

THE EVOLUTION OF INTELLECTUAL PROPERTY RIGHTS FOR DIGITAL INFORMATION PRODUCTS - IMPACT ON AGROINDUSTRY

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Abstract

Intellectual property rights (IPR) are in a state of flux. In Europe and internationally initiatives are contemplated or underway to adapt IPR law to rapidly changing digital information technology (IT). I address three questions: (i) What is the substance of IPR? (ii) How has or will IPR-legislation adapt to changes in IT? (iii) What is the likely impact of these changes on producers and users of digital information products in agriculture?

1. Introduction

Technology and the law co-evolve, but not necessarily in synchrony. Given IT's exponential progress, IT laws and regulations, including IPR law, need to be frequently adapted in order to make best possible use of modern digital technology. With political decision processes being less than perfectly rational we cannot be sure that changes in legislation will serve society's best interests. It is therefore no great surprise that most changes in IPR law are hotly debated. The evolution of IPR is no trifling matter for society and some even believe that IPR laws are as important for the emergent information society as the labor laws had been for the budding industrial society of the 19th century (Boyle 1996, p. 13).

The issues surrounding IPR are complex and I cannot address them all. Rather, I focus on patenting of software and on copyright and I address three questions: (i) What is the substance of IPR? (ii) How has or will IPR-legislation adapt to changes in IT? (iii) What is the likely impact of these changes on producers and users of digital information products in agriculture?

I proceed in four steps. I first review the substance of IPR and characteristics of digital information technology that affect IPR. I then summarize important changes in IPR legislation in the world and in the European Union. Finally, I discuss the likely impacts of these changes on producers and users of digital information products. I close my paper with some remarks that summarize my assessment of the adequacy of IPR for digital information products in agriculture.

2. Intellectual property rights for digital information products

Intellectual property rights have been defined as “the rights given to people over the creations of their minds. They usually give the creator an exclusive right over the use of his/her creations for a certain period of time” (WTO n.d.). Rights are not much use unless they are enforced. Intellectual property rights therefore allow the state to help producers of intellectual products to maintain some control over the products of their efforts after the products have been made public. Intellectual property rights have a long history. In England, patents can be traced back to the 15th century (UK Patent Office 2000). Copyright is a more recent institutional innovation which has its main roots in the French revolution of 1789

(Hesse 2002). In order to understand the current evolution of IPR we have to be familiar with key characteristics of IPR in general and of patents and copyright in particular.

2.1. Property rights for physical and for intellectual products

Property rights can be for physical and for intellectual products. Property rights in physical things allow the holder of the right to exclude non-owners from using his property. Exclusion serves three important social functions. First, without property rights resources are likely to be used inefficiently. Second, when non-owners cannot be excluded from using something they have no reason to pay for the thing and commercial exchange is impossible. Finally, when property may be used but cannot be sold, the incentive to invest in its creation, maintenance, and improvement is diminished.

Even in well-functioning market economies not everything is protected by private property rights and property rights are always limited in certain ways. Some things are best left in the public domain. Other things cannot be owned because exclusion of non-owners is not possible. Finally, property rights are sometimes constrained because the costs of enforcing more comprehensive rights would exceed the additional benefits (Posner 2002).

Intellectual products are produced with at least two inputs, mental effort and information, where the latter often is an intellectual product produced by somebody else. IPR therefore has two effects: the incentives to produce intellectual products are increased and the costs of intellectual production are raised. Which effects dominates is impossible to tell in advance (Lessig 2001). Nevertheless, we have to be aware that "expansive intellectual property rights may actually reduce the creation of intellectual property" (Posner 2002, p. 9).

Intellectual products are different from physical products in several aspects. A key difference is the public good characteristic of information which is non-rivalrous in the sense that its use by one person does not diminish its use by some other person (Posner 2002). Furthermore, the production of some intellectual products, in particular those that consist of symbolic information, are subject to returns to scale because the first copy of information is expensive whereas all additional copies are cheap. The public good characteristic, in combination with low costs of producing copies, affects the ability of producers of intellectual property to recover their costs because any buyer of intellectual property can turn himself into a low-cost seller. With many potential competitors the producer of the intellectual product is deprived of income from sales and the incentives to produce intellectual products are eroded.

Intellectual property laws grant monopoly rights to the producers of intellectual products and prevent buyers of the product to turn into sellers. With potential competition eliminated the owner of the property may charge higher prices than he could without IPR.

2.2. Patents

Patents are property rights in inventive ideas and not in innovative objects. To be patented an invention has to meet three requirements: The idea must be novel, nonobvious, and useful. Patents allow the patent holder to prevent others to make commercial use of his ideas without permission. In this sense patents grant the patent holder monopoly rights over his idea. In return for being granted a patent, the patent holder has to make his idea public in the patent application. Patents are for a limited period, at present 20 years in the EU.

Patenting is costly because the inventor has to describe his idea, and search patent and literature databases to make sure that nobody has had the same idea before him. Drafting the patent claim, which describes the idea, usually requires the assistance of a patent attorney. If a patent is issued, it is limited to the country where the application was filed and if the patent should be taken out for several countries, multiple patent applications, one for each country, are necessary. The cost of obtaining a patent for a single country are relatively cheap at about €4,000 per patent application. The cost can rise quickly to about €50,000 when the patent is

taken out for several countries (Ius mentis 2001). To the cost of the patent application have to be added the annual maintenance fees (Anon. 2001). The cost of enforcing patents through patent litigation are difficult to quantify; they often are high.

2.3. Copyright

Whereas patents are property rights in ideas, copyright is a property right in a creative expression (Posner 2002). The medium used can vary: music, writings, photos, movies, etc. Copyright should give "an author an exclusive right sufficient to create an incentive to produce, but not so great a right as to undermine the public domain" (Lessig 2001, p. 98). Copyright is limited in several ways. For example, copyright is not violated if the protected information is duplicated innocently and under most national copyright laws allow copying of parts of a protected work.

In contrast to patents, copyright is cheap to obtain because, in most countries, including the EU and the USA, a created work is considered copyright protected when it is created and formal registration is not required. Copyright infringements are relatively easy to detect and decide, litigation cost are usually low, and so are the cost of transactions in copyright protected information (Friedman 2000).

3. Characteristics of digital information products in relation to IPR

Property rights in digital information products are complex for several reasons: (i) the nature of digital products is ambiguous; (ii) error free and cheap digital copying separates medium and content economically; (iii) the internet's long reach and high monitoring potential, and (iv) network effects of some information products.

Memory-stored control, the ingenious idea of John von Neumann (1958), probably the most famous Hungarian of the 20th century, makes life difficult for law people. Judge Posner (2002, p. 5-6), for one, speaks of an "ambiguous nature of digital products" because "the products of the new technology are sometimes hard to fit into the law's pigeonholes. Computer software is a kind of text, which implies that copyright is the proper regime; a kind of machine, which implies that patent is the proper regime; and a kind of algorithm, which traditionally has not been protected by either body of law." The ambiguity is reflected in IPR law. In the EU, software programs "as such" cannot be patented but software that has some technical effect can be patented (Ius mentis 2002). And software, whether patented or not, is copyright protected.

For economic reasons the producers of information often combine ownership of information content with ownership of the medium that delivers that content to paying customers. New information technologies tend to lower the cost of copying information but leave the cost of intellectual production largely unchanged. When the cost of copying fall dramatically, business models based on outdated media may become obsolete and the providers of information may have to find new ways to maintain their control over the more valuable resource, information content. Separation of medium and content happened to monastic bible manufacturing after the invention of the printing press had made quill-copying obsolete: the monasteries lost their business and the church had to lead a protracted fight for control over the content of the bible. Separation of medium and content is happening again now when business models based on analog information media have been made obsolete by digital technology. Again it is the content providers – the literati, Hollywood, large software firms, etc. – and not the old media providers – producers of printing presses, printers' unions, etc., - who support IPR vigorously in order to maintain their control over information content.

The internet and the web allow large amounts of information to be transported at the speed of light over long distances. Content owners may therefore be able to service a much

larger number of customers. However, the internet also makes it easy for buyers of original intellectual products to become suppliers of identical and cheap copies and the threat of copyright piracy looms large. The threat may be light, however, because the internet also increases the ability of copyright holders to monitor the use of their intellectual property. Examples for that ability are surveillance bots that monitor the activities at information exchanges on the internet and that attempt to identify the identity of the patrons visiting the exchanges, or spoofing, i.e. data files that pretend to be some piece of information but that prevent the spoofed computer to exchange data with an information exchange (Knop 2003).

Some digital information products have strong network effects in the sense that they become more valuable to a user when there are more users of the same product. If such products are sold to some users but pirated by others, the revenue from sales of legal copies may still go up when some piracy is permitted and strict IPR enforcement would be self-defeating (Liebowitz 2002).

4. Recent developments in IPR legislation

I am no student of law and my approach to the developments of IPR legislation is that of a lay person. If I were a law expert I would keep in mind Judge Holmes' (1881, p.1) famous insight: "The life of the law has not been logic; it has been experience" and I would pay heed to his advice that in order to know what the law is, "we must know what it has been, and what it tends to become." To the delight of some jurists, IPR law is rich in experience, its history spans several hundred years, and its future is opaque. The challenge that delights the expert overwhelms the lay man and I cannot even try to do justice to Holmes' demands. All I can do is to sketch with a broad brush the main lines of recent IPR developments.

4.1. The international stage

In foreign trade policy IPR is considered to play a role now that is similar to the role played earlier by the 'freedom of the seas' (Boyle 1996, p. 3). In international IPR law two lines of development are of interest for us in the EU. The first is the vigorous promotion of IPR law on the international stage by the USA; the other is the inclusion of IPR in the TRIPS Agreement of the WTO and the conclusion of the WIPO Copyright Treaty (WCT) which came into force in the year 2002. WCT deals, among other things, with protection for computer programs and original databases and it harmonizes national copyright laws. Patenting of software is, however, not harmonized internationally (WIPO n.d).

4.2. IPR in the EU

In relation to IPR the EU Commission appears to pursue four objectives: (i) harmonizing national IPR laws; (ii) streamlining patent applications; (iii) adapting IPR to new technologies, and (iv) to transpose into Community law the obligations arising from WIPO treaties. The activities of the EU resulted in numerous interrelated Green Papers, Proposals and Directives on patents and copyright.

4.3. EU patents

According to Article 52 of the European Patent Convention computer programs "as such" cannot be patented. Nevertheless, since the Convention came into force in 1978 more than 30,000 patents have been granted for software that makes a "technical contribution", i.e. "a contribution to the state of the art in a technical field which is not obvious to a person skilled in the art". (European Commission 2002 a).

Patents can be obtained in the EU in two ways. Either the patent application is submitted to the European Patent Office or to the national patent office. Because patent law is

national law, the European Patent Office cannot grant a "European" patent; instead, under the Munich Convention on the European Patent of 1973 a bundle of patents from European countries is granted. The patents have to be maintained and litigated in each member state.

To facilitate patenting the EU has proposed a community patent that co-exists with national patents law and the Munich Convention. The EU patent, which is granted for the territory of the Community, confers on its proprietor the right to prohibit, without his consent, the direct and indirect use of the invention and it has provisions for exclusive and non-exclusive contractual licensing, as well as compulsory licensing in the case of dependent patents. The patent term is 20 years and the patent has to be renewed annually for a fee (European Commission 2002 b).

In a recent proposal EU enlarges the domain of patenting by allowing patenting of "inventions which involve the use of a computer and the use of a computer network or any other programmable device, i.e. inventions created by running a computer program or a similar device. The invention may be a product (for example, a programmed computer) or a procedure" (European Commission 2002 c).

4.4. *EU copyright*

Computer programs which are the "own intellectual creation of its author" are copyright protected. Copyright proprietors have the exclusive rights to reproduce, to authorize reproduction, to translate, adapt and arrange, to distribute in any form to the public, and to rent their software. Buyers of copyright protected software are allowed to use the copy for "normal activities", i.e. to make a (= one) back-up copy for security reasons, to reverse engineer, and to decompile a program in order to make it interoperable with other programs. (Commission of European Communities 2000).

Copyright is granted for seventy years after the death of the author, or the last surviving co-author when there were several. Employers are entitled to exercise the economic rights in programs created by their employees.

A new aspect of EU copyright law is the provision of legal protection against the "circumvention of any effective technological measures covering works or any other subject-matter" (European Commission 2001). Legal protection for technological protection measures is, however, much more important for the music industry than for information suppliers in agro-industry.

4.5. *Protection of databases: Copyright and sui generis*

Databases are indispensable in the information society. Their legal protection is, however, complicated by the fact that data stored in a database are not necessarily the product of creativity and originality. If they are sufficiently creative and original, databases are protected as literary works under copyright law. If a database does not satisfy the requirements of creativity and originality but if its creation required substantial investment – a 'sweat of the brow' database in legal jargon – a database may be protected by a sui generis right introduced in the EU in 1996.

The sui generis right allows the producer of a database to "prohibit the unauthorized retrieval and/or re-use of the contents". Users of sui generis databases may retrieve and re-use "non-essential parts of the contents" of the database. They may not, however, "perform acts which unreasonably prejudice the legitimate interests of the maker of the database" (European Commission 1996). The term of sui generis protection is 15 years after completion of the database. Examples of databases which have been successfully protected by the sui generis right are telephone directories in Germany and yellow pages in Austria.

4.6. Enforcement of IPR

The law is not worth much unless it is enforced by the state because "A man who cares nothing for an ethical rule which is believed and practiced by his neighbors is likely nevertheless to care a good deal to avoid being made to pay money, and will want to keep out of jail if he can" (Holmes 1897, p. 161). The Commission has therefore proposed a Directive that seeks to harmonize IPR enforcement in the member countries by adopting best IPR enforcement practices from the member countries. The Directive is focused on IPR infringement carried out for commercial purposes and which cause "significant harm" to right holders. Offenders of IPR laws would be required to pay damages to right holders and to compensate for lost income. The Commission claims that the intention is not to prosecute large numbers of individuals using peer-to-peer networks but that it is aimed at serious IPR infringements carried out intentionally and for economic gain (Commission Press Room 2003).

5. Impact on agro-industry

From the perspective of agriculture and the producers of intellectual products for agriculture there are two innovations in IPR legislation that are of interest for the agricultural digital information products industry: patents for computer programs and extended copyright terms.

What will be the impact of the new IPR? Will they accelerate innovation in agro-industry? Are they convenient, as the law should be, for the affected, i.e. the small- and medium-sized software houses and their clients from agriculture? And finally, what unintended effects can be expected? In answering these questions I draw on responses from a telephone survey that we conducted in August 2002 among 21 agricultural software houses in Germany. With the exception of one all had developed new software in the preceding year.

5.1. Patents for computer software

Whether patents for computer software will serve their intended purpose and encourage the invention of new software solutions for problems in agriculture is in doubt. Bill Gates, for example, provides no encouragement for patenting: "If people had understood how patents would be granted when most of today's ideas were invented and had taken out patents, the industry would be at a complete standstill today" (Bill Gates cited by Lessig, 2001, p. 206). Similarly, insiders from the German software industry are concerned that patents could block future development because every software project by a SME violates on average 30 non-European software patents (Bruns 2001).

Patents can delay or prevent new inventions. This phenomenon is known as the "hold-up" problem which occurs where an innovator is about to release a product and is discovered to be violating a patent (Lessig 2001, p. 214). A similar problem is the "tragedy of the anticommons" which may occur when downstream inventors need to obtain access to multiple patents on upstream inventions so that each holder of a patent upstream can block or chill development downstream (Heller and Eisenberg 1998). Patenting may, however, help start-up companies to gain access to venture capital and to defend their inventions against predatory strategies of established companies (Bruns 2001).

Patenting law is likely to be quite inconvenient for small- and medium-sized agricultural software houses. Most of the firms we interviewed were unfamiliar with patenting. Only six of the 21 firms in our survey had a unit in charge of IPR management and 14 had none. Five firms claimed to be well informed about patent law and 13 believed their knowledge about patents was fragmentary or absent. 15 firms did not patent their products and only two claimed they did. Asked how many patents they actually held, one firm said it

held two, the rest had none. Only five firms conduct patent searches before they develop new software, and of the five two firms do this regularly. Fortunately, most firms had been spared from patent litigation and only two firms had any litigation experience.

Patenting increases the cost of intellectual production: patent searches have to be made, patent applications must be drafted and submitted, patent fees have to be paid. In addition, patents have to be defended through litigation, false patent infringement claims have to be fought, and licenses have to be negotiated and managed, all adding up to significant transaction costs. Both, high fixed cost and high transaction cost favor large producers of intellectual products over small ones and the SMEs of the agricultural software industry will be among the losers from patenting. Obviously, agriculture will suffer with its suppliers of industry-specific software.

5.2. *Extended copyright term*

The changes in copyright law are unlikely to affect the incentives to produce innovative software by much – the rate of change in computer hardware makes sure that useful software does not outlive its author, certainly not by 70 years. Furthermore, there is no evidence that the rate of innovation is too small in the software industry.

Agricultural software firms are, however, unlikely to be inconvenienced by recent changes in copyright legislation. All firms in our survey claimed to be more knowledgeable about copyright laws than about patents; only one firm claimed to lack copyright knowledge whereas 12 companies assessed their knowledge of copyright law as comprehensive, good, or excellent.

It is unlikely that extending copyright terms has any beneficial impact on the users of agricultural software or other digital information products. If copyright were to benefit the software industry shortening the term drastically would probably be the better policy. For the buyers of digital information products the term of copyright is immaterial for those who legally acquire copyright protected material. For pirates of software and information products extending the term also is of no concern because pirates do not usually copy legacy software and outdated information.

6. **Close: Policy implications from an agro industry perspective**

Boyle (1996, p. 140-141) raised several critical questions about IPR that I would like to answer from my perspective of the role of IPR for the digital information sector in agriculture:

"Does this system rest on evidence or faith?" – Mostly on faith because there is no evidence to speak of.

"Do we want to consider a systems that would have more protection for information production and less protection for the production of innovation?" – This is hard to say in the absence of empirical evidence on the impact of alternative systems.

"Do all the types of innovation that get protected actually need it?" – Hardly.

"In its overall effects, does this system disproportionately help or hurt ... the individual author or creator?" – Probably it hurts more than it helps.

"Does this system ... actually end up diminishing future innovations and impeding future innovators?" – Most likely, yes.

For the SMEs that produce agricultural software, patenting is likely to become a nuisance at best and a hindrance at worst. It will harm SME without providing benefits for their customers. Copyright appears to serve the industry well and extending copyright law for longer terms is not necessary; shortening the term of copyright might be the better choice.

From the point of view of the small digital information industry in agriculture, policy makers would be well advised to focus their scarce attention on other matters than strengthening IPR.

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