated. Why, then couldn't we expect a continuous stream of new inventions in Internet business methods from these inventors, regardless of whether or not firms could patent them? Moreover, millions of websites have been created by individuals, with motives ranging from the joy of creating to the desire to impress other people to the impulse to hurt other businesses and organizations – but not the profit motive. Allowing patent monopolies into this area of technology might arguably even reduce the total amount of innovation in Internet business methods over the longer term. On the other hand, many of the business methods patented by firms would not be of interest to academic or government researchers. Thus absent patent protection, they might not be invented.

The second societal benefit of the patent system is information disclosure. Here, one might argue that to the degree that information about new Internet business methods would otherwise not be made public, the opportunity for firms to read others' patents provides a clear advantage. On the other hand, to the degree that these inventions cannot be kept secret or protected in another way, the information would probably have become available anyway, and the stock of public knowledge would not notably have been increased. One might also question whether something like a "one click" system truly represents knowledge.

As noted in the previous section, patents also involve costs. The first type of costs has to do with the administration of the system. Societal costs are incurred processing applications (including further education and training of patent officials), building up websites containing the relevant information, and answering an increased number of queries from firms considering taking out patents. While patent examiners have considerable experience in older areas such as mechanical engineering and chemicals, with excellent databases within which to search for prior art, this is not (yet) the case for software and Internet technologies.

One problem is that government salaries offered are not competitive with those in business. Not surprisingly, many talented patent examiners leave government service after a few years and move to private firms. This not only deprives patent offices of expertise, but also imposes new costs in the form of training replacements, and enables the firms that hired the former examiners to draw on their expertise without having to pay for it. The problem is particularly acute with regard to recruitment for examiners in new technical areas like Internet business method patents. Not only do U.S. patent examiners reportedly start at salaries of \$28,000, their workloads have also swelled in recent years. They are asked to make decisions in new technological areas that even seasoned patent officials find difficult. And while the number of patent applications rose 11% between 1998 and 1999, funding for the U.S. patent office fell, and it was required to spend 16% less on operations. (Ross, 2000).

Second, that firms can obtain patent monopolies on systems involving Internet access could well change the traditionally open character of Internet-based business. Much will depend on the degree to which patent-holders enforce their monopoly rights to methods important to other users, and the degree to which they license out the rights to all comers at reasonable fees. In 2000, for example, Apple Computer became the first company to license Amazon.com Inc.'s one-click patent, reportedly to allow its customers easier and faster access to the on-line store. For Amazon, the agreement also strengthened its efforts to defend the validity of its controversial patent (Tillett, 2001).

Often the will to resolve conflicts exists. When Priceline sued Microsoft's travel spin-off, Expedia, for infringing their "reverse auction" system for reserving flights, the two companies then worked out a royalty agreement which satisfied both (Parker, 2001). On the other hand, according to Andrew Steinberg, vice president of the Internet travel site Travelocity.com (whose company also had to pay to use Priceline's system), the proliferation business method patents effectively hampered innovation, with firms diverting resources that could have gone into developing new products to paying legal fees. (Harmon, 2001).

The proliferation of patents on Internet business methods in the U.S., the problems faced by patent examiners in assessing them, and the many questions raised about their long-term validity, would also seem to indicate that both patent races and pre-emptive patenting are rampant here. The purpose of many patent applications on Internet business methods may

well be simply to allow the applicant to come first – to assert its claim ahead of potential competitors – rather than a reflection of a clearly thought-out plan to develop and commercialize a promising new technology. Even if such patents are later rejected, they will have served their purpose, at least partly, by preventing other firms from making, selling or using the technology while the patent was pending. But to the extent that many patents are rejected (or subsequently declared invalid), the societal resources devoted to processing them will in effect have been wasted.

The fourth cost of patents had to do with the effects of patents over time. As noted above, Scotchmer (1991) has argued that the broader the scope of the patent taken out by the “first-generation” innovator, the weaker the incentives for “second-generation” innovators, and vice versa. Since patents on Internet business methods are so new, it is difficult to evaluate their “inter-generational” effects. But clearly, patents on basic Internet business methods such as British Telecom’s patent on hyperlink technology might well hinder future innovation, depending on how the scope and reach of this patent is interpreted in the courts.

3.5. Jurisdictional issues

Finally, patents on Internet-related technologies raise substantial – and costly – jurisdictional issues. As mentioned earlier, patent authorities often differ from country to country as to what is patentable. Such differences clearly spill over into the court system. For example, in a case brought by Merrill Lynch, a U.S. court allowed a patent for method of doing business, since it included the use of a computer. In England the same claim by the same company was turned down, the court ruling that even though the method included a computer, this did not change the fact that it concerned a method of doing business, which was excluded from patent protection. Contradictory decisions have even been made with regard to the same types of inventions. For example, while a U.S. court granted patent protection on an algorithm in a ROM chip (in the case *Re. Iwahashi*, 1989), an English court denied patent protection to a very similar claim (*Gale’s Application*, 1991) (Davies, 1999).

Moreover, jurisdictional boundaries for Internet technologies are unclear. Since patents have only national force, patents granted in the United States normally have no effect outside U.S. jurisdiction. U.S. users will typically be able to access all Internet products and services,

irrespective of their physical location. That patented technology is utilized outside the United States may not be enough to protect these non-American users from accusations of patent infringement. Thus the utilization by a European firm of a method patented in the U.S. could be seen, in practice, as occurring in the United States, thereby infringing the patent. Similarly, American firms could conceivably deliver Web-based applications from a location in Europe without having to worry about U.S. patents (Friedman, 2000). The attorney generals of several U.S. states have actually asserted that they have jurisdiction over all Internet activities, regardless of the locations of those activities or to whom they are addressed (Davies, 1999). The question of liability may well, in the end, turn on an interpretation of what constitutes a connection with the state in question.

Because of the global character of the Internet, jurisdictional disputes may well arise as to where the use of the patented business method took place. Analysts have noted that firms outside the United States which use Internet business methods patented in the United States need only be concerned about patent infringement suits if they are active in the American market (Wallberg, 2001). Again, this will need to be decided by the courts.

Several ideas have been proposed to address the international problems posed by the divergence between American and non-American practices. One is for the United States to restrict the subject matter for which it grants patents. This would be quite difficult, however, to the degree that it involves revoking existing patent rights held by the parties concerned. Another solution would for other national patent offices to extend patent protection to include electronic business methods. This would incur opposition from countries that feel that patent monopolies, with the resultant social costs, should not be granted here (Davies, 1999). Broadly speaking, these complex legal issues are as yet unresolved, and substantially increase the uncertainty costs of patenting to society. We will return to this question in the Conclusion.

4. Impact of the Internet on firm patenting practices

4.1. Accessing and using patent-related information

Earlier, patent databases were largely proprietary; today, several open databases have been established on the World Wide Web, available to users with a simple click of the mouse.

These include the databases maintained by the U.S. Patent and Trademark Office, the Canadian Intellectual Property Office, the European Patent Office, IBM, and the Franklin Pierce Law Center Intellectual Property Mall. Specialty patent databases have been created to cover areas such as agricultural biotechnology, AIDS, and chemical abstracts. Firms often use online updating services that automatically e-mail their users information like SEC filings, news releases, and patents related to the companies they are following (Kahaner, 2000). Dartmouth College, for example, has created an intellectual property business-to-business Web site exchange (UVentures.com) to help universities and governments sell technologies developed in their laboratories to businesses (Little, 2000).

The services provided by national patent offices have also become more user-friendly. Earlier, if the firm's engineers were interested in particular patents or groups of patents, they could come to the patent office library and browse through the files. Today, they can obtain the relevant information over the Internet. The Internet database operated by the USPTO allows users to search for patents in specified areas, by class and subclass, by date, and so forth. By clicking on a patent of interest, the user can read its abstract, the name of the inventor, the assignee's name, the date of filing, and the references cited, with links to the patents in question. Users can then order copies of any patents of interest.⁶ The British Patent Office Library has developed a slightly different approach. Access to its patent database is fee-based, but to encourage use, the library conducts training workshops to introduce researchers to how to evaluate and interpret patent information, and access online patent databases and related information (Anonymous, *Professional Engineering*, 2001).

The availability of web-based patent databases and related services can help to decrease firm costs in applying for patents, since patent information is more readily available. At the same time, since this information is in "raw" form, and there is so much of it, the costs of sorting and interpreting it will rise. The sheer volume of this information is daunting: some 30 million pages of patent documents exist. Further, since everyone has access to the same types of information, what matters is not the amount of information to which one has access, but the ability to analyze this information and determine its value.

This, in turn, has led to the emergence of new consultant agencies specializing in the retrieval and interpretation of patent information. Value-added databases like Derwent World Patent Index help to "clean" and sort patent data in a preliminary fashion, charging customers for the

search costs. Other consultants, like Mogee Research & Analysis Associates, analyze this data further, assisting clients both in assessing their patent positions among their competitors, and discovering and understanding trends in new technology. A third group of consultants specialize in accessing and systematizing various types of information on the Internet, including patents, and sell the information to clients as a form of competitive intelligence (Kahaner, 2000). Consultant firms have also been set up to evaluate the legal issues surrounding business method patents.

Software technicians have created new data-mining and visualization techniques, enabling the generation of “patent maps” of the firm’s own and competitors’ R&D activities, showing their relative strengths and weaknesses. Armed with this knowledge, a firm can attempt to block its rivals and strengthen its own proprietary positions. Patent mining can additionally reveal the relative age of the patent holdings of a potential target for acquisition (particularly the date of expiration), so that the would-be buyer can evaluate whether or not its patents will continue to be valuable over the longer term. Access to patent-related information sources on the Internet has greatly decreased the costs of building such databases.

4.2. The Internet as a medium for patent signaling and exchange

The accessibility of patent databases over the Internet also enhances firms’ opportunities to signal others that they have staked out their “territory” in a particular area. This can facilitate the buying and selling of patent rights (including cross-licensing), making it easier for potential collaborators to link up. The more firms know about each others’ patent portfolios, the better such markets will work. Thus the Internet adds a new dimension to the commercial value of the disclosure requirement of the patent law.

In addition, patents have become a key indicator of value for companies, particularly for start-up firms. If a new venture has a strong patent position, this indicates both that it is serious about its product development plans, and that it is less likely to be blocked from developing and marketing its technology in the future by patent lawsuits initiated by rivals. The Internet arguably makes it easier for such firms to stimulate market awareness of their patents by using them as signals.

At present, about 120 businesses have set up web-enabled intellectual property exchanges, including IBM and PricewaterhouseCoopers. Another example is the Patent & License Exchange, Inc. (<http://Pl-x.com>). None existed twenty years ago. Other, more specialized exchanges include the Intellectual Property Technology Exchange, Inc. (TechEx), which focuses on early-stage biomedical and life sciences, from basic research to issued patents. To reduce the risks of utilizing these exchanges, new insurance products for potential licensees have been introduced. Exchanges specifically devoted to patents include sites run by Patent Action.com and PatentCafe.com, Inc. The first, modelled on eBay, has over 300 selected and evaluated patents in all areas, along with 3,500 registered, evaluated buyers. PatentCafe serves a wide audience of inventors and technology managers, from schoolchildren to patent professionals. Listings are free, financed by e-commerce and banner advertising. No registration is necessary; buyers and sellers deal directly with each other (Bauman, 2000).

Organizations such as Pl-x.com offer a full-service interface covering every aspect of the transaction, requiring participating firms to provide all the information necessary for the sale of the intellectual property, including insurance to protect the buyer if a patent is later declared invalid. The company reports that it has over 170 subscribers who can buy and sell technology. It provides a financial market approach for licensing intellectual property, using proprietary algorithms to calculate value, price and financial risk. In the past, the only way to obtain comparable information was to use a technology broker, who normally charged a fee of about 30% of the transaction. Generally speaking, Web-based exchanges are paid a commission on the value of each patent sale or license; Pl-x.com also collects revenues from annual subscriber fees (Studt, 2000).

Before the introduction of these sophisticated Web-based exchanges, finding partners with relevant patented technologies was typically a “hit or miss” situation. Intellectual property vendors and buyers were relegated to using cumbersome and incomplete software tools and databases which linked firms together, but where cooperation often ultimately failed due to the inherent uncertainties involved. The more patents become an integrated element of a firm’s competitive strategy, the more important patent-related sources of information will be, and the greater the incentive to bear these costs.

Ironically, the Internet can be used as well to discover the necessary evidence to prove or disprove the validity of patents on Internet-related technology. Patent databases can be mined

for information on prior art, which can be used both in company patent searches and in connection with lawsuits. Netscape, for example, established a website asking for information about prior art after being sued by Wang over its browser function “save as.” (Parker, 2001)

As mentioned earlier, innovating firms can choose to publish new knowledge instead of patenting it, rendering it impossible for anyone else to take out a patent. Many firms deliberately publish knowledge in obscure sources and later, if another firm tries to patent technology incorporating this knowledge, reveal its existence to the firm or the patent authorities. The impact of the Internet on such practices is as yet unclear. On the one hand, there will be new places on the World Wide Web to hide information that can be used to declare a rival’s patent invalid. But the ready access to information via the Internet, combined with the development of powerful search engines, may also mean that otherwise obscure sources of information can more easily be discovered.

An intriguing recent development in this regard is Cella’s establishment of the website Bountyquest in 2000. For a fee of \$2,500 plus a cash prize of \$10,000 or more, customers can post a reward on the site, to be paid upon receipt of proof that the “prior art” in a patented invention was publicly available before the patent was issued. Several bounty hunters have reportedly already collected large rewards. Another firm, IP.com, gives inventors the opportunity to “defensively disclose” on its web site any material they choose not to patent, for a fee of \$109 (Harmon, 2001, Anonymous, *Business Week*, 2001).

4.3. Implications for innovation

Following the economic rationale of the patent system, web-based patent databases and related services might be expected to lead to a higher level of innovation in society. Access to patent-related information is less dependent than in the past on factors like firm size and financial position, previous experience with patents, or geographical location. Yet because this information is only as valuable as the ability to interpret it and use it commercially, large multinationals continue to possess a considerable edge over smaller companies.

As regards patent examiners, on the one hand, the Internet clearly improves their ability to provide patent information to inventors quickly and easily – thereby enhancing the timeliness

and accuracy of their information services. Establishing these services incurs high fixed costs, but since the information can largely be standardized and made available to an infinitely expanding number of users at virtually zero marginal cost (as compared with answering user requests by mail and telephone), the overall costs of distributing patent information will ultimately, *ceteris paribus*, be reduced.

On the other hand, the plethora of information contained on the World Wide Web, combined with the broader increase in other sources of scientific and technical information, makes it more difficult for patent examiners to establish prior art – and thereby ascertain whether the invention is really new. In processing the application, examiners must determine the degree to which the invention described differs substantially from existing knowledge, which means they must search exhaustively through technical sources in many different languages, in all parts of the world. It is this that makes the patent the strongest form of intellectual property right – but which additionally puts great pressure on patent authorities to be as certain as possible that granted patents fulfil it.

The TRIPS agreement (regulating trade-related aspects of international intellectual property rights, under the aegis of the WTO), while intended to standardize international patent practices, has in effect served to compound these administrative problems. The signatory countries of the TRIPS agreement were given until the year 2000 to enact the required provisions, and most have done so. Yet for many countries, these provisions have been enacted only on paper, with no practical relevance. If making decisions about prior art is problematic even for the U.S. Patent and Trademark Office and the European Patent Office, with their modern data processing systems, it is next to impossible for patent examiners in other countries. India, for example, a country of a billion people, has just 44 patent officials (as opposed to 3,000 in the United States, with one-fourth the population of India), rendering effective administration of the Indian patent system impossible. The accelerating availability of information available over the Internet only makes such problems worse.⁷

On the other hand, the Internet can facilitate new ways by which patent authorities can interact with users to improve the quality of government patent services. The Danish Patent and Trademarks Office (DKPTO), for example, has developed a new model called IPscore, to help firms manage and value patents and trademarks, and to integrate intellectual property rights into their overall business strategy. By using this tool, they can gain an overview over

their intellectual property holdings, and learn about unexploited opportunities. Users, based on their experience with IPscore, are actively encouraged to report back to DKPTO over the Internet to IPscore, so that the model can be further developed and improved.

5. Costs and benefits in a wider perspective

Weighing the different benefits and costs, we argue, in this paper, that extending patent protection to Internet business methods represents a logical, natural – and in fact inevitable – development as we move forward in the emerging knowledge economy, where competitive advantage derives less from tangible assets, and more from intangible ones. The resultant tensions with regard to the use of patents are particularly acute in the case of Internet-related inventions, where the technology is advancing so rapidly. And since the main events are so recent, it is not always easy to determine the nature and scope of these benefits and costs. Yet the strategic use of patents in relation to the Internet, while currently more disruptive than for many other kinds of technologies, is only part of the larger pattern of the more strategic use of patents by firms in all sectors.

There have always been initial periods of confusion when patent protection is extended to a new technology. What is needed, today, is to reconsider the basics of the relevant legal framework in light of these changes. The goal is to maximize the benefits of the patent system in relation to the Internet – both as an incentive to invention and innovation, and as key source of new technical information – while minimizing the costs.

An important question here concerns what is the value of these patents to innovating firms. A key difference between the pharmaceutical and IT industries, for example, is that while drug firms will not invest unless patent protection exists, the IT industry's current use of patenting is a *potential* value-enhancing element rather than a foundation for investment. How, then, would Internet-related investment have evolved if patenting had not been available? A strong case can be made that much innovation would probably have occurred anyway. Perhaps, in later years, many of the companies themselves will ask whether patenting Internet-related “inventions” was, in practice, worth all the cost and effort.

Much also depends on *how* the technology creates value. Software and Internet technologies, like telephone and telegraph technologies before them, are typically based on network externalities, where the value of the technology is dependent on the number of users. (When only a few people owned telephones, its expansion was restricted; telephones were mainly a status-laden “toy” for the rich. As more people acquired telephones, the value of the telephone as an actual communications medium increased.) Technologies characterized by network externalities grow very slowly at first, and then suddenly, after achieving critical mass, grow explosively, eventually “locking in” their customers. Users then face high switching costs in changing to another system: learning about the new system, ensuring compatibility, and so forth. (These issues are explored in greater detail in Chapter ____, “Is Appropriability a ‘Problem’ for Innovations in Digital Information Goods” elsewhere in this book.)

Hyperlink technology is characterized by substantial network externalities. As mentioned in Section 3, the degree to which British Telecom finds it to its own interests to enforce its patent rights strictly here – or to encourage as many users as possible to come on board – remains to be seen. Moreover, should a firm seek to dominate the market, the courts can always intervene at some later time, as was true in the past in the antitrust suits against AT&T and IBM in the 1950s. Companies have also found that high-profile patent lawsuits can damage their reputation. This is reportedly the case for Amazon, which, in the wake of the adverse publicity surrounding its one-click patent lawsuit, has taken its approach to patents under review (Parker, 2001).

Another substantive issue – and one that has not, to my knowledge, been emphasized in the public debate on Internet business method patents – concerns the broad societal benefit stemming from the publication of new technical information by one firm (or in one country) for the rest of the world. When an American firm patents an Internet business method, the information is disclosed. Thus firms operating outside of the American market can not only learn from the patent – they are also, at least at present, free to use the method. This imposes a complex set of benefits and costs. On the one hand, the patent provides the American firm with the incentive to invest in R&D. Yet while the patent can prevent other American firms from imitating the knowledge – it cannot prevent non-American companies and individuals from doing so. Until patent laws in this area are standardized, at least some of the information that might otherwise have been patented will remain secret.

To the extent that the details published in U.S. patents on Internet business methods are valuable, they represent a substantial “knowledge externality”. Thus since European, Asian and other firms can free ride on this knowledge to develop their own imitations of the method in question, it may considerably undermine the incentive effects of these patents. One might even conjecture that, sooner or later, U.S. firms may decide that the overall costs imposed by patenting Internet business methods outweigh the benefits.

Many patents on Internet business methods, as noted earlier, will probably later be declared invalid. Might the apparent lack of interest in drawing up strong patent applications reflect, at least in part, a recognition by many American firms that it doesn’t really matter if the subject matter is not new. What counts is to obtain the temporary monopoly conferred by the patent application before – and just after – publication. The value of this temporary monopoly is enhanced for American firms since in the U.S., applications are not published until the Patent Office has made the decision to grant the patent; in Europe and Japan, by contrast, patent documents are published eighteen months after the date of application. As long as the patent application is kept secret, the knowledge cannot be copied. Free-riding by non-American firms is concomitantly limited. By the time the application is published, the knowledge may be outdated.

6. Conclusion

The Internet, because of its dual character as both a source of innovation in its own right, and a means of transmitting information, has not only itself emerged as an important object of patenting, but has also affected how firm use patents. This paper has addressed, in a preliminary manner, the interactions between the growth of the Internet, the increasingly strategic use of patents by innovating firms, and the wider benefits and costs of the patent system. We demonstrated that the Internet, as a highly efficient communications medium, has profoundly affected the conditions of firm access to patent-related information, particularly with the development of sophisticated patent databases, information search services, and the like. The patent system, in turn, crucially affects developments in the Internet, due to the extension of patent protection to cover Internet business methods.

The key policy issue with regard to Internet business method patents has to do with the criteria of patentability. How “permissive” should patent authorities be? National patent offices continue to differ in this respect. Yet the trend – in contrast to developments in software patenting – may well be towards greater restrictiveness. Recently, the European Patent Office upheld its ban on software-implemented business method patents. And legislation has been introduced in the U.S. House of Representatives to establish higher standards for issuing patents in this category.

Further, the opportunities inherent in using the Internet as a highly efficient medium for communicating and transmitting patent-related information could and should be exploited more fully. The Internet could be harnessed to take some of the pressure off national and international patent authorities through the development of web-based patent databases, making it is easier to search for information on existing patents and related technologies. At present, national patent authorities are responsible for searching for prior art. One way of easing this burden would be the development of a sophisticated, technical system, permitting automatic electronic patenting filing from any country in the world to any patent office. Such patents would be required to be put into a format easier to use, and earlier problems which have plagued patent processing activities, such as incorrect or missing information, would be caught at an earlier stage (some even performed electronically). It is the goal of the USPTO to accept 70% percent of its applications via the Internet over the next decade.⁸

Reforms like this can work only if the political will exists. International differences as regards the patentability of Internet business methods, and the validity of many of these patents, require urgent consideration. Thus far, the USPTO examiners have tended to act unilaterally, both with regard to Internet business methods, but also more generally, extending patent protection into new subject areas (like biotechnology) without discussing the implications of these extensions with their patent colleagues internationally. Due to the resulting uncertainties as to what is patentable (and where), such precipitous actions substantially increase the patent-related costs of both firms and governments, not only in the United States but around the world as well.

To the degree that the kinds of “games” – as described in Sections 3 and 5 – are being played, it would seem appropriate for patent authorities in the United States, Europe, Japan, and other interested countries, to meet and work out a more internationally standardized approach to

patents on Internet business methods. Many in the United States, as we have emphasized, support raising the standards of patentability. A solution would be to establish an international forum within which senior trade officials and patent authorities in different countries – at the highest level – could meet to address these problems, both with regard to the principles of patent protection, and the effective administration of the system.

Participants in such a meeting could confront not only the immediate subject of contention – the patentability of software-implemented business methods – but also the broader issues implied. Should the standards for patentability be raised? If so, how might this best be accomplished? In particular, might not the requirement that an invention has to demonstrate a “technical effect” be introduced, more generally, as a criterion of patentability in all countries – including the United States?

International agreement strengthening and harmonizing the criteria of patentability would serve both to preserve the benefits of the patent system, while decreasing the costs. Such reforms would help to restore the “balance” implied by the patent system, which in recent years seems to have swung too far in the direction of lowered standards of patentability. The purpose of the patent system is to encourage and reward the creation and commercial development of valuable technical knowledge – not the creation of patent monopolies in trivial devices. Clearly, reaching international agreement on this issue would be extremely difficult – but this does not diminish the need at least to make the attempt.

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NOTES

¹ This chapter has benefited greatly from comments from Jerome Davis, Beshar Wattar and the editors of this volume.

² The patent system functions as an incentive to both invention and innovation. It motivates inventors to create new products or processes by enabling them to appropriate at least part of the return. Without patent protection, inventors might use their energies in other ways, or perhaps keep their inventions secret. The patent system also motivates innovators to make the large additional outlays to bring the invention into commercial use (further R&D, the construction of pilot plants, introducing the product to market, and so forth). These outlays are so large and uncertain, it is argued, that they might not be made without patent protection.

³ By awarding the exclusive ownership of each of its technological prospects to one inventor shortly after discovery, society both optimized the use of technological resources and minimized waste, since other inventors did not allocate resources in the area of the prospect.

⁴ This general conceptualization of the benefits and costs of patenting is based on a number of different sources. These include the literature on the innovative firm's strategic use of patents and patent information (e.g. Rivette and Kline, 2000a,b); studies of the costs associated with the innovator's choice of appropriability strategy (Davis, 1988, 1998); the welfare economics literature on appropriability generally (e.g. Arrow, 1962, Nelson, 1959) and patents in particular (e.g. Harris and Vickers, 1985, Gilbert and Newbery, 1982); studies of the cumulative effects of patents over time (Scotchmer, 1991, Merges and Nelson, 1994); the property rights literature both generally (e.g. Demsetz, 1967, Posner, 1992), and as the logic applies to patents in particular (Kitch, 1977); and the economic effects of intellectual property rights (Besen and Raskind, 1991). The distinction between the innovating firm's benefits and costs, and the broader benefits and costs to society, reflects both the division in the literature as a whole as regards level of theoretical analysis, along with the distinction between the private and social benefits and costs associated with investments in R&D characteristic of the economic analysis of appropriability.

⁵ The U.S. patent law has also generally, over the past two decades, been extended more quickly than has been the case in other countries (sometimes with the U.S. courts overruling decisions made by the Patent Office) to cover inventions in software (earlier covered by copyright law), life forms, and Internet business methods. Europe and other countries have subsequently often followed the U.S. lead.

⁶ There are at present certain limitations on the type of information available. The USPTO's database does not include information on the current fee status of the patent, or whether or not it has expired (this information may be acquired via the USPTO's home page). The database begins with patents from 1976 onwards. For information about earlier patents, users are requested to visit a Patent and Trademark Depository Library or are referred to a commercial service. If they know the specific patent number, however, they can order a copy of the patent.

⁷ Described by Bruce Lehman, President and CEO, International Intellectual Property Institute, Washington, in his presentation, "The future of the global patent system," at the conference by the Danish Patent and Trademark Office, Copenhagen, January 19, 2001. Countries may have different traditions as regards searching for prior art. In the past, for example, the Japanese Patent Office only looked at Japanese patents to establish prior art (supplemented by the patent databases of the USPTO and the EPO). Yet most prior art for new technologies is not available here, but in other types of technical publications.

⁸ Described by Lehman, January 19, 2001.