

Contract no. INNO-99-04

Patent protection of computer programmes

Final Report

**Submitted to European Commission,
Directorate-General Enterprise**

**Dr. Puay Tang, SPRU, University of Sussex
Prof. John Adams, University of Sheffield
Dr. Daniel Paré, SPRU, University of Sussex**

© ECSC-EC-EAEC Brussels-Luxembourg, 2001

Neither the European Commission, nor any person acting on behalf of the Commission, is responsible for any use which might be made of the information in this Report.

The views expressed in this Report are those of the authors and do not necessarily reflect the policies of the European Commission.

Table of Contents

TABLE OF CONTENTS	I
LIST OF TABLES	IV
LIST OF FIGURES	IV
EXECUTIVE SUMMARY	V
PART 1	1
INTRODUCTION	1
PART II	3
TALKING THE SAME LANGUAGE @ ONCE?	3
The United States	3
Invalidation/revocation process	5
The European Union under the European Patent Convention (EPC)	5
Opposition procedures	7
A note on business method patents	9
A note on open source software	12
SMES AND IPR: IS IT AN ARCANE WORLD FOR THEM?	14
Aims and themes of the Intellectual Property Initiative	14
General lessons from the Initiative	15
MORE OR LESS @ ONE ON IPR?	16
What of copyright?	16
Electronic publishing	16
Textiles	20

What of patents?	22
Do patents benefit SMEs	22
Use of patent information as a source of new technology	29
WHAT OF IPR IN GENERAL?	32
WHAT OF SERVICE FIRMS AND IPR?	38
A NOTE ON OTHER EUROPEAN NATIONAL PROGRAMS ON IPR AWARENESS-RAISING	43
Germany	43
Measures	43
Denmark	45
Measures	45
France	47
Measures	48
SUMMARY	49
PART III	51
THE METHODOLOGY	51
The Questionnaire	51
The Survey	52
DATA ANALYSIS	53
Organizational Characteristics of Respondents	54
Concerns Regarding Software Protection	57
Strategies for Protecting Software Creations	57
What of SMEs and protecting software?	57
What of Public Research Organizations and protecting software?	63
What of large companies and protecting software?	66

Perspectives about Software Patenting and “IPR help”	67
SUMMARY	72
PART IV CONCLUSION	73
ANNEX 1 THE QUESTIONNAIRE	76
BIBLIOGRAPHY	86
ENDNOTES	92

List of Tables

Table 1. Methods of IP Protection	18
Table 2. Adoption of formal IPR by enterprise size (%)	33
Table 3. Informal methods of IP protection.....	34
Table 4. Use of formal IPR methods (% of each group).....	41
Table 5. Informal Methods of IP by service firms (% of each group).....	42
Table 6. Summary of Response Rates	54
Table 7. Ranked Concerns About Protecting Software Creations.....	57
Table 8. Methods for Protecting Software Creations – SMEs	58
Table 9. Perceived Advantages and Disadvantages of Copyright	60
Table 10. Reasons for Varying Levels in the Use of Patent Protection	61
Table 11. Methods for Protecting Software Creations - PROs	64
Table 12. Perceived Advantages and Disadvantages of Copyright	65
Table 13. Reasons for Varying Levels in the Use of Patent Protection	66
Table 14. Perspectives on Software Patenting.....	68
Table 15. Success of Efforts to Keep SMEs Aware of New Developments in European Patent Policy	71

List of Figures

Figure 1. Sources of information for SMEs	25
Figure 2. Effectiveness of Appropriability Mechanisms for Product Innovations	26
Figure 3. Effectiveness of Appropriability Mechanisms for Process Innovations	27
Figure 4 Reasons for conducting patent searches.....	30
Figure 5. Relative importance of secrecy and lead-time earning competitive advantages from Product	36
Figure 6. Relative importance of secrecy and lead-time for earning competitive advantages from Process innovation.....	37
Figure 7 Importance of Patents for Competitive Advantage by Firm Size	38
Figure 8. The SME Respondents' Target Clients (N=12)	56
Figure 9. Ranked Order of SME Respondents' Grouped Core Businesses	56

Executive Summary

The increased use of digital technologies, as captured by the concepts of Information Society, new economy and the knowledge economy, has generated a heightened concern over the protection of Intellectual Property Rights (IPR). Exemplified by the Internet, that has been characterized as one giant copying machine, the apprehension over rightful appropriation of one's intellectual property (IP) has prompted national legislators, and international organizations, charged with global governance of IP to amend their IP laws.

In a landscape in which IPR has sharpened its relief, the debates on this topic have become robust. Economists, social scientists and lawyers worry about whether innovators should worry more about maximizing the *value* of their IP than the terms and conditions that maximize its *protection*.

In the light of the greater use of digital technologies and increased knowledge-based activities, the European Commission study on *Innovation Policy in a Knowledge-Based Economy*, and other studies conducted in the U.S., assert that we are now entering a "pro-patent world." Patents have, in particular, become both a contentious and exciting issue for consideration and discussion among academics, legal scholars, policymakers and business. The granting of business method patents by the United States Patent and Trademark Office has arguably driven this realm of activity. A major bone of contention in the debates surrounding this issue is whether such patents obtain the novelty and inventiveness for which patents are granted.

As it is, there is extant literature on patents and their role in promoting the innovative and inventive process. The conclusions of a recent European Commission sponsored report entitled *The Economic Impact of Patentability of Computer Programs* highlights the ambiguous impact of patenting on the innovation process, in both large and small firms. It also addresses the question of business method patents and raises some concern over it. Still, it is unarguable that the primary goal of the patent system is to encourage innovation and commercialization of technological advances. Through the publication of the information on the patented product/process, interested parties can use it to improve further the product/process, or to develop new applications.

This study aims to investigate how businesses, in particular, Small and Medium sized Enterprises (SMEs) involved in the development of software manage their IP. A central objective is to produce for them a brochure that will enhance the awareness of various methods of IP protection, as well as to inform them of these forms of protection.

The research was largely desk-based but was supplemented with a survey questionnaire of a small group of European software SMEs that were selected from a number of sources, particularly those from EASDAQ and

several Europe-based national stock exchanges. A limited number of large European software companies were also surveyed, as was a group of public research organizations. The European Commission specifically requested this variety of firms and organizations. As noted above, the paramount aim of the survey questionnaire was to elicit from these entities their means of IP protection, and their opinions on the various methods of protection. In addition, the questionnaire also sought to discover their opinions on the effectiveness of “IP informational” measures and sources of patent information produced by the European Commission and European Patent Office.

A small number of interviews were conducted with selected SMEs to explore further their views on the role of patents. For instance, SMEs were asked about the initial financing of their business. They were also questioned if they thought that the ownership of patents made it easier to raise capital, and if patents aided their company in expanding their market and revenue streams. Another question requested their opinion on whether they foresaw the issue of software patenting becoming a greater or lesser concern for their organization in the light of expected growth of e-commerce.

The research also addressed briefly the U.S. and European patent systems, focusing on software patents in general, and business method patents, in particular. It also addressed summarily the invalidation/revocation process of the U.S., and the opposition procedures. The underlying purpose of this discussion was to highlight the basic differences between the U.S. and European patenting systems in these areas.

A review of primary and secondary European, UK and U.S. material on how SMEs manage their IP was undertaken. UK material, in particular, was based on the projects sponsored by the UK Economic and Social Research Council, under the £1.2 million program *Intellectual Property Initiative*, reputedly the largest single research program in the country ever to focus specifically on IPR issues. Researching how SMEs manage their IP formed the kernel of 8 of the 10 funded projects.

The main conclusions from these research projects also reflected, in the main, the general findings of European and U.S. studies. Significantly, SMEs

- rely, generally, on copyright for their “digital literary works” including software;
- patent less, as they find the system complicated, expensive and do not view patents as conferring any particular advantage for their software-based products;
- argue that the lack of resources of SMEs make it difficult for them to defend patents, and would in all likelihood, “lose” if challenged by corporate players;

- do not particularly use patent information for their innovation;
- employ, in addition to copyright, several informal methods of protection, particularly technical systems, such as encryption and passwords, and defer to trust (arising from networks and close customer/supplier relationships); market niche (the smaller the market, the easier it would be to detect infringement); first mover advantage (being first to market); and secrecy as effective methods of protection;
- feel that amendments to and “tampering” with IP law, for instance, copyright and patent, will increasingly make it more difficult for SMEs to cope with developments, which in turn, may not have any tangible effect on them because of their inability to keep up with them;
- contend that while appropriation of IP is important to them, their main concerns in general are developing the product and getting it to market in the shortest possible time. This concern emanates from the twin pressures of: (a) rapid developments in software and electronic publications; and (b) speedy obsolescence of these products; and
- remain interested in IP-related information which can be provided in a comprehensible fashion, in “layman’s language” and made widely available in various medium.

The findings from the small survey conducted for this research also mirror, to a large degree, the above conclusions. As noted above, the survey was based on a questionnaire, and was sent out to software SMEs, large software companies and public research organizations (PROs). Included within the groups of respondents were representatives of organizations and firms based in England, Scotland, Ireland, France, Belgium, the Netherlands, Italy, Germany, Spain, Denmark, Portugal, Sweden, Greece, and Finland. In total, 12 SMEs, 8 PROs and 3 large firms responded to the questionnaires, out of a total of 35, 20 and 10, respectively, that were distributed. While the resulting data and conclusions drawn from them are instructive and informative, they may not be regarded as providing a definitive Europe-wide portrayal of how SMEs and others regard the software patentability issue.

The three primary aims of the questionnaire were to identify:

1. how SMEs and other organisations protect their computer software-related IP;
2. the reasons why particular forms of IP protection are adopted; and,
3. the types of ‘informational’ measures that may be of assistance to SMEs for IPR related matters.

The questionnaire was divided into four sections. Section 1 consisted of five descriptive questions regarding the specific organizational characteristics of the entities that the individual respondents represented. These questions were used as a basis for comparison, with the assumption that they may have a potential to influence IPR strategies and attitudes

regarding the patenting of computer software. Section 2 presented 16 questions, which focused on the methods of protection used, and the reasons for each choice of protection. Querying the participants about how they appropriated their IP was regarded as a means of identifying the strategies used by SMEs, and other organizations.

Section 3 consisted of a series of seven statements for which the participants were asked to indicate whether, or not, they agreed. These statements focused on broader issues associated generally with perceptions of the potential benefits, or lack thereof, from patenting computer software, as well as the types of 'informational' measures that may be of assistance to SMEs for IPR related matters. In addition, a "Comments" section was included at the end of the questionnaire. Its purpose was to provide an opportunity for the respondents to make any additional remarks regarding the issues addressed in the survey.

With respect to the primary concerns that SMEs, large companies and PROs have about the protection of their software creations, the data showed that:

- SMEs and large companies are most concerned about the unauthorized use of their computer software inventions;
- SMEs ranked the creation and implementation of 'unwanted legislation' as being among their primary concerns; and
- PROs are mainly concerned with unauthorized duplication of their software creations.

The most common methods of protection were:

- copyright
- technical systems of protection; and
- licensing.

The survey data on how SMEs rank the importance of methods of IP protection reveal that 27 per cent of them regard licensing as the most effective means of protection and 24 per cent ranked technical systems of protection as the most important means. Combining this with 21 per cent and 8 per cent for copyright and patents, respectively, one could contend that additional information on all these forms of IP protection could be beneficial to SMEs. A similar argument also could be made for PROs, although 12 per cent from this group claimed that they regarded patenting as the most important form of protection for their software creations.

As seen above, only a minority of SMEs patent their software creation. The majority argued that patenting was not particularly appropriate for their software products as other forms of IP protection, such as informal methods – technical systems and licensing – are equally effective. As with the findings from projects of the *Intellectual Property Initiative* and those conducted in the U.S., the main reason for the lack of patenting is the complexity and laborious nature of the patenting system and the rapid

developments in software development. Moreover, the main aim of SMEs, in particular, is to get their products to market as fast as possible, in order to maintain and sustain market presence. They claimed that in the light of the limited life span of most software applications, the time required to put together a software patent application was better spent in developing new applications to market.

However, despite their reliance on copyright as a legal form of protection, SMEs are aware of the “vulnerabilities” of copyright. Several of them cited the ease of infringement of copyrighted material. However, on balance, they still relied on it, and other informal means of protection, instead of patenting. Yet, there was a recognition of the potential investment benefits that software patents might confer although this was tempered by a strongly held view that the ownership of such patents would not help them to compete against other industry players. The perceived lack of competitive advantage to be gained by software patents was linked repeatedly to a belief that, SMEs lack, generally, the financial resources required to defend themselves against any legal challenges to the validity of the patent(s) they might own. Another common reason cited by SMEs for not patenting was a preference for “giving away” software creations and generating income from consultancy services thereafter.

Interestingly, the follow-up interviews revealed that although the patenting of computer software would provide a much stronger form of IP protection than copyright, it would not facilitate the policing or enforcement of IPR. Furthermore, it was repeatedly argued that patent protection would not lighten, in any way, the difficult task of ensuring one is not infringing on a third party’s IPR.

In addition, the majority of firms interviewed reiterated their “pessimistic” views on the competitive advantage that patents are reputed to confer. Curiously, they also asserted that patents were also not a significant factor in raising capital for their businesses and their licensing activities. One SME, did however point out that in his firm’s experience, the willingness of American and Japanese based potential clients to invest in a software license was becoming increasingly contingent upon that software being patented.

Given the excitement over the issue of patenting computer software, particularly with respect to business method patents, it is not surprising to find that the opinions of participants were divided as to whether the patenting of computer software helps to promote innovation. This finding is not new as the issue of the relationship between patentability and innovativeness is, and continues to be robustly debated in academic circles.

The finding is however, useful in that a number of opinions at “grass roots level” continue to reflect the decades of academic discussions over this issue. Another notable finding from the survey and interviews is that there is a general consensus that the software patentability issue is likely to become an increasing concern for SMEs. Yet, this potential concern

continues to focus on the ambiguity of the effects of patenting. But what also needs to be noted is that the use of the patenting system is, in large part, related to the size of the SME. Research has shown that larger firms, such as medium-sized enterprises with perhaps more than 200 employees, tend to patent more than smaller companies. The availability of resources and experience with the patent regime account, in large degree, for this pattern.

The majority of the SME respondents are all involved in creating Web-based applications for e-commerce and other Internet-based processes. Based on their perspectives, one could conclude that in spite of the furore over “Internet patents” or business method patents, younger “new economy” SMEs do not appear to be any more anxious to obtain patents for their respective software creations than their “old economy” counterparts. This arguably, could be seen as raising some doubt about the extent to which we are in a “pro-patent era.” Furthermore, is this “pro-patent era” specifically related to business method patents, and needs to be viewed in geographical terms, that is, could this frenzy over business method patents be a particularly U.S. phenomenon? What is clearer is that we are indeed in a “pro-IPR era” given the extensive and intensive use of digital technologies which do make copying and unauthorized use of protected material that much more easy.

In terms of keeping SMEs and other organizations abreast of new developments in European patent policy, the survey data suggest that a greater effort needs to be extended in this direction. Only one-quarter of the participant SMEs surveyed (3 out of 12) support the view that the European Commission has been successful in keeping SMEs aware of IPR-related developments. This suggests that the various existing IPR tools now available from the European Commission could be tailored and designed to provide information on the latest IPR developments specifically for SMEs. Moreover, only two SMEs expressed an awareness of the existence of the EPO’s database service *esp@cenet*. A similar situation was also found with PROs.

The interviews also showed only one participant SME referred regularly to patent information when seeking to develop new software products. The remainder of the interviewees reported that their respective organizations never, or only very rarely, consulted the above information resources.

When taken together, the findings serve to strengthen our belief that there is a need to increase awareness levels among SMEs and PROs about the software patenting issue. The high number among the 12 participant SMEs and 8 respondent PROs of “disagree” and “no opinion” to the questions on the informational measures undertaken by the European Commission on IPR-related matters illustrate the importance of effective measures. In spite of the avowals of the effectiveness of other methods of IP protection, and the perceived lack of ability to defend patent-related litigation, more “practical education” could help to dispel some of the

concerns of SMEs and PROs with, or lack of knowledge of, the software patentability issue.

With respect to how policymakers can help to improve the awareness of SMEs to the IPR related issues, the research suggests that such measures must address the heterogeneous nature of SMEs. Hence, information materials could be tailored in such a way as to be relevant to this diversity, and cover a range of IP appropriation mechanisms. Information also needs to be presented in a plain and intelligible way, and made widely available to them in a variety of media. As is often the case, SMEs are often critical of the language used in presenting information on IPR. The brochure that this study is contracted to produce could, perhaps, be used as a precursory measure to inform SMEs, in a “non-intimidating” and comprehensible fashion. The brochure provides a discussion and description of formal and informal methods of IP protection.

PART 1

INTRODUCTION

What is so unexpected is the effect these types of patents have had on business in the “new economy” world.

Stefano Nappo and Melissa Clarke, attorneys¹

One of the defining characteristics of the Information Age has been the intensive and extensive use of digital technologies. For example, the rapid proliferation in computer software programmes and applications has played a key role in developing and fostering multiple uses for the Internet. Given the nature of the Internet, many leading analysts view it as one giant, out-of-control copying machine, thereby catalyzing an intense concern over the protection of Intellectual Property (IP), and the tightening and expansion of Intellectual Property Rights (IPR).

Another factor for the increased concern with IPR is the rapid pace of innovation in “knowledge based” activities, such as in information technology, software and biotechnology. The “knowledge-based economy” and the “new economy” have become the buzzwords of today, both of which imply an intensive and extensive use of digital technologies by industry. E-commerce, for instance, is a sterling example of the “new economy.” In step with this heightened concern over IPR, legislators have enacted new laws and practices to extend the scope of protection, particularly that provided by patents and copyright. For example, the USPTO (U.S. Patent and Trademark Office) now grants patents to software-based “business methods,” such as those used in e-commerce conducted over the Internet. (See below for more on this.) The WIPO (World Intellectual Property Organization) Copyright Treaty 1997 makes it a criminal offence to circumvent or remove any technical system that is designed to prevent unauthorized copying of copyrighted material, or to track authorized use of such material.

In the light of the greater use of digital technologies and increased knowledge-based activities, the European Commission study on *Innovation Policy in a Knowledge-Based Economy* asserts that we are now entering a “pro-patent world.”² The climate of growing concern over IPR has sharpened the debates between economists, social scientists and lawyers as to whether software innovators should worry more about maximizing the *value* of their intellectual property than the terms and conditions that maximize its *protection*.³

Yet, the authors of the recent ETAN (European Technology Assessment Network) Working Paper on the *Strategic dimensions of Intellectual Property Rights in the context of S&T Policy* appropriately concludes, IPR are vital for innovation, and can foster it “if approached in the right way.”⁴ However, the conclusions of another European Commission sponsored report entitled *The Economic Impact of Patentability of Computer*

Programs, highlight the ambiguous impact of patenting on the innovation process, in both large and small firms.⁵ Still, it is unarguable that the primary goal of the patent system is to encourage innovation and commercialization of technological advances. Through the publication of the information on the patented product/process, interested parties can use it to improve further the product/process, or to develop new applications.

Again, according to the European Commission study *Innovation Policy in a Knowledge-Based Economy*, European policy makers have reacted to the apparent rise of a “pro-patent” era with both unease and resolve.”⁶ The unease is based on a belief that the European innovation system has not been as successful in commercializing their inventions as their American and Japanese competitors have done with theirs. The resolve comes from a conviction that new IPR policies could enhance the competitiveness of European firms. European policy makers believe that new changes to patent law could attract European firms, particularly SMEs (small and medium enterprises) to patent more, and through this route, help to foster and maintain European competitiveness.⁷

Indeed, an impetus for the forthcoming European Commission directive on the patentability of computer software, in large part, lies in the assumption that patentable software creations by smaller developers motivates them to innovate.⁸ According to this view, the inability to patent more software creations discourages innovation because firms may not be able to protect their financial investments or attract venture capital.

The ambiguity, in large part, could be argued to arise from the dilemma: “to allow easier passage for more business method software patents as in the U.S. so as to foster the development of European e-commerce, or to continue restricting the number of business method patents in Europe?” After all, software patents with an application in the business field have been granted in the European Union when the requirements are met, such as for “technical effect,” novelty and non-obviousness.⁹ (See below for more on technical effect.)

The Report is organized as follows:

PART II – provides a discussion about how SMEs regard the protection of their IP and the importance of IPR. It also addresses their awareness of IPR.

PART III – presents the data analysis based on a survey of European small and medium sized, and large software developers, and public research organizations.

PART IV – contains the conclusion.

PART II

For better or for worse, whole new landscapes have been opened to the possibility of patents.....we may see an explosion of activity. Or we may hear horror stories about good, solid businesses abandoned in the face of predatory patent extortionists. It is simply too soon to tell.

Robert P Merges, Law Professor, Berkeley¹⁰

Talking the same language @ once?

This section provides a brief overview of the U.S. and European system with respect to the patenting of software and computer programs.¹¹ It aims only to review summarily the different principal procedural features of the patent granting and invalidation process. In the light of the apparent proliferation of business method patents being granted in the U.S., this section also provides a short account on the business method scope of software protection in the U.S. As it is beyond the scope of this study, these brief discussions are not intended to provide an exhaustive explanation of the differences between the European and U.S. patenting systems.

The United States

The governing legislation for the patenting of computer programs in the U.S. is the Patent Act 1952, Title 35 USC. Section 101. Here, there is no specific reference to the patenting of computer programs; instead, it merely states that the discovery of any new and useful “process, machine manufacture or composition of matter, and new and useful improvements thereof” is patentable, subject to the condition and requirements of the Title. Thus there is no specific exclusion of software, and the USPTO has granted software patents since the 1970s, despite judicial disputes over the validity of some of these patents. The U.S. Copyright Law at Section 101 defines a computer program as

a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a result.¹²

In the 1990s, a utility-based test in which, among other things, a computer-related process need not require a physical transformation outside the computer resulting from the process, was used for the patentability of software. Particularly, in 1996, the USPTO issued Examination Guidelines for Computer-Implemented Inventions.¹³ Specifically, the section on “Identify and Understand Any Practical Application Asserted for the Invention” clarified that

The utility of an invention must be within the “technological” arts. A computer-related invention is within the technological arts. A practical application of a computer-related invention is statutory subject matter.....An invention that has a practical application in the technological arts satisfies the utility requirement.¹⁴

This section is further explained by the section “Claims Particularly Pointing and Distinctly Claiming the Invention” by identifying that

- (a) *a computer or other programmable apparatus whose actions are directed by a computer program or other form of software is a statutory machine;*
- (b) *a computer-readable memory that can be used to direct a computer to function in a particular manner when used by the computer is a statutory article of manufacture;*
- (c) *a series of specific operational steps to be performed on or with the aid of a computer is a statutory process.*¹⁵

These Guidelines arguably facilitated the granting of more software-based patents. According to J Fellas, “[t]he real question is no longer whether software-related inventions claim patentable subject matter, but, rather whether such inventions are novel and non-obvious.”¹⁶ On November 29, 1999, an important legislation entitled the *Intellectual Property and Communications Omnibus Reform Act of 1999* (“the Reform Act”) was signed into law. USPTO Director and Under Secretary of Commerce for Intellectual Property Q. Todd Dickinson called it the most significant change in U.S. Patent law since the 1952 Patent Act because of the additions to it. (More of this below.)

Up until November 20, 2000, when “Changes to Implement Eighteen Month Publication of Patent Applications”¹⁷ was enacted as part of the *American Inventors Protection Act of 1999* (AIPA), which was passed into law on November 29,¹⁸ U.S. patent applications were not published. In other words, there is no disclosure of information prior to the granting of the patent. Patent applications are kept secret indefinitely pending the grant decisions. This gives rise to a particular situation – *submarine patents* – not encountered in the European system. Submarine patents are an extreme form arising largely from perceived abuses of the patent review process, in which applicants manage to revise their original claims during the review period in light of subsequent discoveries.

These patents are based on old, allegedly vague applications, kept alive within the patent office by repeated continuations and changes that modify the patent application to reflect developing practices and relevant technologies. Then after the technology has matured, this “old” patent “surfaces” and surprises companies who then find out that their new products have infringed the “old” patent.¹⁹ This is not to suggest that the patent office has issued several submarine patents, but it is arguable that a small number of potential submarine patents could have an important economic impact, although to date, the effect has not been as great as many people think.²⁰ Take for instance the case of the most famous practitioner of submarine patents, the late Jerome Lemelson. He held patents on the bar code scanner and components of VCRs, ATMs (automated teller machines), cordless phones, fax machines, compact cassette players, welding robots and machine vision and image processing, and was able to extract significant royalties from companies that thought

they were using only their technologies.²¹ In the light of the AIPA, one could argue that it could effectively reduce further the granting of this type of patents.

The switch to the “first to file” system is being discussed in the U.S. In his keynote speech to the National Academies Board of Science, Technology and Economic Policy, on February 2, 2000, Director Dickinson asked for the support of the scientific community to study the impact of such a change. Furthermore, in his regular on line discussions with “patent” customers, Dickinson, in response to a query on U.S. adoption of first to file clarified that the U.S. position on this issue was still far from decided. He argued that although members of the WIPO Standing Committee on Patents would like to address this, he felt that there were other priorities to be dealt with, such as the international grace period. He concluded that once these were settled, the U.S. could then focus on this nettlesome issue (for the U.S.) of first to file.²²

Invalidation/revocation process

Although U.S. patent law now permits publication of patent applications, the system of “opposing” patent applications or invalidating patent applications remains complicated. Occasionally, different inventors claiming substantially the same patentable invention file two or more applications. Since only one patent can be granted, the USPTO institutes a proceeding known as “interference” to determine who is the first inventor and entitled to the patent.

Interference proceedings may also be conducted between an application and a patent already issued, provided the patent has not been issued for more than one year prior to the filing of the conflicting application, and furthermore, that the conflicting application is not disallowed from patentability for some other reason.²³ Each party to such a proceeding must produce evidence for being the first inventor. If such evidence is not provided, then the party is restricted to the date of filing the application as his/her earliest date.²⁴ The Board of Patent Appeals and Interferences, made up of 3 administrative patent judges, then decides on the evidence submitted. The losing party may appeal to the Court of Appeals for the Federal Circuit (CAFC, a court charged with ruling on the validity of patents) or file a civil action against the winning party in the appropriate U.S. district court. Such a time-consuming process would likely require sizeable financial and legal resources.

The European Union under the European Patent Convention (EPC)

The legislative framework of the EPC does not permit computer programs to be patented, *as such*.²⁵ The exclusion to patentability is contained in Article 52(2) EPC, which identifies what cannot be patented.

- (a) *Discoveries, scientific theories and mathematical algorithms*
- (b) *Aesthetic creations*

- (c) *Schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers*
- (d) *Presentation of information*

The underlying reason for the exclusion of computer programs was initially based on the belief that computer programs are not of a “technical nature.”²⁶ In other words, in the absence of any explicit exclusion, computer programs are not patentable. Yet, it also implies that the patentability of software is based on whether the software invention is of a technical nature. Accordingly, computer program-related inventions can be patented in Europe, and several have been,²⁷ see for instance, IPC subgroup GO6F17/60, provided patent applications are drawn with care to reflect the EPO Guidelines for Examination, which specifically state that

an invention featuring a program and which represents a technical process (e.g., a program-controlled manufacturing process) or which has a technical effect (e.g., a program which increases the working memory of computer) must be seen as making a technical contribution and patentable.

Recently, the European Technical Board of Appeals of the EPO rendered two important decisions relating to the patentability of software in Europe. These decisions have somewhat eroded the Guidelines in the light of the Board’s interpretation of the EPC rules. Importantly, these decisions nullified, and reversed an EPO guideline that a computer program claimed by itself or as a record on a carrier is not patentable irrespective of its contents.²⁸

Both cases relate to patent applications filed by IBM.²⁹ The Board reasoned that a computer program claimed by itself is not excluded from patentability if the program, when running on a computer or loaded into a computer, effects, or is capable of bringing a technical effect which goes beyond the “normal” physical interactions between the program (software) and computer (hardware) on which it is operating. Furthermore, the Board claimed that there is little significance to the fact whether the computer program is claimed by itself, or as a record on a carrier.³⁰ In the past, restrictions on “computer programs as such” have been the basis for the EPO to refuse granting claims to a computer program product on a computer-readable medium on a carrier. The two IBM case decisions, however, allowed such claims because the Board argued that a technical effect can be derived (1) from the execution by the computer of the instructions provided by the software program; and (2) from the solution of a technical problem that the software enables.

The EPC does not specify the requirements of technical effect although the Board did identify that the technical character of an invention is generally an essential requirement for its patentability, as represented in Rules 27 and 29 EPC. Rule 27 (1) states that the description of the invention must specify the technical field to which the invention relates. Rule 29(1) states that the claim shall define the matter for which protection is sought in terms of the technical features of the invention. Several legal scholars point out that the lack of specificity for “technical effect” could give rise to

miscellaneous and flexible interpretations, not unlike what has happened in the absence of a further definition of “business method” in the U.S. system. (See below for business method.)

The EPO is preparing for a revision of the EPC which will include rescinding the “computer program” exception. Although it is highly unlikely that the “business method patent” issue will be on the agenda, a recent EPO press release acknowledges that under existing law, there is some scope for patenting business methods.³¹ In particular, it notes that “although methods for doing business, programs for computers, etc., are as such explicitly excluded from patentability,³² a product or a method which is of a technical character may be patentable, even if the claimed subject-matter defines or at least involves a business method, a computer program, etc.”³³

Recent discussions over the patentability revolve, principally around the issue of business method patents, in the light of the granting of several thousands of this type of patents in the U.S., as noted above. (See more on the debate over this issue below.) With respect to the definition of a business method, the EPO suggests that a business method is any subject matter which is “concerned more with interpersonal, societal and financial relationships, than with the stuff of engineering.”³⁴ The U.S. treatment of business method patents is discussed below.

In sum, U.S. scholars contend that these two decisions have brought the EPO closer to the U.S. and Japanese standards for software-related patents.³⁵ This is indeed arguable, but it is beyond the scope of this study. What is clear, however, is that business method patents in the form that they can be granted in the U.S., is still not permissible in Europe. Yet, it is worth noting that in a recent study done by Olswang (law firm) and Oxford University, more than 400 business methods with “technical effect” have been filed at the EPO during the period 1996-1999. Only 5 (1.2 per cent) have been granted, and 8 (2 per cent) were withdrawn. U.S. companies accounted for 52 per cent of these applications compared with about 20 per cent from the UK, Germany and France (Germany and France with 7 per cent each, and the UK at with 5 per cent). Japan filed 10 per cent of the business method related applications.³⁶

Still, there is a starkly different procedure between the European and U.S. system with respect to attempts to invalidate or “question” the validity of a patent application. The next section addresses this issue.

Opposition procedures

Specifically, Europe has opposition procedures. A European patent may be opposed once it is granted – “belated opposition.” In other words, this is a post-grant procedure, unlike the U.S. method of interference, which is done during the grant period by the USPTO itself. The opposition is handled by a three member Opposition Division of the EPO, and this process is separate and in addition to national invalidity/revocation procedures. Opposition to a granted patent can be filed any time within

nine months following the publication of the patent grant in the European Patent Bulletin.

Any person (legal, as in a company or natural) can file an opposition. According to a recent decision of the Enlarged Board of Appeals, a nominal opponent (straw man) can also file, thus allowing the true identity of an opponent to be concealed, although such a procedure must not be such as to conceal opposition by the patentee himself/herself.³⁷ The possible grounds for opposition are:

1. the claimed invention is not patentable; either lacks novelty or is excluded from patentability;
2. the specification of the patent does not disclose the invention sufficiently clearly and completely for it to be conducted by a person skilled in the professed art;
3. the subject of the European patent extends beyond the content of the European application as originally filed; and
4. the claimed invention lacks an inventive step and industrial applicability.

A Notice of Opposition is initially communicated to the patentee, after which the patentee's observations are then communicated to the opponent. The EPO advises that as a precautionary measure, a patentee or opponent should request an "oral proceeding" with the first submission in the event that the Opposition Division may intend to issue a decision adverse to either the patentee or opponent. The oral proceedings are like a mini court hearing, but with less formality. The hearing is mainly for the purposes of repeating and expanding on arguments already presented on the filed opposition. Importantly, the opposition procedure is not an adversarial process as the EPO plays a directive part in trying to resolve the issues raised. An adverse decision on an opposition can be appealed.

This measure allows disclosure of information contained in the patent application, thereby giving the opportunity for third part observations to question the patent application and draw attention to prior art and use following publication of the European patent application. EPC Article 115 provides this facility – Observation by Third Parties. Such observations must be filed in writing and must include a statement of the grounds on which they are based to the EPO. The observations are then communicated to the applicant for, or proprietor of the patent who may comment on them. This process is far less expensive than opposition procedures.

A note on business method patents

As mentioned above, on November 29, 1999, an important legislation entitled the *Intellectual Property and Communications Omnibus Reform Act of 1999* ("the Reform Act") was signed into law. USPTO Director Dickinson heralded it as the most significant change in U.S. Patent law since the 1952 Patent Act because of some key additions to it. Among the subtitles introduced in this Act is *Subtitle C: First Inventor Defense Act of 1999* which emphasized the key language of "commercial" use of a "method". The term "method" is defined in the Act as a method of doing or conducting business, without suggesting any further definitions. The absence of further defining what a method is provides a host of opportunities for varying interpretations of the protectability of software-based applications. Nonetheless, in large part, the reform was in response to 2 events.³⁸

The first was the upholding by the CAFC of a patent for a software-based method for calculating the net asset value of mutual funds. This was the case of *State Street Bank and Trust Co vs. Signature Financial Group* in 1998.³⁹ Here the court ruled that business methods could constitute statutory subject matter for patent protection. The court ruled that patent laws were intended to protect any method, whether it required the use of a computer, so long as it produced a useful, concrete and tangible result. This ruling legitimized software patents and methods of doing business, and in a sense, opened the gateway for Internet related and e-commerce patents. Indeed, the CAFC ruling resolved what had been a hitherto nettlesome problem of patent validity arising from an "ill-conceived exception"⁴⁰ (business method).

The second incident accelerating the reform is the rapid introduction of e-commerce through the Internet. USPTO Director Dickinson stated that in 1999, the number of applications with claims for software-based "business processes or steps for doing something" "increased over 40 percent from the previous year, out of a total of 22,930 issued patents. He also reported that during fiscal year 1998, the PTO had expected to issue over 300 "business method" type software patents.⁴¹ Thus, it can be seen that the number of issued software patents in general has grown phenomenally. These patent applications are covered in the area of "Automated Financial/Management Business Data Processing Method Patents" covered by the classification Class 705 "Data processing: financial, business practice management or cost/price determination" which was introduced in 1997.⁴² According to the USPTO group that examined these software patents, "Internet" patents, in particular, also escalated from 9 issued in fiscal 1991 to 1,595 in fiscal 1998.⁴³

An example of a business method patent is "ClickReward" (U.S. Pat No. 5,774,870) which is an online shopping rewards program. Another involves a system that provides financial incentives for citizens to view political messages on the Internet (U.S. Pat No. 5,855,008). An example of e-commerce patents is a method for compensating computer users for paying

attention to an advertisement information distributed over a computer network such as the Internet (U.S. Pat No. 5,794,210). Yet another can be found in a method and system for enabling a small seller to register its goods for sale through a third party distributor, such as through an electronic "classified advertisement" system of the distributor (U.S. Pat No. 5,799,285). An online auction system in which consumers name the price they are willing to pay with the first willing seller getting the sale is found in U.S. Pat No. 5,794,207. There is another patent which allows the blocking of the auction practice (as described above) in U.S. Pat No. 5,845,265.

In sum, business method patents can be viewed as part of a larger family of patents known as utility patents that protect inventions, processes, chemical formulas and other discoveries. Here, a business method is regarded as a process because it is not a physical object. The test for patentability is whether the subject matter has practical utility that results in a useful, concrete and tangible result.

Business methods, however, have given rise to complaints that these new patents will stifle e-commerce. There is also widespread lament that several of these patents are trivial, non-inventive and "obvious." These complaints have highlighted the inadequacy of the current examination – that either the examiner is failing to understand the substantial matter of the patent, or is failing to conduct an appropriate search of prior art. This has catalyzed the USPTO to undertake a *Business Methods Patent Initiative: an Action Plan*, which attempts to engage industry on a wider and formal basis to help improve the quality control of the examination process, enhance technical training, revise examination guidelines and expand search activities.⁴⁴

The USPTO, as already noted, has granted thousands of business method patents, and "American business methods are knocking on the doors of the EPO," as suggested by the Olswang-Oxford University study mentioned above. This trend of filing for such patents is likely to continue unabated in the light of its perceived importance for the development of electronic commerce. Observe the promotional material on the website of Walker Digital, Inc., a U.S. company that develops integrated business solutions, particularly for the Internet. It proclaims:

Walker Digital has invented more than 300 new Internet business methods, products and services, and is currently commercializing many of these companies. Walker Digital invents proprietary new business methods, develops and operates new companies, and partners with other companies to improve their performance. No other company has this combination of capabilities at this scale.

Walker Digital holds approximately 50 U.S. patents, and has approximately 300 patents pending. Walker Digital's intellectual property portfolio is as unique as it is diverse, and reflects the company's commitment to developing highly innovative new technology and Internet-based solutions to business problems.⁴⁵

Gregory Aharonian, a well-known critic of the expanded U.S. patent system, however, challenges these claims. He laments:

*There are many fears of future patent litigation..... While such fears in moderation are very justified, there is another danger, more psychological than financial... due to the trivial and obnoxious obviousness of many of these patents.*⁴⁶

Since the last 5 to 6 years, there has been a growing body of literature on the pros and cons of extending the patentability of software creations.⁴⁷ This topic is, however, beyond the scope of this study. Yet it is helpful to note that those opposing the extension of patentability of software argue passionately for limiting any negative effects from “bad patents,” that is, those lacking in novelty or an inventive step. Significantly, bad patents impose a cost on potential competitors.

In contrast, advocates of extended software patentability assert that stricter and expanded protection provides stronger incentives for the generation and diffusion of new technologies.⁴⁸ Furthermore, inadequacies in intellectual property protection create loss of export sales and trade distortions in international trade.⁴⁹ Software patentability also makes it worthwhile for investors to sink large resources into new and existing companies, and for new entrants to devote, in many cases, relatively meagre resources into research and development. A patent portfolio can also be used to bargain with companies for use of their patents. Importantly, a patent has a major advantage over copyright in that it can protect against competitors creating equivalent solutions.

Commenting on the evolution of software patentability within Europe, Lawrence Lessig, distinguished law professor at Stanford Law School, and Fellow of the Institute for Advanced Study, Berlin, worries that insufficient credence is given to the fact that while increasing patentability may increase incentives, it assuredly increases costs. In line with the views of several advocates of a cautionary approach to software patenting, Lessig advises, in hyperbolic fashion, that “before Europe paints its patent law with the Stars and Stripes,” there is a need to study rigorously whether there is any good economic reason to believe that software patents will induce more innovation.⁵⁰ Importantly, Lessig argues, that

*if patenting software will induce more innovation in software development, then let proponents demonstrate it, through careful and convincing evidence. But until they do, Europe should wait. Legislation needs a better reason than that lawyers like it, and that America does it.*⁵¹

The current differences between the U.S. and European practices in the granting of software patents appear to be somewhat lost in the excitement over software patents among those involved in the development of software, and those concerned with the software patentability issue.⁵² Bolstered by the perceptions of many cautious scholars and observers that Europe might start granting U.S. business method type patents, the activities of an Internet-based movement, known as the *EuroLinux*

Alliance for a Free Information Infrastructure has become highly active. This organization consists of an open coalition of commercial software companies and non-profit associations that is opposed to the creation of an expanded patent system. Paralleling the concerns of Lessig and others, EuroLinux fears that an expanded patent system would create increased costs for users and potentially restrict innovation. Recently, it has been gaining increasing support from commercial software publishers in Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Italy, Netherlands, Norway, Spain and Sweden.⁵³ Highlighting the concerns of members of the EuroLinux Alliance, Jacques Le Marois, President of MandrakeSoft, a software company based in France, particularly worried about U.S. business method patents, affirms that

*Software patents are a major source of concern, not only for the Linux & Open Source Software industry, but for the whole information technology industry. Software publishers and innovative Internet businesses in the U.S. constantly face the risk of a patent war, just because obvious techniques such as publishing a database on the Web were granted a patent. This system generates more losses than revenue for the IT industry.*⁵⁴

Likewise, Ralf Schwöbel, CEO of Intradat, a leading e-commerce software publisher in Germany argues that “introducing Internet patents in this complex system may just trigger a recession cycle instead of boosting economic growth. I am surprised that European Authorities never considered this possibility....”⁵⁵ Jean-Francois Abramatic, president of the World Wide Web Consortium also has expressed concern with the evolving patent system.⁵⁶

A note on open source software

It is worth noting that the open source software movement, such as the EuroLinux Alliance has both its proponents and opponents.⁵⁷ Students of this topic point out that over the past 2 years, numerous major patenting corporations, including Hewlett Packard, IBM, and Sun have launched projects to develop and use open source software. At the same time, a number of companies specializing in commercializing Linux, such as Red Hat and VA Linux have completed initial public offerings, and other open source companies, such as Cobalt Network, Collab.Net, Scriptics, and Sendmail have received venture capital financing.⁵⁸

There are several advantages to open source software, but the pivotal ones include access to the source code and the right to modify it, which enables unlimited improvement of the software product, as well the right to redistribute the modification and improvements in the code. According to Eric Raymond, author of the widely read *The Cathedral and the Bazaar*, and leader of the Open Source Initiative (a loose confederation of volunteer software developers), the collective inventive power of open source software developers lies in the accessibility to the source code. This in turn allows peer review and reliability.⁵⁹ Leaked internal Microsoft memos, popularly dubbed as Halloween 1 and 2 documents, conceded that

[r]apid creation and deployment of incremental [improvements] and bug fixes [combined with] greater code inspection and debugging in OSS [Open Source software] results in higher quality code than commercial...because the pool of potential OSS developers is massive, it is economically viable [for them] to simultaneously investigate multiple solutions to a problem and choose the best solution in the end.⁶⁰

Another involves the right to use the software in any way, which arguably helps to build a critical mass of users and developers, and market for support and customization of the software. The absence of a “central” power, such as that found in a proprietary software vendor, allows for various uses and improvements of the product. Specifically, there is no single entity on which the future of the software development depends. For instance, one need not be held hostage by a proprietary software company who does not upgrade its software despite customer reliance on it for improvements. Conversely, a company may upgrade its software in such a way that users will need to purchase the whole new package in order to obtain new functions.⁶¹

There are also several perceived disadvantages. Among these is the lack of guarantee that development will happen, that is, there is seldom a certainty that the software will be useable. Furthermore, given the paucity of advertising of open source software, potential users/interested parties find it difficult to know that a project exists and if there is one, what its current status is. According to Kevin Rivette and David Kline, the inherent fragmentation of the Open Source movement could lead to a multiplicity of incompatible versions of Linux. Furthermore, Linux is generally used in SMEs, universities and research institutions, and markedly less in large corporations. This could discourage “Fortune 500” companies from using the Linux operating system over a more well known proprietary system, thereby hurting its commercial future.⁶²

Importantly, there may be significant IPR problems. In the light of patentability of software, there is always the possibility that some particular method to solve a software problem is patented. Since the source code is accessible, patent holders are able to detect infringement, and the likely absence of any one entity in the open source software project owning patent rights for cross licensing, can “doom” a promising open source project.⁶³ As Bruce Perens of the Open Source Initiative warns, “patents may become the next great battle for the Linux community.”⁶⁴

Similarly, according to Rivette and Kline, the biggest threat to the Open source movement will come from the “patent bludgeon.” Open source software will not be able to compete with advances in proprietary software. More importantly, “patents are on the Net to stay” and open source developers will increasingly have to contend with patented software.⁶⁵ The authors of the study *The Economic Impact of Patentability of Computer Programs*, referred to above, also suggest that developers of open source may soon find it advantageous to file patents to obtain bargaining leverage, for instance, license money from owners of proprietary platforms. This according to the authors was an opinion

shared widely by open source developers they had interviewed. They, however, conclude on a sanguine note on the confrontation between open source and patents, by stating that

the point here is that the growing power of Internet patents represents not just a threat to the Open Source community but a major opportunity as well. For just as money can buy a person freedom from the rat race of materialistic pursuit, so might the wise use of patents enable Open Source developers to continue pursuing their unique style of patent-free software innovation.⁶⁶

These ongoing commercial, academic, economic, legal, political and “interest group” debates about the relative benefits of the patent system highlight an important question. ***How does the “middle of the road” small company, quietly maintaining a viable and growing business, regard the increasingly complex world of IPR?***

SMEs and IPR: Is it an arcane world for them?

This section discusses the awareness of SMEs toward the prevailing IPR regime, with a focus on patents and copyright. The discussion is largely based on the research results of the Program on Intellectual Property known as the *Intellectual Property Initiative*. It was funded by the UK Economic and Social Research Council, the UK Department of Trade and Industry (DTI) and the London-based Intellectual Property Institute. About £1.1 million were invested in 11 projects, all of which were selected on an open competition basis. The Program was conducted between 1996-1999, and is one of the biggest studies on IP ever. It involved about 30 UK academics from a wide range of social and natural sciences disciplines. Some of the projects involved lawyers as advisors.⁶⁷

A motivating reason for the deliberate preference for social and natural scientists was that industry recognized that earlier IP research noticeably lacked a multidisciplinary and interdisciplinary approach to the study of IPR. The *Initiative*, therefore, sought to address this in concern order to benefit from the empirical research that the projects had committed to undertake. It was recognized that multidisciplinary research would deliver a “reality check” and yield wide ranging “grass roots” opinions gathered from SMEs across different industrial sectors of the “old” and “new” economy,” as well as research institutes.

Aims and themes of the Intellectual Property Initiative

The primary objective of the *Initiative* was to learn how the current IPR system is working, particularly for SMEs, and to what extent they are aware of it. In addition, it aimed to elicit suggestions for IPR awareness raising and support actions by policy makers and national authorities for smaller companies and organizations.

The Initiative addressed five broad themes:

1. to identify best practice in the management of IP;

2. to evaluate the impact of current system of IPR on development and application of new technologies in the UK;
3. to investigate how well UK business exploits the information in published IP;
4. to identify ways of evaluating IP assets; and
5. to identify the most appropriate arrangements for IP between the UK science base and business.⁶⁸

General lessons from the Initiative

This section briefly summarizes the conclusions from the relevant projects.⁶⁹ A detailed description of each project and its findings will follow.

SMEs recognize the importance of IP for their businesses, but find informal methods of protection generally more effective than formal ones, such as patenting.⁷⁰ The majority of businesses that use the copyright system seemed to be satisfied with the efficiency and effectiveness of this IPR. Several companies, however, were unaware of the *Directive on the Protection of Computer Databases* and expressed concerns about the extension of copyright protection.

Patent databases are rarely used by SMEs as sources of information. Within SMEs, innovative ideas are generally produced from a combination of generic professional knowledge with client-specific requirements. Protection of such creations is based on trust and contract.

Universities are not a significant source of IP for exploitation by businesses. Rather, their primary role is to generate knowledge through basic research and produce high quality graduates.⁷¹

The Department of Trade and Industry, in its efforts to promote the awareness of the IPR regime, should recognize that IP management practices are sector specific and to large degree, dependent on company size. The focus of IP policy support on patents and copyright inevitably ignores the requirements of the majority of firms in the manufacturing and service sectors.⁷²

Judging from the general conclusions of the research produced by the *Initiative*, there is little empirical evidence to support the view that SMEs would derive any additional benefit from expanded patent and copyright systems. Instead, as the discussion below will illustrate, SMEs tend to be less fixated on protecting their software creations formally, than on getting their product(s)/service to market.

Of course, it is arguable that UK companies and probably European firms as well, are less prone to litigating in comparison to their American counterparts. The management of IPR seems to hold for them a popular conception of dealing with attorneys and the courts, a practice, which is historically an anathema to small companies. According to Mitch Kapor, the founder of Lotus, "litigation is becoming a business tactic, not a

practice of last resort.”⁷³ The relative absence of such a practice in Europe, which could be partly explained by cultural differences, could also contribute to explaining why formal protection of IP is, at best, only as important as informal methods of protection.

So, is the IPR world arcane to SMEs? Not quite, according to the findings of the Intellectual Property Initiative. SMEs are aware of, and understand the basic modes of protection, such as copyright, patent and trademarks. They know what these rights can do for their businesses and, importantly, what they cannot do for them. What they do not seem to be explicitly aware of, however, are the reforms and amendments that have been made to IP law to deal with the “digital-knowledge economy,” for instance, the *sui generis* right for the protection of computer databases. Curiously, several firms that participated in the *Initiative* projects, expressed little concern over these IPR changes when drawn to their attention. Instead, some claimed that “excessive tinkering” with copyright, for instance, would only make it more complicated and expensive for smaller businesses. The next section explores in greater detail these research findings.

More or less @ one on IPR?

This section provides a more detailed examination of the research findings of the *Initiative*. It will divide the findings into 4 clusters:

1. copyright;
2. patent;
3. general management and protection of IP, in relation to use and relevance of formal and informal protection strategies; and
4. impact of the IPR regime on knowledge-based services.

What of copyright?

The projects that dealt with copyright aimed, *inter alia*, to investigate (1) how UK rights holders of software-based creations, particularly electronic publications, and textile designs were protecting their innovations, and (2) to identify “best practice” among these firms.⁷⁴ Data for these projects were gathered from face-to-face interviews and telephone surveys. The project on textiles was complemented by research visits to firms in Italy and the U.S. This enabled a comparison to be made between the perceptions of rightsholders within three significantly different legal systems.

Electronic publishing

Puay Tang conducted the research on electronic publishing. “Electronic publications,” for the project, referred to games, reference materials, educational and training materials, scientific material, music, video and image libraries, news bulletins and newsletters, business, legal and financial material, corporate archives and general interest material. The

main delivery means of these publications were CD-ROMs serving various platforms, proprietary networks and the Internet. The majority of the SMEs interviewed created most of their content and software application in-house.⁷⁵

A database of 1,000 electronic publishers, comprising various firm sizes and activities was created from different published sources. From this source, 31 UK-based SMEs, ranging in size from 2 to 249 employees were selected on the basis of the year of establishment of the firm, its location and the type of electronic publication the firm was producing. An example from each segment of the electronic publishing industry was successfully identified and interviewed for the project. All but 10 interviews were conducted face-to-face, using a semi-structured questionnaire. The respondents were mainly senior executives of the companies, and in some instances, more than one executive was interviewed from the same company.⁷⁶

A main advantage of using this format, also used in other *Initiative* projects, is that it allows time and opportunity to pursue matters in some depth. The open-ended questions also provided for a much richer degree of detail to be given in answers than it would have been with a postal survey. The disadvantage with such an approach, is of course that it is time consuming and costly, both in terms of intensive interviewing and writing up of the results, and travel. This tends to limit the representativeness of the sample, although an example from each segment of the electronic publishing industry was successfully identified and interviewed for the project.

A key objective of this project was to establish the methods of protection that smaller companies were adopting to protect their products and creations. Table 1 below summarizes the methods of IP protection identified. The answers were in response to the two questions: “What methods do you use to protect your intellectual property?” and “Are you aware that copyright is automatic and protects software and publications?”

Table 1. Methods of IP Protection

Legal (copyright, patents, contracts, user agreements)	100%
Market niche	52%
Technical	52%
Pricing	29%
Trust	19%
Non-technical	16%
Bad publicity	10%

N=31; Source: Tang, p. 7

One hundred per cent of the firms interviewed resorted to copyright as their main mode of protection because it is cheap and automatic. About 4 firms, however, had escrowed their source codes and a master copy of the electronic publication with an attorney. Some were aware that they could register their copyright with a private agency, such as Stationers Hall, but none of the firms who knew had done so. Rather, they tended to view registration as a “back-up” for ownership in the event of litigation. Furthermore, the firms interviewed had not ever resorted to the legal system because all but one had not experienced any case of infringement. The firm which had experienced infringement of its product used “bad publicity” to “name and shame” the infringer. (See below for more on this.) Several argued that litigation is an expensive affair, and proving infringement of copyright tends to entail a lengthy process. This makes it difficult for small firms because they often have limited resources for legal service/expertise.

With the exception of one instance, all interviewees declared their satisfaction with the effectiveness of the copyright system. Only one firm, the “doubting copyrighter” patented its software application, citing that they had done so in preparation for their worldwide sales, and particularly because their software development was conducted in the U.S. On the other hand, another company specifically explained why they had not proceeded with patenting their software, even though they believed that their application could satisfy patenting requirements. The reluctance to disclose and publish the firm’s IP, which the patent system requires was a principal motivating reason. The firm maintained that it was better to license their software to a third party and felt sufficiently confident that its copyright would be sufficient in protecting the firm’s IP.

Interestingly, several firms admitted that keeping up with legal developments in copyright was not a priority for them. Rather, several SMEs pointed out that getting their product to market in the shortest possible time is integral to their business. The majority of firms were also only vaguely aware of legislative reforms to copyright in the European

Union, and only 2 were aware of the *Directive on the Protection of Computer Databases*. It was indeed curious that several of these electronic publishers, whose lifeblood depends on the innovative databases they produce, were relatively unaware to such developments. Some gravely warned against “excessive tampering” with the copyright system as it would make it even more complicated and difficult for SMEs to understand, thereby leading to a situation where fear and uncertainty might discourage further innovation.

Despite the overall importance of copyright to electronic publishers, it is interesting for analysts and policymakers to note that 52 per cent of those interviewed considered market niche and technical systems of protection – *informal methods of protection* – as important methods of protection.⁷⁷ A CD-ROM publisher succinctly summed up the security that niche markets provide by stating “why would anyone want to steal my yellow bicycle when red is the popular colour and there are so many red bicycles around?” Although the literature on IP protection has scarcely referred to market niche based forms of IP protection, the findings of Tang’s research suggest this informal method of protection is relatively common among SMEs. (See below for more on this.)

Technical systems refer to the use of encryption, dongles, steganographic techniques, key diskettes, firewalls and passwords.⁷⁸ As was noted in Table 1, more than half of the respondents use these systems. Several respondents, however, despite their use, acknowledged that such systems are generally “too user unfriendly, and too complicated,”⁷⁹ and curiously, were adopted “as an act of faith.” Those who did not employ these methods explained that the lack of an industry standard made them cautious about employing any technical method. Other respondents perceived the push for technical protection as “a conspiracy by large companies to protect their territories from more innovative and imaginative smaller players.”⁸⁰ The Legal Advisory Board (of the European Commission) echoed a similar view when it stated that “the widespread use of technical protection devices might result in the de facto creation of new information monopolies, [and] this would be especially problematic in regard of public domain materials.”⁸¹

Trust, as will also be discussed below, was also cited as an additional and effective protection mechanism. The firms who relied on this complementary means (to copyright) claimed that it was a necessary element for sustaining their business in electronic publishing because without it, users could be inundated with all kinds of binding contract, user agreements and protection systems which, collectively, would influence demand. In his preliminary study on non-contractual relations in business, Stewart Macaulay has shown that businessmen often prefer to rely on a “man’s word” or “common honesty and decency” even where the transaction involved exposure to serious risk.⁸²

Trust, as perceived by these firms, seems to be a form of control mechanism and appears to support Diego Gambetta’s notion that trust is a

“type of expectation that alleviates the fear that one’s exchange partner will act opportunistically. Of course, the risk of opportunism must be present for trust to operate.”⁸³ A number of respondents also pointed out that acute concern over piracy should be a signal to present and potential electronic publishers to “stay out of the business” as the very nature of this commercial activity lends itself to widespread illegal use of digital content.

Ten per cent of those interviewed stated unequivocally that the threat of bad publicity through using distribution channels “to promote the infringing activities of those who commit such acts” was not a situation most companies would like to experience.⁸⁴ Robert Blackburn’s project on “How SMEs see their intellectual property rights” which will be discussed in greater detail below, reveals a similar argument for the use of this informal form of protection. As with market niche, this trust-based mode of protection is scarcely explored in works on IP protection and strategies.

Several firms interviewed noted that it was difficult for them to judge if the use of informal methods of protection had an adverse effect on their IP. At the same time, they were also unable to gauge if the use of copyright had a positive impact on protecting their innovations. What was however made clear was that electronic publishers believed that IPR was only one way of protection, and that a combination of formal (copyright) and informal methods was likely to be the optimal and most cost-effective way of protecting their interests (copyright being automatic and therefore, cheap).

With respect to the question about how government could help increase awareness of the IPR regime, the SMEs all felt that policymakers should provide useful information on (a) how IP law works; (b) developments of legislative developments; and (c) implications for small firms. In particular, it was urged that this information should be freely and widely available, as well as being written in simple, non-legalistic language.

Textiles

In his project on “Design Protection Practices in the Textiles Industry,” Keith Dickson found that the furnishing fabrics industry is extremely fragmented, with SMEs dominating the landscape.⁸⁵ Consequently, the fabric production process entails multiple parties, ranging from firms to individuals, from independent designs through to mills and printers. This results in many fabric suppliers using the same designers, or intermediary firms, which in turn generates among firms a fear over the security of new designs before they reach the market. UK firms felt that their informal domestic communications networks helped to minimize the fear of piracy of designs and to protect their creations without recourse to legal remedies. Dickson concluded, “the frequency of informal interaction between UK firms reinforces the impetus for informal settlements and informal sanctions.”⁸⁶ Stated differently, UK designers rely on copyright and heavily on trust between parties.⁸⁷

Here we revisit the trust mechanism, in an industry in which piracy, according to Dickson is rampant. The reason for reliance on this form of protection within the textile industry mirrors the explanations by electronic publishers for using market niche as a form of IP protection. Electronic publishers who relied on market niche for additional protection explained that given the smaller size of the market, they could depend on their distributors to inform them of similar or unauthorized reproduction of their designs.

In comparison to SMEs operating in the UK, small firms in the U.S. felt that their strong copyright law helped to discourage infringement. In Italy, a perceived weaker law combined with the lack of high-trust relationships between firms engendered a much greater degree of suspicion about their competitors. Furthermore, many Italian firms expressed their despair over frequent allegations of infringement even when they were not involved in such acts. However, with greater competition between designers, original designs, especially computer-produced designs, are becoming cheaper to buy, thereby reducing incentives for design copying.⁸⁸ The research found that in all three countries, textile designers are not familiar with design law and the protection it can offer.

The textiles industry, as already noted above, is fraught with infringement and piracy. According to Dickson, “for designers, a key question is when does imitation become infringement. The problem lies in the use and interpretation of the law.”⁸⁹ The research found that amicable settlements were the common recourse adopted in the UK, with the aggrieved party acting only upon half of the cases of alleged infringement. In Italy and the U.S., less than half of such incidents were acted upon legally, certainly a surprising finding with respect to the U.S. cases.⁹⁰ This finding, however, could, in part, be explained by the size of the companies involved.

The three countries studied differed clearly in their general approach to protection. The U.S. firms tended to register their designs and were confident in the protection afforded by copyright. The UK firms relied extensively on copyright and trust between parties. Few registered their designs. The Italian design firms believed that copyright law in Italy to be weak, and preferred to rely on industry organized arbitration.

In response to a question posed by the researchers “how do designers react when they discover copying, the answers were:

Box 1. Reaction of designers to infringement

Ignorant	“I don’t want to know”
Complacent	“It never happens to me”
Outraged	“It didn’t used to be like this”
Passive	“That’s life”
Aggressive	“Just dare try it”

Source: “How UK textile companies protect their designs” *Intellectual Property Initiative*, 1998, p.2

The aggressive responses tended to come from the larger design firms, which had resources to take legal action. The majority of the other firms, as shown above, were either quietly affronted or quiescent about infringement. The main reasons attributed to the range of responses in Box 1 were:

- high level of informal interaction
- ignorance of legal rights
- cost of legal action; and
- low confidence in securing a favourable judgement.

In sum, textile designers are, on the whole, aware of copyright, and rely on it as a way of protection. They are, however, aware that their traditional faith in negotiations and trust is increasingly under siege as a form of protection with the growing use of digital cameras and computer-aided design software. Although these technologies foster easier copying, Dickson concludes that the use of copyright for protection gives way to inter-personal trust. Given the varying levels of implementation and enforcement of copyright law in Europe, he proposes that the Directive on Copyright and related rights in the Information Society might help to alleviate some regional problems in the design field.⁹¹ Designers are, however, much less aware of the protection that design law can afford them. It can be argued that greater knowledge of it could increase the use of this IPR.

What of patents?

Do patents benefit SMEs

“The patent system is at best an irrelevancy for most small firms, and it can be a major indirect cost. But to say that SMEs are not innovative would be quite wrong” concluded Stuart Macdonald in his research on “What the patent system offers the small firm.” This project sought to discover if the patent system makes a significant contribution to the

innovation of SMEs. It also aimed to investigate if the patent information is a useful source for SME innovative activity and R&D.

This research involved an investigation of 2 substantial groups of SMEs throughout the UK. The participants were surveyed by a postal questionnaire, and several of them were followed up with phone and face-to-face interviews. The first sample was derived from the UK Patent Office's database of UK SMEs, which had been granted at least one patent in the UK or Europe in 1990. Macdonald identified 615 SMEs that had patented. The second sample was based on 2,000 manufacturing firms throughout the UK who were listed in the *Kompass* commercial database. The second sample was used to distinguish non-patenting SMEs from the first sample of patenting SMEs.⁹²

The research found that more than 83 per cent of respondents reported that they were engaged in R&D activities. The indifference of SMEs to the patent system, Macdonald submitted, is "much worse than we ever expected."⁹³ Very few of the surveyed firms attached any particular value to the patent system either as a source of information or as a means of protection. Nonetheless, these firms viewed themselves as innovative. Of the patenting firms, about half did not continue to patent their inventions, and 87 per cent claimed that they would have developed their 1990 inventions (which were patented) without a patent. More than 80 per cent had not licensed their 1990 patent and the vast majority had never licensed a patent from anyone else. The researchers found that the average SME with patent experience was no more keen on the patent system than those without any experience. They also found that those firms that had patented did not repeat the process for their subsequent inventions. Oddly, none of the firms surveyed saw the relevance of copyright, registered designs, trademarks and trade secrets to their innovations!⁹⁴

Box 2 below summarizes the attitudes of SMEs toward the patent system.⁹⁵

Box 2. How SMEs regard the patent system

- Generally too expensive to initiate and too expensive to police. Cost is a major problem.
- The cost of such protection/searches has been a deterrent in the past so any online service which offers cheap access to information would be received gratefully.
- Discussions with colleagues have revealed disillusionment that patents do not protect theft. Procedure needs less red tape and should be cost effective.
- We have had patents, which resulted in expense and no real protection. We now rely on simply being first.
- Over the lifetime of our business I've protected the innovation of the company with 2 pats in 2 fields. The risk of taking out pats has grown considerably and now is almost out of reach of a small company.
- We have found the patent system over complicated and costly and as a result avoid using it.
- We have had patents. There is no purpose, it is very expensive, difficult to police and therefore not practical to us. We rely on being first then leading by innovation progress.
- Once got involved in trying to get a patent. Hopeless – very expensive, very tedious. Would not bother again – ever
- The process moves slowly and pedantically, rather like the law. If a patent was the product the agent was getting to market, most agents would bust.
- We stopped applying for patents in the mid-80s because (a) inadequate patent searches, and therefore inadequate protection in most countries, particularly USA, outside of Europe; and (b) patent applications provide too much intelligence to competitors

Sources: Intellectual Property Initiative “What the patent system offers the small firm”, 1998, p. 3, and “How SMEs use the patent literature,” 1998, p.3.

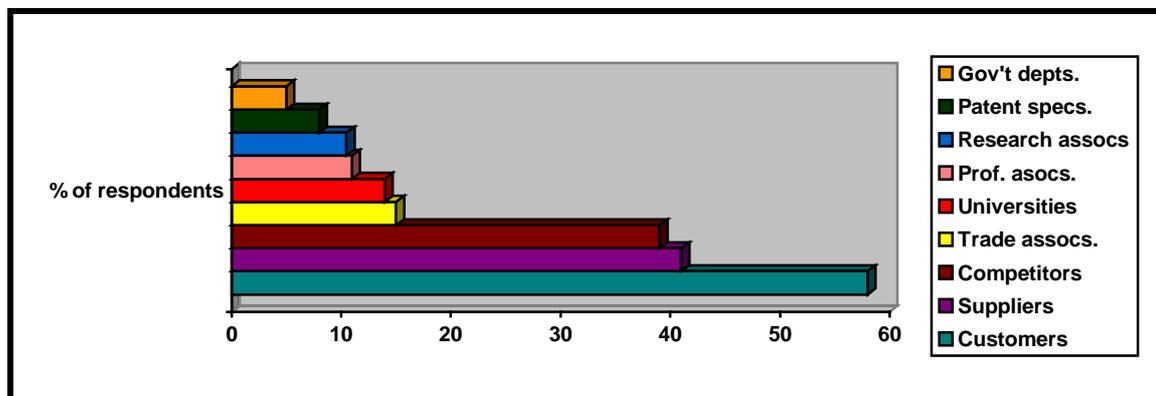
The emphasis about being first to market expressed by the manufacturing SMEs echoes the “lack of infringement concern” articulated by electronic publishers. This finding suggests two conclusions. First, the resources SMEs need for their day-to-day operations and possibly for survival are generally fully stretched. Second, developing first mover advantage is a more practical method of protection than patenting. Supporting this view, a software developer was reported to have said

If our software was taken and people did find out how to configure it they would be all right when they first used it but because of the 6-9 months to really learn it, by the time they have learnt the software they are running a 9 months' out of date version and the version we will be offering will be something completely different because it will have had all sorts of extra features built into it. From that we feel it is almost self protecting because no one is going to put that 9 months' effort into trying to steal a bit of

*software that is going to be out of date by the time they worked out how to use it.*⁹⁶

With regard to the use of patent information as a source of information for innovation, Macdonald reports that patent specifications do not feature highly as such as source. Figure 1 below captures the sources of information SMEs used in their innovative activity. The figure shows that the three main sources of information are, in descending order, from customers, suppliers and competitors. The high degree of reliance placed on the customers and suppliers suggests a somewhat “insular” approach to innovation. Patent information ranks second last to information provided by government departments.

Figure 1. Sources of information for SMEs



Source: Adapted from Intellectual Property Initiative, “What the patent system offers the small firm,” 1998, p. 2

Macdonald concluded that policies and programs “to encourage SMEs to innovate through making more use of the patent system may not be appropriate and are likely to be ineffective as long as SMEs remain insular in their approach to innovation.”⁹⁷ The notion that the patent system is a rich source of innovative ideas, as promoted by the UK Patent Office, appears not to have the expected results. Instead, Macdonald suggests that current DTI programs designed to assist SMEs could be tailored and re-directed, such as “playing down SME’s expectations of what they might get from the [patent] system.”⁹⁸ Macdonald contends that to try to adapt the system to make it more SME-friendly may be a futile exercise because “the existing system is too important to those firms it *does* [sic] help, for which patenting is everything.”⁹⁹

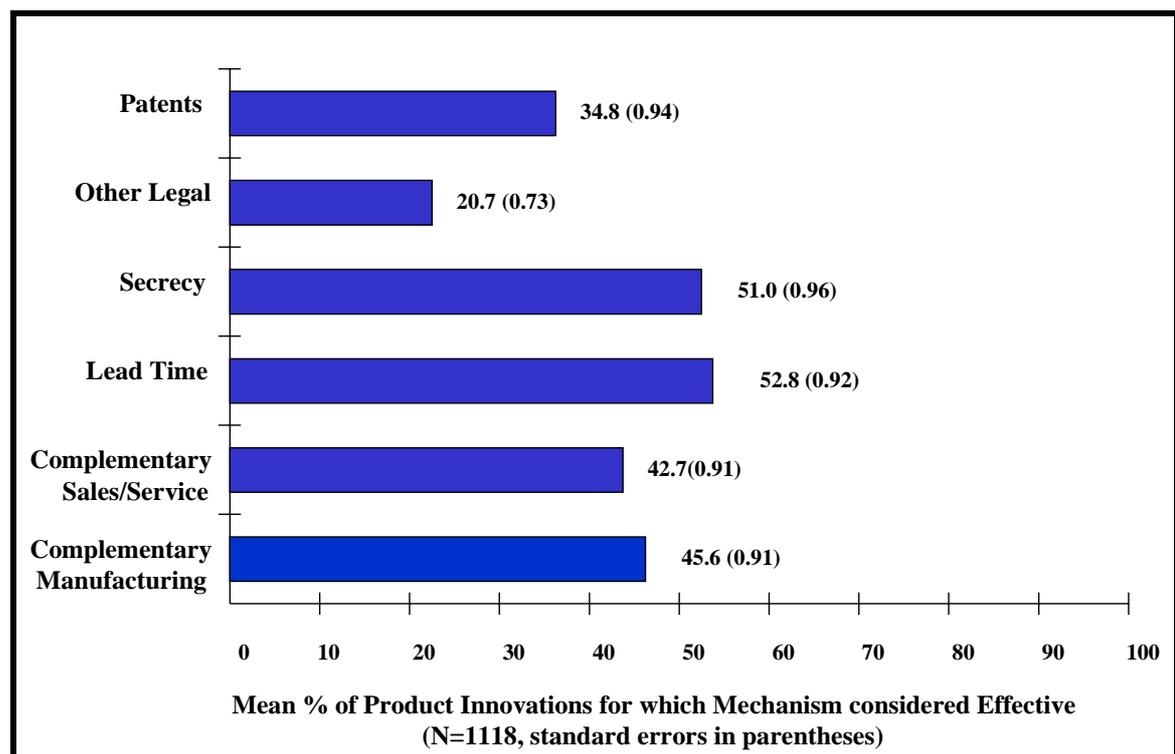
The patent system is indeed important to firms that patent, according to a study undertaken by Stuart Graham and David Mowery on “Intellectual Property Protection in the Software Industry.” Here, however, the researchers focused mainly on the “big players” such as Microsoft, Novell, Borland, Symantec, Hewlett Packard, Toshiba, Fujitsu, Hitachi, NEC and Compaq. Among other objectives, this research sought to find out the patenting propensity of incumbent software developers (founded before 1985) and entrants (founded after 1985). Using a base year of 1990 and a cut-off year of 1997, Graham and Mowery found that incumbents of U.S.

packaged software industry increased their patenting propensities more than entrants during the 1990s.

In contrast, these authors offered no time trend in the patenting activities of the entrants, which according to their findings, actually displayed a sharp decline during 1992-1994, and 1995-1996.¹⁰⁰ Interestingly, Oracle Corporation, a major producer of database software and an opponent of software patenting,¹⁰¹ has “embarked on an aggressive program to secure patents for its software products – primarily to protect itself against potential infringement claims, in the face of a sharp increase in recent years in the number of software patents issued by the PTO [USPTO].”¹⁰²

In another study by Wesley Cohen, Richard Nelson and John Walsh, the authors surveyed 1478 R&D laboratories of various sizes in the U.S. manufacturing sector in 1994.¹⁰³ Their aim was to enquire how these companies protect their IP. Of the mechanisms employed, patents tended to be the least emphasized in the majority of manufacturing industries; instead, secrecy and lead time were noted as a means of protection. The following Figures illustrate their findings.

Figure 2. Effectiveness of Appropriability Mechanisms for Product Innovations

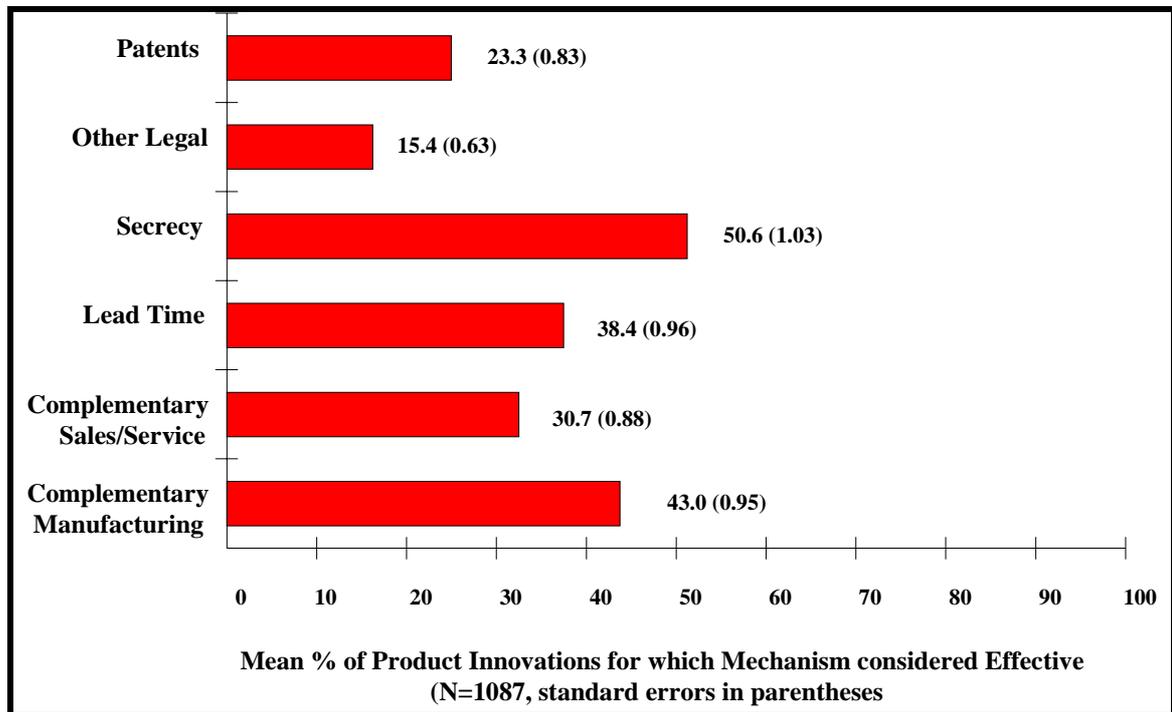


Source: Cohen, Nelson and Walsh, Annex, Figure 1.

The authors found that large firms patented more frequently than smaller ones. Interestingly, however, the motives to patent innovation extended to go beyond the profit incentive; instead, it was to prevent rivals from patenting related inventions, for negotiations and to prevent litigation suits. (Compare with Figure 5 and Figure 6 below.)

Samuel Kortum and Josh Lerner in their comprehensive study on *Stronger protection or technological revolution: What is behind the recent surge in patenting?* found that the marked growth in patenting in the U.S., particularly in the software and biotechnology sectors, is *not* a result of stronger protection that patents afford, but because of the changes in the management of research, resulting in a more efficient R&D process. In particular, they noted that the use of IT tools aided significantly the improvement of their research activities.¹⁰⁴ Barry Riordan of the USPTO, on the other hand, argues that the surge in patent filings is driven by the rapid pace of technological innovations and developments.¹⁰⁵

Figure 3. Effectiveness of Appropriability Mechanisms for Process Innovations



Source: Cohen, Nelson and Walsh, Annex, Figure 2.

An EPO commissioned study in the use of patents found that larger companies, unsurprisingly, tended to patent more than smaller firms.¹⁰⁶ The study surveyed, *inter alia*, the patenting activities of 8,837 “production” companies over the period of 1987-1993. The sample reflected a mix of “old economy, bricks and mortar” industries, such as energy, chemical, food, textiles, automotive engineering, and “newer economy” industries, such as data processing and word-processing equipment (considering them as such) although the overall bias appeared to be toward the former. The study found that over this period, the U.S. demonstrated the greatest increase in patenting activity. Japan ranked second, with Europe’s patenting performance remaining stagnant. Significantly, the EPO study found that patenting activity was concentrated on the whole, on companies of traditional industries.

With respect to SMEs and their patenting activity, the study found similar scepticism expressed by the respondents of the “patent projects” of the *Initiative*. These included the uncertainty over the commercial exploitability of patents, their ability to deter imitation (“cost/benefit ratio” and risk of “piracy”) and lack of resources (“organizational outlay”). Not surprisingly, the study found that bigger firms patented more than SMEs. Specifically, 68 per cent of companies that hired between 500-1000 employees patented, those with 20-99 employees showed a 30 per cent patenting activity, and 23 per cent of firms hiring between 1-19 employees patented their innovations.¹⁰⁷

Again, larger firms used patent information more regularly and extensively than SMEs.¹⁰⁸ The main reason for this pattern exhibited by the SMEs was explained by the lack of resources which included an inadequacy of funds and qualified staff, both of which hindered access to patent documentation.¹⁰⁹

With respect to the effectiveness of patents for competitive purposes, secrecy and getting to market were viewed by the majority of companies who patented as being as important as patent protection. However, in the case of process patents, secrecy prevailed in importance. For non-applicants (firms that did not patent), it was found that secrecy and getting to market were critical in maintaining competitive advantage.¹¹⁰

The findings of this extensive survey reflect the results found in other European (UK included) and American studies noted above. Although the absolute numbers for patenting activity differ from these regions, it is worth noting that the *trends* and *reasons* for use of patents by variously sized firms do not vary markedly. However, the study has established an interesting finding; SMEs appear to display a positive attitude toward *potential* patenting and possess a sound *familiarity* with patent information. (More on this below.)

A recent study done by Mariko Sakakibara and Lee Branstetter on the impact of Japanese patent reform in 1988 to the present showed suggestions by practitioners, government officials and professional documents for patent agents that the patent reform has significantly expanded the scope of patent rights. Yet the econometric analysis undertaken by the authors showed no statistically or economic evidence in the increase in either R&D spending or innovative output that could be significantly attributed to these reforms.¹¹¹

Overall, the findings of the above studies appear to support Macdonald’s unease about attempts to reform or make the patent system more “SME-friendly” because it works as it is for those who use it. The pertinent issue, is therefore, how well does the patent system work for SMEs? And how can the conditions that SMEs operate under be incorporated into attempts to increase their patenting activities? The following *Initiative* project addresses these questions.

Use of patent information as a source of new technology

In a complementary study undertaken by Charles Oppenheim, “How SMEs use the patent literature,” he found that SMEs are “not very interested in patent literature as a source of new technology.... And are more than likely to ignore this literature..... [t]hey get their technology in other ways – by word of mouth, for example.”¹¹² The aim of the project was to identify the most important barriers to use by SMEs, and to assess the potential roles of patent offices, patent libraries, librarian, and information scientists to ensure better use of patent information.

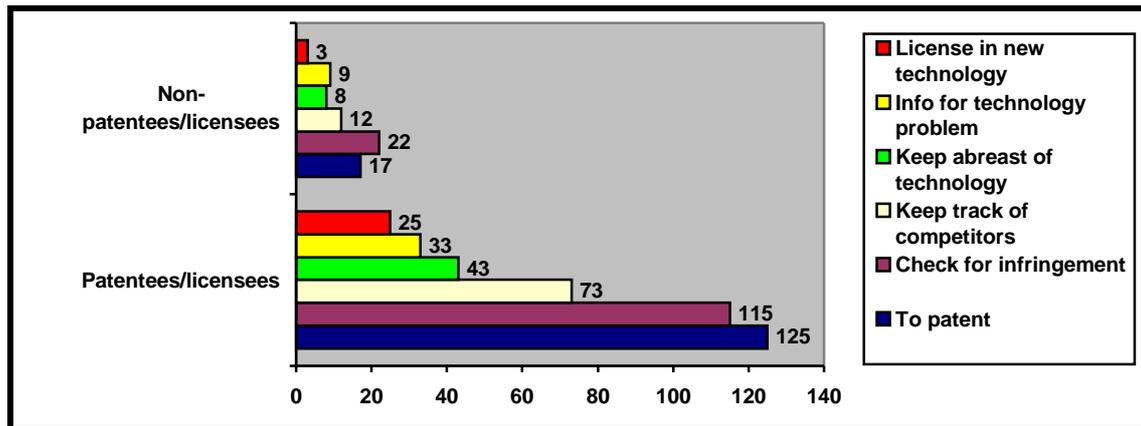
The research involved a mailed questionnaire which, was sent out to 2,500 companies that hired up to 250 employees. In contrast the Macdonald study which obtained a 32 per cent response rate from each of his sample groups, Oppenheim’s survey obtained only a 13.5 per cent response. Oppenheim’s research team also conducted fifty interviews as a follow-up to the questionnaire.

In addition to the usual reasons cited for checking on patent information, Oppenheim’s responses included some novel reasons for SME use of patent information. They were:

- to invent around a patent to avoid it
- for market intelligence
- for problem solving
- for information about process techniques
- for improving the quality of a firm’s own patent application; and
- for avoiding unnecessary R&D costs.¹¹³

Figure 4 compares the responses between non-patentees and patentees. The figures against each bar in the graph indicate the number of companies conducting each type of research. Although a primary goal of the patent system is to disseminate technical information through disclosure, it is worth noting that a majority of the respondents did not give much credence to the patent system as a source of information. Could this finding, however, suggest SME familiarity with patent information, as suggested by the EPO Study? On the other hand, 125 and 115 companies did use patent information to patent an invention and to check for infringement, respectively.

Figure 4 Reasons for conducting patent searches



Source: Intellectual Property Initiative “How SMEs use the patent literature,” 1998, p. 2

Oppenheim advanced several reasons for the under-use of patent information for technological information searches. Box 3 encapsulates the barriers to its use.

Box 3. Barriers to the use of patent information

- Patents are written in a difficult mixture of technical and legal language.
- Patent online searching services are considerably expensive.
- SMEs who would like to conduct more patent searches do not have the time and financial resources, either to start or to increase their level of use.
- Patent information is regarded by SMEs as having no, or low relevance to them.
- SMEs experience difficulties in getting access to patent information.
- it is likely that SMEs who could benefit from using patent information are not aware of its potential.
- Cost of engaging a patent agent in the patent process.
- Perceived irrelevance of patent protection.

Source: Intellectual Property Initiative, “How SMEs use the patent literature,” 1998, p. 2.

Oppenheim advised policymakers wishing to promote the use of patent information to structure their measures in a manner that addressed the variety and segmentation of SMEs in the industrial landscape. Policies that fail to acknowledge this, he suggested, would more than likely fail to meet their objectives.

There are two main reasons for this. First, SMEs can be divided into three categories by their attitudes toward the patent system. They are:

irrelevant – there is nothing in the patent literature that is relevant to them

unaware – SMEs who have no experience of patent information, but could benefit from it; and

aware – this category is further divided into subsets: (a) *avoiders*, who are aware but are disaffected by, or afraid of the patent system and patent information; (b) *offloaders*, who are aware but leave patent searching to the Patent Office, if they apply for patents, patent agents or third party; (c) *learners*, who are beginning to experience the benefit from patent information; and (d) *professionals*, the very small number of SMEs who have sophisticated patent information usage.¹¹⁴

Second, SMEs are a heterogeneous group. As seen above, there are big differences among the patenting activities of these companies, and their respective attitudes about the utility of the patent system. For instance, pharmaceutical and engineering companies tend to patent extensively for protection. In the light of these two characteristics, Oppenheim recommended that the UK Patent Office should focus on providing more access to SMEs, instead of expecting them to work through patent agents. Macdonald's research also reflects how the variety of SMEs and the industrial sectors they belong to affect their attitude about the utility of patents.

In addition, Oppenheim suggested that in seeking to persuade SMEs to the utility of the patent system, using examples of "success stories" was not an effective means of awareness raising. According to him, "this leads to naïve assumptions, particularly by younger proprietors of SMEs, that a patent is the passport to a fortune."¹¹⁵ As this is not usually the case, he opined that such "publicity" could be misleading and unhelpful.

In sum, the project confirmed the low use of patent information by UK SMEs, but identified a strong correlation between the level of use of patent information and the level of use of the patent system for legal protection. On the other hand, with the exception of the pharmaceutical industry, his findings did not establish any correlation between patent information use and the industrial sector within which the companies operate.

Both the Macdonald and Oppenheim projects on the utility of the patent system to SMEs in a broad range of industrial activities reveal that the patent system is somewhat irrelevant to many companies. While this may not necessarily be of grave concern to policymakers, it is NOT to suggest that awareness raising measures will be of little use. Instead, they would benefit companies that know little of the patent system and those who are starting to work with it. Such measures, importantly, would also alert them to the danger of infringing third party patent(s).

What of IPR in general?

The project “How SMEs see their intellectual property rights?” conducted by Robert Blackburn firmly concluded that, “most owner-managers of SMEs are not backward at managing their intellectual property. They may not know the legal jargon but they know what’s important to them.”¹¹⁶ This research entailed telephone and face-to-face surveys with 400 SMEs drawn from the computer software, design, electronics and mechanical engineering sectors, with an emphasis on companies with less than 250 workers. A main aim of the project, among others, was to examine the effectiveness and relevance of current IP systems and investigate sector differences.¹¹⁷ Table 2 below summarizes the use of formal IPR by SMEs.

The numbers in Table 2 do not show the intensity with which individual firms used particular methods of IP protection. On the other hand, Kitching and Blackburn suggest that these numbers could indicate an anticipated market value of an innovation owner’s perception of the relative efficacy of formal and informal protection practices. They could also reflect the availability of, and the willingness of the respondents to use the resources for the acquisition and enforcement of formal rights. For instance, prominent copyright notices (automatic and therefore cheap) were used widely to protect material. On the other hand, business owners were highly discerning in the acquisition of formal rights, such as patents, and were only obtained where the proprietors judged the potential benefits to exceed the potential costs.¹¹⁸

In sum, of the 400 firms surveyed, 270 claimed that they had something they could formally protect. Copyright notices in the case of software and designs were regularly used. Software firms also made extensive use of licensing. In breaking down the methods employed by the 4 sectors, they can be summarized as follows:

- in software, lead time over competitors is rated highly;
- in mechanical engineering and electronics, contractual undertakings are important’
- in electronics, using know-how to ensure that products are not easily copied is rated favourably; and
- market niche which is a common ploy used by all 4 sectors.¹¹⁹

Table 2. Adoption of formal IPR by enterprise size (%)

Method of protection	Micro enterprise (0<10 employees; N=147)	Small and medium enterprise (10<250 employees; N=137)
Any formal rights	82.2	90.5
Registrable rights	43.8	61.6
Trade or service marks	28.8	51.8
Registered design	17.1	31.4
Patents	17.8	29.9
Non-registrable rights	77.4	89.1
Supplier contracts	50.0	74.5
Employment contracts	43.8	75.9
Copyright	50.0	59.9
Licensing	32.9	43.8
Restricted publication	30.8	36.5
Unregistered design	22.6	30.7
Other formal method	2.7	1.5

Source: Adapted from Kitching and Blackburn, p. 330

It is worth noting that Blackburn's study also reports on the widespread use of trust and market niche. His research shows that there is a distinct preference of SMEs in these sectors to resort to informal methods of protection. For each of the four sectors examined, a majority of firms maintained that they preferred to rely on relationships to ensure that their specialist knowledge is not stolen. Table 3 below provides further details about the types of informal protection methods that SMEs tended to adopt.

As Table 3 shows, forging high-trust relationships with customers and suppliers reflects both a method of conducting business and mode of IP protection. It is indeed intriguing that Blackburn's data show the highest figures for trust-based modes of informal protection. His findings concur with Tang's figures on informal methods, which showed trust as the fourth most relied upon form of protection by electronic publishers, and Dickson's conclusion that such relationships represent how designers protect their

IP. Taken together, the findings of these studies support the work done by scholars on the role of trust in business relations.¹²⁰

Blackburn's data also show that about 55 per cent of the reporting firms relied on market niche; again compare this with Tang's figure on this mode of protection. In the latter case, however, market niche is cited as the most favourable form of informal protection. Such a practice is probably an appropriate avenue for protection in a market that is characterized by rapid technological changes, such as in electronics, software and electronic publishing. As was discussed in the case of electronic publishing, the threat of bad publicity against infringers, is also regarded as a significant protection mechanism. Unsurprisingly, the use of technical systems of protection, such as reflected in "copy protection" and "dongles" in Blackburn's data rate highly as an informal approach to protecting IP.

Table 3. Informal methods of IP protection

Informal method	Micro enterprise (0<10 employees; N=146)	Small and medium enterprises (10<250 employees; N=137)
Trust relationships	81.5	75.9
Maintain lead time	59.6	65.7
Build specialist know-how	60.3	56.9
Market niche	55.5	56.9
Spreading information across staff	39.7	62.8
Copy protection	47.6	48.6
Limited key information to selected staff	32.9	47.4
Membership in "watchdog" organizations to prevent copying	15.8	27.7
Threat of bad publicity	15.8	24.1
Dongles	17.3	9.7
Design and Artists Copyright Society	22.9	4.8
Other informal methods	11.6	9.5

Source: Adapted from Kitching and Blackburn, p. 332.

Blackburn contends that there is little evidence to show that the limited use of formal rights has had any adverse effect on SME innovation or the protection of their IP. With respect to the use of formal methods, he concludes that the medium sized firms are more likely to adopt formal rights than smaller firms, in part, because they generally have more resources, knowledge and experience in dealing with the IPR system.

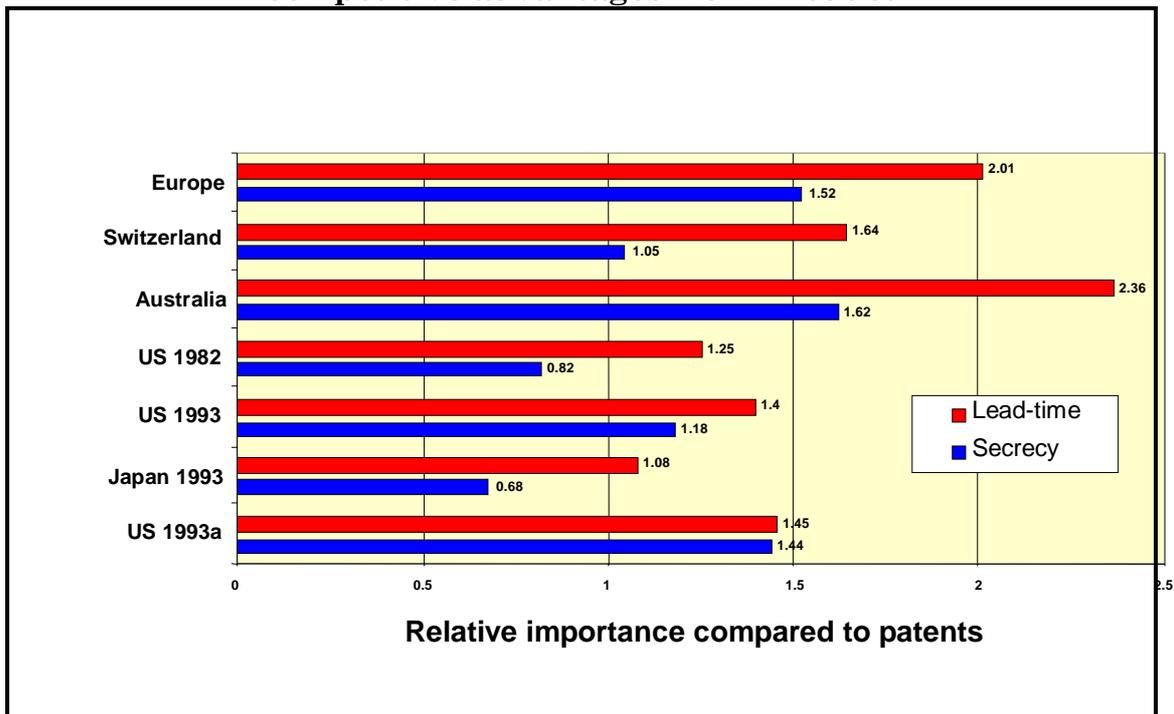
Owner perception about the cost and benefit of acquiring formal IPR was also a factor. These findings seem to reinforce a conclusion of Oppenheim about the heterogeneity of SMEs.

As was noted above, owner-managers tend to use formal methods of protection only in very specific instances where high commercial benefits are anticipated from the exploitation of their IP. Moreover, formal rights, particularly patents, are used largely as deterrents to infringement, rather than as a means of seeking legal redress. The majority of firms interviewed and surveyed reported that even when success was probable, they would not be inclined to litigate because of the high cost of the litigation process.¹²¹ Instead, as with most of the SMEs surveyed above in the various *Initiative* projects, they preferred to use their resources for product and process innovation, and first mover advantage, rather than acquiring and defending formal IPR. Elaborating on this point, an owner-manager of an electronics firm employing 5 workers noted:

*We tend to be very focused on supplying good value product to a customer, getting it there on time or getting the development done quickly so that they can get to market on time. I think that is the biggest issue, is being there, doing it and the bureaucracy doesn't add to the sale of the product. It doesn't add to the value. It just diverts you from going out there and selling it or developing it or whatever. Leave the bureaucrats to sit there and push paper about. We will put together products and push them out to the market and sell them.*¹²²

Reflecting the use of formal methods of IP protection, the European Commission *Innovation Policy in a Knowledge-Based Economy* addressed this issue in terms of the effect of “non-IPR appropriation strategies” on innovation versus the effect of patenting on innovative activity. This study did not directly address modes of informal protection. Yet, the findings on the use of secrecy and lead-time compared to the use of patents in gaining competitive advantage do, in a sense, resemble the results of the *Initiative* projects regarding preferred adoption of informal methods by SMEs.¹²³ It is worth noting that part of this analysis was based on the European Commission 1993 Community Innovation Survey. Figure 5 and Figure 6 show how secrecy and lead times compare to patenting as a means of creating or preserving competitive advantage from innovation.

Figure 5. Relative importance of secrecy and lead-time earning competitive advantages from Product



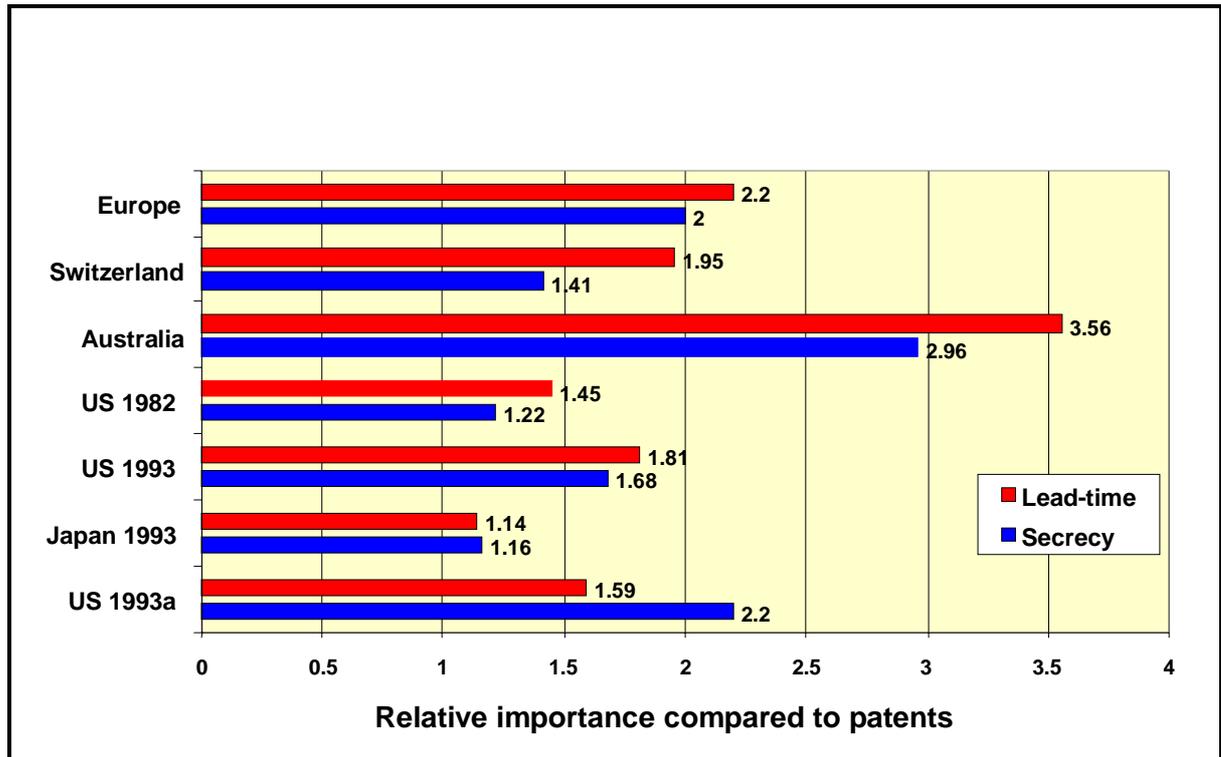
Source: European Commission, 2000, p. 61¹²⁴

The figures for Europe are based on input from of 5,147 innovative firms in Belgium, Norway, the Netherlands, Ireland Denmark, Luxembourg and Germany of varying sizes. The figures for U.S. 1993a and Japan 1993 have been standardized to the same industrial distribution so that the results are directly comparable. A value of 1.0 indicates that the method is of equal importance to patenting. The figures show that lead-time, or first mover advantage, is consistently higher than secrecy. As well, both reflect a higher use than that of patenting.

It is indeed interesting to note that even with the inclusion of larger companies, such as those with more than 500 employees, lead-time and secrecy prevail over patents as a mode of protection, or as a means for competitive advantage. The European Commission's findings, therefore, do not in essence, conflict with the findings of the *Initiative* projects with respect to IP protection mechanisms. These findings also question the popular belief that patenting could help to develop and maintain competitive advantage.

Oppenheim and Blackburn have also discussed the importance of the relationship between the size of the SME and its propensity to patent, given the heterogeneity of these smaller companies. Figure 7 presents the findings on the importance of patents for competitive advantage by firm size. This Figure, as with Figure 5 and Figure 6, is based on the European Commission report on *Innovation Policy in a Knowledge-Based Economy*.

Figure 6. Relative importance of secrecy and lead-time for earning competitive advantages from Process innovation



Source: European Commission, 2000, p.62.

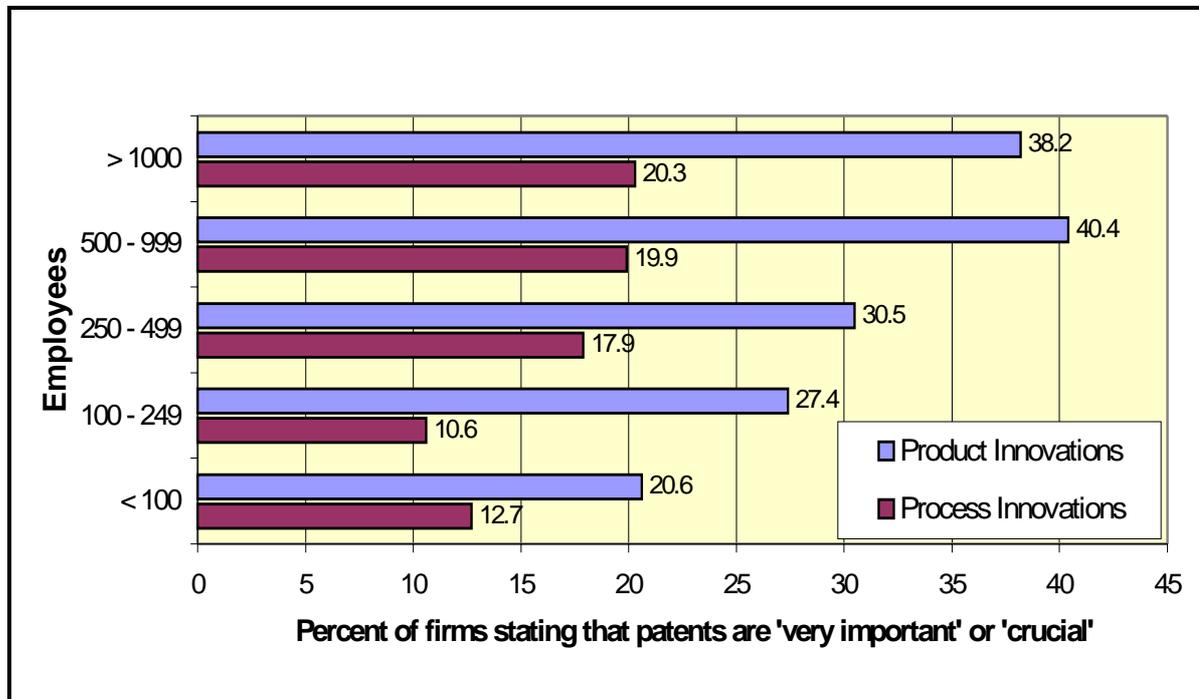
The figures in Figure 7 reveal a clear trend of patenting among the surveyed companies. There is a clear correlation between company size and patenting activities. For instance, 38 per cent of the surveyed firms with over 1000 employees reported that patents are “very important” or “crucial” to maintain competitive advantage. On the other hand, only 20 per cent of firms with fewer than 100 employees regarded patenting as such.

The corresponding responses can be partly explained by the financial resources that larger firms have for the patenting process, such as that required for applying, maintaining and enforcing, whereas as already noted above, smaller firms have usually limited resources for legal expertise and services. As already discussed earlier in the other patent-related *Initiative* projects, smaller companies regard the cost of using the patent system, that is, filing, maintaining and defending a patent as prohibitively high. In an interview conducted by Blackburn, an owner-manager of an electronics company, employing 7 workers voiced this sentiment.

Obviously, it [the patent system] is prejudiced against the small company because of costs involved. Costs of a patent are much higher for a small company. I think one of the reasons we are not very keen on patents is that they are expensive to service initially, and certainly on an annual basis renewal fees. And if someone infringes it then you have got to have quite a substantial funding behind you to be able to defend it. If a big company goes after it and its goes to the High Court you could be looking at a

*£50,000-£100,000 bill and to offer that you have got to weigh up the risks of whether or not you are going to win and who is going to pick up the costs. Patents are OK but unless you have the funding to defend it then you have got to be slightly cautious about whether or not it is worth it.*¹²⁵

Figure 7 Importance of Patents for Competitive Advantage by Firm Size



Source: European Commission, 2000, p. 63.

These factors, combined with perceptions about the ambiguous utility of obtaining a patent, tend to lead SMEs to consider other forms of IPR or informal protection method. Furthermore, larger firms often have in-house patent offices, which implies that they patent routinely as long as they do not expect the value of the patent to exceed the costs of disclosing information.¹²⁶ These reasons notwithstanding, it could be argued that smaller companies, in addition to having limited financial resources, see a lesser need for patenting because of the niche markets within which they operate.

Simply put, for SMEs to make greater use of the patent system, they need to meet a combination of conditions. First, that they believe that the innovation has a high potential commercial value. Second, they must be convinced that a formal right will offer superior protection to informal methods. Third, SMEs do not usually have the resources to engage in the patent process. The findings of the *Initiative* research projects suggest that most firms do not generally meet all the conditions.

What of service firms and IPR?

Services encompass a broad spectrum of activities, ranging from retailing, architectural, software consulting, engineering and to public services such as the mail system and public transportation. In comparison to studying

innovation in manufacturing, innovation in services is relatively under-explored, in large part, because services seldom produce a tangible product. With the proliferating use of Information Technology in the delivery, use and composition of services, innovation undertaken in the service sector is beginning to move centre stage in research agendas. Still, to date, exploration of this issue is less than that of manufacturing.

The way in which firms operating in the services sector are managing their IP is a topic in need of much further research. In another *Initiative* project “How knowledge-based services manage their Intellectual Property,” Ian Miles attempted to study this important but poorly understood issue by focusing on three service sectors: accounting, architectural and engineering. His research was based on case studies and a telephone-assisted mail survey of 50 companies engaged in each of these three sectors. It should be noted that the sample was not restricted specifically to SMEs, but also included a few large accounting firms.

In his analysis Miles distinguished the way in which firms protected their IP and innovations on the basis of formal IPR and informal methods of protection. *It is interesting to note that figures reported in Table 4 below for use of copyright as a formal method protection range between zero per cent in the “Always” category to 90 per cent in the “Never” category. This prompts one to question if the service firms that were surveyed know that copyright is automatic. Alternatively, these responses may suggest that the respondents were referring only to the use of copyright notices that accompany the delivery of the service product?*¹²⁷ Nonetheless, this ambiguity suggests a need for IPR awareness raising measures to highlight the automatic nature of copyright.

The data provided by Table 4 also suggest that services firms may patent more frequently than it is generally assumed. For instance, more than one third of the respondents from the environmental engineering sector report using patents at least some of the times. However, when compared to informal methods of protection, there is a preponderant use of the latter. To this end, Miles concluded that relations with other organizations and employees, and professionalization featured more significantly than formal IP mechanisms.¹²⁸ Table 5 depicts the types of informal methods of IP protection adopted by service companies, as well as the frequency of their use.

Miles’ research suggests that patents, in particular, are generally perceived to be less suited for protecting much of innovative activities conducted by service companies. Yet as more financial and engineering services, for instance, incorporate software into their activities, it is likely that they may make a greater use of formal IP protection mechanisms. This is partly because, as discussed earlier, business methods (as in the case of the U.S.) and software that produces a technical effect (as in the European patent system) are patentable,

A German study, comparing services and manufacturing in terms of perceived barriers to innovation reported that service firms, saw imitation

as a barrier to innovation. In the software sector, in particular, more than 40 per cent of the software firms highlighted a concern with imitability.¹²⁹ A study on service and manufacturing firms done in Italy also reported similar results. Of a list of 15 factors hampering innovation, service companies ranked “risk of imitation by competitors” last.¹³⁰

In sum, it can be safely conjectured the level of software-based activity has grown remarkably in the last 2-3 years with the “take-off” of Internet-based electronic commerce. There can be little doubt that this form of commercial activity has spawned a burgeoning sector of software-based service applications, including Web design, retailing, financial services, inventory management, auctioning, and security systems. The jury is still out as to whether this new breed of service providers will, in the main, adopt the patenting route in Europe. The results from our survey may help to identify if a trend toward the patenting of software-based service applications by European SMEs is emerging.

Table 4. Use of formal IPR methods (% of each group)

Level of use of method	Copyright	Design rights	Patent	Trademark/ Company name
Accountants, 1-14 employees				
Sometimes	10.0	0.0	0.0	30.0
Never	90.0	100.0	100.0	70.0
Accountants, 15+ employees				
Always	0.0	0.0	0.0	12.8
Sometimes	5.1	0.0	0.0	20.5
Never	94.9	100.0	100.0	66.7
Architects, 1-14 employees				
Always	65.4	30.8	0.0	26.9
Sometimes	26.9	34.6	0.0	19.2
Never	7.7	34.6	100.0	53.8
Architects, 15+ employees				
Always	68.0	40.0	0.0	36.0
Sometimes	28.0	36.0	0.0	8.0
Never	4.0	24.0	100.0	56.0
Environmental Engineers, 1-14 employees				
Always	7.1	0.0	7.1	14.3
Sometimes	21.4	14.3	42.0	28.6
Never	71.4	85.7	50.0	57.1
Environmental Engineers, 15+ employees				
Always	7.1	12.6	6.3	25.0
Sometimes	34.4	43.8	28.1	50.0
Never	43.8	43.8	65.6	25.0

Source: Ian Miles, Birgitte Andersen, Mark Boden and Jeremy Howells, p. 117.¹³¹

Table 5. Informal Methods of IP by service firms (% of each group)

Level of use	Agreement with partners	Agreement with suppliers and end users	Work with trusted partners	Internal working practices	Lead-time advantage	Embody knowledge in products	Membership of prof. assocs.
Accountants 1-14 employees							
Always	11.1	0.0	44.4	20.0	10.0	30.0	30.0
Some-times	33.3	38.3	11.1	70.0	40.0	40.0	70.0
Never	55.6	66.7	44.4	10.0	50.0	30.0	0.0
Accountants 15+ employees							
Always	12.8	2.8	33.3	48.7	10.3	23.1	64.1
Some-Times	38.5	48.7	33.8	48.2	46.2	48.7	33.3
Never	48.7	48.7	12.8	5.1	43.6	28.2	2.6
Architects 1-14 employees							
Always	3.8	3.8	19.2	11.5	3.8	19.2	61.5
Some-times	57.7	30.8	53.8	50.0	23.1	26.9	23.1
Never	38.5	65.4	26.9	38.5	73.1	53.8	16.4
Architects 15+ employees							
Always	16.0	4.0	16.0	44.0	4.0	20.0	56.0
Some-Times	52.0	56.0	64.0	28.0	52.0	40.0	20.0
Never	32.0	40.0	20.0	28.0	44.0	40.0	24.0
Environmental Engineers 1-14 employees							
Always	35.7	7.1	35.7	35.7	28.6	28.6	7.1
Some-Times	42.9	64.3	42.9	14.3	35.7	35.7	7.1
Never	21.4	28.6	21.4	50.0	35.7	35.7	85.7
Environmental Engineers 15+ employees							
Always	21.9	25.0	28.1	28.1	18.8	18.8	15.6
Some-Times	68.8	65.6	65.6	50.0	53.1	59.4	53.1
Never	9.4	9.4	6.3	21.9	28.1	21.9	31.3

Source: Ian Miles, Birgitte Andersen, Mark Boden and Jeremy Howells, p. 118.

A note on other European national programs on IPR awareness-raising

This section provides a brief overview of programs introduced by three Member States of the EU. These initiatives are aimed at broadening the awareness of IP-related matters among SMEs, in particular, with a focus on the patenting process.

Germany

The Federal Ministry of Education, Science, Research and Technology (BMBF) established in 1995 the five year INSTI Project to contribute to the creation of an increasingly inventor-friendly atmosphere in Germany, with the aim of accelerating and improving the exploitation of results from R&D into marketable products. Intending to conclude it in 2000, the Ministry has extended the program indefinitely.¹³²

Measures

The INSTI project conducts several programs, (see below) but the *INSTI SME Patent Action*, which was established in 1996, is aimed particularly at SMEs. This Action targets SMEs with less than 250 employees, with an annual turnover of at least DM18 million (approximately 40 million euros), and an annual balance sheet of less than DM54 million.

The objectives of the Action are twofold. First, it is designed particularly to illustrate the benefits of patenting and to improve the understanding by SMEs of this form of protection. The use of patent and scientific-technical databases can help to avoid bad investments and preclude two or more companies working on the same new product, as well as to provide up-to-date information on technical developments and the patent situation and technical developments on inventions and specific technical fields, respectively.

Second, it provides financial assistance to SMEs who wish to find out more about the patenting process and undertake the fundamental steps required for patenting. In addition to the criteria for eligibility of the grant as noted above, the SME must not have patented in the last 5 years, since the establishment of the program. Furthermore, the R&D has to be undertaken by the company itself, or in conjunction with other parties. SMEs that have 20 per cent equity held by a third party are eligible; subsidiaries of large companies, however, are not.

To date, almost 2000 grants have been awarded, SMEs can be recompensed for 6 areas with respect to the patenting process. They are:

1. enquiring about “the state of the art” with respect to developments in technical fields;
2. undertaking a cost/benefit analysis of patenting;

3. paying for the cost of a patent attorney and the Patent Office's administrative fees (if applicable);
4. investigating the means of exploitation of a patent through a search of suitable partners and conduct of market analysis;
5. paying for the cost of a patent attorney to file for a patent abroad; and
6. the preparation and submission of an enquiry to establish if a "technical approval" is required for a product, which is distinct and different from applying for a technical approval, which is not covered by the program.¹³³

The program reimburses the party 50 per cent of the cost for each of the 6 measures undertaken. The Ministry will pay

- ➔ DM1500 for enquiring about the state of the art;
- ➔ DM1500 for undertaking a cost/benefit analysis;
- ➔ DM4000 for costs of a patent attorney and the Patent Office
- ➔ DM1500 for exploring the means of exploitation;
- ➔ DM5000 for costs of a patent attorney to file a patent abroad; and
- ➔ DM1500 for the preparation and submission of an enquiry

In the event that an applicant does not expend the whole grant awarded for any of the 6 steps, he/she may apply the balance to any other of the 6 steps. The balance may not be used for any other purpose.

The INSTI Project managed and co-ordinated by the Institut der deutschen Wirtschaft Köln,¹³⁴ established a nation-wide network of service and advisory organizations and companies, collectively known as the INSTI Partners. The network consists of patent attorneys, regional patent information centres, information brokers, business consultants and technology transfer centres. This network provides services throughout the whole of Germany, which include providing information on IPR related issues, such as on patents, trademarks and other forms of legal protection, training in using patent databases, and costs of obtaining a patent.¹³⁵

Another leading example of INSTI activities is the *INSTI-Innovationsbörse*, an electronic database run by the BUSINESS GmbH, one of the INSTI Partners. Interested companies or individuals can consult this database if they are interested in putting their new products on the national or international market, or to search for business opportunities and partners. The database also compiles offers and demands of technologies, R&D services, licences, manufacturing, commercial agreements, agencies, joint ventures and investments in all industrial sectors.¹³⁶

INPAT is a special support project that aims to improve student's knowledge of the patent system and the use of patent databases. This is done by expanding the engineering and natural sciences curriculum to include a primer on the patent system. *INPAT* is managed by the

Association of German Engineers (VDI) and supports financially compulsory courses on patent legislation as well as trains junior academic staff to become “information commissioners” and to use patent databases.

There is also an *INSTI Inventor’s Club*. INSTI Partners have already established more than 26 INSTI Inventors Clubs. These clubs offer a platform for the exchange of experience and advice for inventors and young creative individuals. The rationale behind this activity is the belief that creativity and entrepreneurship would benefit from financial and “knowledge” support.

The *INSTI Innovation Training* activity is aimed at improving innovation management, developing creativity techniques, and providing patent and information management. The long-term aim is to increase innovation activity in Germany. Training is provided through various modules, which also include classes on enhancing communication skills and organizational processes. The first pilot seminars started in spring 1997.

Denmark

The Danish Ministry of Trade and Industry published a study on new trends in industrial property rights, entitled *Industry Policy in Denmark* in 2000.¹³⁷ The study, which reviewed the working of the Danish IPR regime, offered several suggestions to make patenting, in particular, easier and cheaper for Denmark. Help for SMEs with the patenting process was identified as a key issue, as there were other central measures with which the Danish Government sought to undertake.

Measures

From its analysis of SMEs and their record of patenting, the Danish Ministry outlined recommendations for assisting smaller companies to use the patent system. The Danish fees represent only a very small proportion of the total cost of the patent process in Europe. Yet, according to the Ministry, there is evidence that the level of patent fees in Denmark as well as in Europe influences the decision of many smaller enterprises and private inventors not to patent their inventions, despite the better solution that patents could offer.¹³⁸

Against these findings, the Danish government intends to carry out an analysis of the situation to consider if there is a basis for extending financial assistance to Danish SMEs and private inventors to encourage them to use the patenting system. An associated aim is to reduce the translation requirement that is currently needed to apply for a European patent. The Government believes that translation imposes a distinct cost and burden on SMEs. Significantly, several measures proposed by the Danish Government reflect those being contemplated by the European Commission, such as by Internal Market Commissioner Frits Bolkestein, for a single European Union patent.¹³⁹

The Danish Government is also intent on maintaining a qualified Danish IPR authority. While Denmark supports the continued development of a

sound European patent system, it is determined to implement steps to ensure that the Danish Patent and Trademark Office remains rigorously competent in the field of IPR.

This must be achieved by preserving and developing the Office's core skills in the IPR field in order that it can continue to process applications for IPR, furnish information on IPR systems, provide an innovation service and other business services, and tackle special IPR assignments for Danish enterprises. In addition, the Danish Patent and Trademark Office, in order that it performs optimally, must co-operate with other authorities and institutions engaged in government funded research and activities connected with the promotion of innovation.

In conjunction with the above, the Danish Government intends to pursue is the strengthening of Danish courts when dealing with IPR disputes. In April 1999, the Ministry's Committee on Enforcement of IPR concluded that a need exists for improvement of the law enforcement of patent rights in Denmark. It also noted that the number of Danish courts capable of hearing patent lawsuits should be reduced so that a smaller number of courts could accumulate more experience in dealing with IPR lawsuits. Specifically, it was proposed that the High Court of Eastern Denmark should be nominated as the competent body to hear the first stages of patent disputes, with the Bailiff's Court under the City Court of Copenhagen hearing all patent related injunctions.¹⁴⁰ The Committee also suggested that both kinds of cases need to be heard by judges with a technical background, as is done in the UK, Sweden and the Netherlands. This is necessary so those judges can competently assess the contents of a particular set of patent specifications.

In order to act upon the proposals by the Committee, the Danish Government will analyze the possibilities of employing technically skilled judges for patent infringement proceedings and the possibility of reducing the number of courts involved in patent proceedings. More specifically, these suggestions will be simultaneously considered in detail with the current work of the Standing Committee on Procedural Law which is examining the administration of civil justice.

In addition to supporting a move to introduce an EU wide "central" court to deal with patents, the Danish Government is also urging the European Commission to investigate the possibility of setting up a European insurance scheme. Insurance schemes of this nature have previously been tried unsuccessfully in Sweden, the UK and other markets and have failed because of the lack of a critical mass of customers in each national market. The Danish Government argues that a European scheme would more than likely create a larger demand for insurance.¹⁴¹

In particular, a European insurance scheme would secure for patent-holders the financial means of litigating against infringers. Many enterprises, especially among SMEs, tend to avoid taking legal action, even if there is a likelihood of a successful defence of their rights. This behaviour is largely influenced by the prospect of heavy costs and valuable

time incurred in such cases. The Danish Government has found that the rights of many Danish enterprises are infringed both in Denmark and abroad and widespread support among the business community for a European insurance scheme. The Danish proposal for an insurance scheme may also include trademark infringements so as to broaden its coverage.

In its review of the Danish IPR environment, the Danish Ministry also concluded that the country needed to develop a “strong IPR culture” through Government support and encouragement. To do so, Government will address 5 broad areas:

- help to develop skills and providing practical experience with protective strategies;
- encourage enterprises to assess the value on their IPR and promote the development of more reliable methods of evaluation;
- generate better terms for utilizing patent information during the early phases of the innovation process;
- make universities and researchers more aware of the potential in using the IPR system; and
- take steps to ensure that familiarity with IPRs and their potential are given greater emphasis in the educational system.¹⁴²

In order to address the lack of exploitation of public research results and the inadequate knowledge of the patent process by academics, Government passed the Act on Inventions of Public Research Institutions in 1999. The rules for funding technology incubators were also tightened by requiring clear clarification of the rights that could be associated with the research results. The Danish Patent and Trademark Office has also offered help to universities and institutions of higher education to meet some of the challenges posed to their management by the 1999 Act. These include, for example, identifying the commercial potential of research results, assessing business potential, and ensuring the most appropriate way of protecting the invention via the IPR system.

Government is also encouraging wider introduction of IPR education in universities. It also supports the idea of directing educational efforts directly toward children and young people, as is done in Japan, Australia and the U.S., such as by tailoring their websites specially to children and young people by including e.g. interactive games.

France

A French study, known as the *Lombard Report* also advances suggestions, with an emphasis on ways to develop a “patent-friendly” environment and encourage SMEs, in particular, to patent their innovations.¹⁴³ The study rightly acknowledges that throughout the world, including advanced economies such as Japan and the U.S., SMEs encounter specific difficulties in acquiring patents. This problem, is however, particularly

marked in Europe, and especially in France. Only 25 per cent of French industrial organizations have acquired more than one patent.

In particular, the study highlights the “insufficiently developed” IPR regime in France.¹⁴⁴ It argues specifically that SMEs must be encouraged to patent their inventions and to be educated to the benefits of patenting. Given the pace of globalization, the study contends that the “protection of IPR within the sovereign territory of France is inadequate.”¹⁴⁵ To ameliorate this perceptibly dire situation, the study advanced a few recommendations for improving the IPR regime, with a focus on measures to assist SMEs to use the system more effectively.

Measures

The study advances 5 policy proposals, which are aimed at:

- establishing a patent policy that is part of a pan-European innovation policy. To achieve this, the role of the EPO should be enhanced. In addition, a Europe-wide patent regime could replace the domestic patent office;
- developing within France a more favourable patent environment.
- reducing the cost of patents, as well as decrease the level of taxation on returns (revenues) from patents. In addition, there is a need to find the solution of translation of patent applications;
- reinforcing the protection of IPR by enhancing reliance on the GATT TRIPs Agreement (Trade Related Aspects of Intellectual Property) and considering the harmonization of the international patent system. The introduction of a litigation insurance scheme could also be considered and the judicial system could also be made more efficient; and
- adapting the regulation of IP to deal better with the “diverse modalities” of research and newly emerging technologies, such as biotechnology and new software applications.¹⁴⁶

These measures, to a large degree, reflect the Danish measures, for instance, the suggestion that France should work in concert with Europe in strengthening the IPR regime, as well as attempt to make the patenting process more “user friendly.” The study contends that pan-European measures could contribute to the improvement of the French IPR regime.

Specific measures aimed at SMEs were also outlined, particularly with respect to assisting SMEs and other individual inventors to obtain their first patent. A way of achieving this is to develop and provide these parties with “diagnostic tools” for evaluating their needs in order that they may be encouraged to apply for a patent. A first step would be to provide SMEs with help in auditing their industrial property so that such an exercise may reveal the potential of a patent(s) from among their portfolio.

Another measure at promoting the use of the patent system is for appointed public officials to meet personally with company directors of

SMEs, with the aim of explaining to them the benefits of patenting, and to assist them with any related information. In much the same vein as that of the German *INSTI* project and the Danish recommendations, the *Lombard Report* is clearly signalling the crucial role of information in helping SMEs use the patent system.

To create incentives for individual inventors to exploit their inventions and innovations, the study recommends that help be provided to SMES to seek out potential industrial and commercial partners. This again reflects the *INSTI Innovationsbörse* and the *INSTI Inventors Club*.

It is quite apparent that there is timely “soul searching” on the part of France and other EU Member States to reinforce their IPR regime and to promote a flourishing “IPR culture” so that their innovative and inventive activities can be duly recognized and rewarded. As with public measures for improving any particular activity, the political will to achieve the stated objectives need to be accompanied by resources to ensure their implementation.

Summary

In response to the question posed earlier, “*are SMEs aware of the IPR system*”, all the *Initiative* projects discussed above illustrate that this indeed the case. It may be said, however, that when it comes to IP law, “the devil is in the detail.” SMEs undoubtedly have an awareness of it and its implications for their businesses. An extract from an interview conducted with an owner-manager of an electronics company employing 49 workers offers a revealing summary on the degree of knowledge SMEs have about formal IP protection.

We've been very selective about what we have applied for patents for in the past because of the sheer cost of maintaining these, which rises steeply over the 11 years. We knew we couldn't afford to patent absolutely everything that we felt needed defending. So we select the prominent ones and even while we were doing that we were mindful that we just didn't want to give away details of certain items. We would take the risk of not patenting it, using prior knowledge as defence, as a protection.....I think we've got a policy that any other means of protection other than patents first. A patent is a waste of time. It's only worth investing in a patent if you can afford to fight for it. It may do some good in other terms, of frightening people off to see a patent number on it, but the man that's really going to run with it, to take it is the guy that's going to look at you. He's going to get the D&B [Dunn & Bradstreet] out, which tells you everything about the company.....So they look in they and they say “oh yes, we squash this one. They won't be able to find the resources.” And truly they can't.¹⁴⁷

Government interest in the promotion of IPR awareness on the part of SMEs, as reflected by the UK Government-funded (specifically the Department of Trade and Industry) the *Initiative* program, is also demonstrated by other European Union initiatives. For instance, the *INSTI* project conducted by the German Ministry of Education, Science, Research and Technology has a wide-reaching scheme to develop such

awareness, with a focus on the patenting process. The Danish Government, in reviewing its industrial policy, is concentrating on measures to improve and strengthen its “IPR culture” through various measures, such as ensuring the competence of its judicial system to handle patent infringement cases, and the promoting IPR education. Many of these measures are also reflected in the Lombard Report. For instance, SME-specific actions to encourage the use of the patenting system by small firms include the appointment of public officials to meet directly with firm directors to explain to them the benefits of patents.

PART III

There is undoubtedly a good case for new measurement tools and methods to analyse service innovations, such as software technology

Miles, et al,¹⁴⁸

The Methodology

This study has concentrated on the general level of awareness among SMEs of prevailing systems for protecting IP with regard to computer software. It has focused specifically on copyright and patents as methods of protection. To investigate how software developers are appropriating their intellectual creations, we employed qualitative and quantitative research techniques. These consisted of:

1. a review and analysis of primary and archival documents (Part II);
2. a questionnaire distributed to representatives of European-based SMEs, public research organizations, and large companies, all of whom are involved in computer software development; and
3. follow-up interviews with selected firms and organizations from the survey sample.

The information obtained about the patentability of computer software from these qualitative and quantitative sources facilitated the development of a more detailed understanding of software related IPR issues. Importantly, our data analysis from the survey and interviews provides additional perspectives on how software developers regard the utility of patents as a means of IP protection.

The Questionnaire

The questionnaire for this study was distributed to potential respondents. (See Annex 1 for a copy of the questionnaire.) Its three primary aims were to identify:

1. how SMEs and other organisations protect their computer software-related IP;
2. the reasons why particular forms of IP protection are adopted; and,
3. the types of 'informational' measures that may be of assistance to SMEs for IPR related matters.

The questionnaire was divided into four sections. **Section 1** consisted of five descriptive questions pertaining to the specific organizational characteristics of the entities that individual respondents represented. These questions sought to identify:

1. the year in which the respondent organizations were established so as to provide an indication of whether their attitudes towards software patentability were influenced by their vintage;

2. their size, in terms of employee numbers;
3. their ownership structure to establish if the kind of ownership is a factor in their IPR strategy;
4. the products and/or services whose provision they viewed as their core business; and
5. their target clients.

The reason for using the above factors as a basis for comparison rested on an assumption that they may have the potential to influence IPR strategies and attitudes regarding the patenting of computer software.

Section 2 presented sixteen questions, which focused on:

1. the respective organizations' approach to protecting its software-related IP;
2. the frequency with which each organization sought to patent its software-related inventions;
3. the rationales underpinning decisions for seeking, or not seeking, patent protection for software creations;
4. the perceived advantages and disadvantages of copyrighting software; and
5. whether each organization had either initiated, or been subject to, litigation for software related IP infringement.

Querying the participants about how they appropriated their IP was regarded as a means of identifying the strategies used by SMEs, and other organizations. In addition, an analysis of the responses to the above issues served as a means of ascertaining why particular forms of IP protection are adopted for software creations.

Section 3 consisted of a series of seven statements for which the participants were asked to indicate whether, or not, they agreed. These statements focused on broader issues associated generally with perceptions of the potential benefits, or lack thereof, from patenting computer software, as well as the types of 'informational' measures that may be of assistance to SMEs for IPR related matters. In addition, a "Comments" section was included at the end of the questionnaire. Its purpose was to provide an opportunity for the respondents to make any additional remarks regarding the issues addressed in the survey.

The Survey

Participation in this survey was restricted to European-based organizations that develop computer software. Our aim was to obtain completed questionnaire responses from a total of 50 firms (SMEs and large companies) and public research institutions (PROs), which reflected representation from various Member States. Included within the groups of respondents contacted were representatives of organizations based in England, Scotland, Ireland, France, Belgium, the Netherlands, Italy,

Germany, Spain, Denmark, Ireland, Portugal, Sweden, Greece, and Finland.

Whereas the selection of public research institutions was based primarily on personal contacts, the SME's and large companies approached for this study were selected from the following sources:

1. SPRU database of electronic publishers;
2. The Pan European Exchange (EASDAQ): <<http://www.easdaq.com>>;
3. The London Stock Exchange Alternative Investment Market (AIM): <<http://www.londonstockexchange.com>>;
4. The Computer Services and Software Association: <<http://www.cssa.org.uk>> (this organization has several European affiliates);
5. *hemscott.NET Group* plc., Online business and investment information service: <<http://www.hemscott.net>>;
6. Wright Investor Web Site: <<http://www.corporateinformation.com>>; and
7. Personal contacts.

Prior to distributing the questionnaire, we contacted the potential respondent organizations directly to: (i) identify the most appropriate party to whom we could explain the purpose of our project and questionnaire; and (ii) to enquire if he/she would be willing to participate in our study. In the majority of instances initial contact with potential respondents was made by telephone, however, in some cases email messages were used.

In the light of recent research suggesting that there are negligible differences between response rates for email and 'snail' mail administered surveys, we offered individuals a choice as to whether they preferred to receive the questionnaire via email or through the post.¹⁴⁹ As an incentive to respond, potential respondents were offered a summary report of our survey findings. In addition, they were assured that any information they provided would (i) treated with the utmost confidentiality; (ii) not be passed on to any third parties;¹⁵⁰ and (iii) be non-attributable because the data collected would be aggregated to ensure the respondents' anonymity.

Ten days after distributing the survey, we sent follow-up messages via email to the potential respondents who had not yet returned their completed questionnaires to us. In the cases of those who did not respond to our first reminder, we sent a second follow-up message 20 days after the initial distribution of the questionnaire. Where possible, we also followed up with telephone reminders.

Data analysis

Despite their initial agreement to respond, and our attempts to remind them of their commitment, several respondents declined, subsequently, to

participate in the study. Therefore, the findings of our analysis of the survey data should be regarded as *illustrative* of the perceptions of companies and PROs with respect to the patenting of computer software.

Among the most frequently cited reasons offered by potential respondents from SMEs and large companies who chose not to participate in our study were concerns about confidentiality and a lack of available time. In addition, many of the large companies we contacted did not wish to disclose the name of the appropriate individual within their organization to approach regarding our study. Instead, they required us to write a non-personalized formal letter to their corporate headquarters requesting their organizational participation in our study. We were informed that once our letter had been received it would be forwarded to the relevant department(s), at which time a decision about their participation would be taken. Despite complying with these instructions, none of the firms who had made requests of this nature, responded to our inquiries.

Many of the representatives of the PROs we contacted also declined our request to participate. The reason given in most of these instances was that their respective organization did not have any official position vis-à-vis the protection of its IP, and that therefore, they and/or their colleagues were not in a position to respond on behalf of the organization.

A summary of the response rates obtained for each category of respondents is provided below in Table 6.

Table 6. Summary of Response Rates

Respondent Group	Number contacted	Number of Responses	Response Rate
SMEs	40	12	30%
Public Research Organizations	40	8	20%
Large Companies	20	3	15%

Organizational Characteristics of Respondents

The survey findings about the ownership structure of the participant SMEs were somewhat ambiguous. Although the vast majority of the SMEs we contacted were listed either on EASDAQ, or other European-based stock exchanges, most of their respective representatives indicated that they represented privately owned companies. With the exception of one SME that had been financed initially through a government subsidy, initial financing for all of the remaining firms in this group was raised through the acquisition of private capital (i.e. private capital raised by founders, bank loans). Only 25 per cent of these firms reported that they had attempted to fund subsequent growth through venture capital. In terms of age, three-quarters of the participant companies reported to have been in business for more than five years.

Approximately two-thirds of the respondent SMEs targeted their products/services to large business clients (see Figure 8). A summary of the SMEs core businesses is provided below in Figure 9. The three most common core businesses, listed in descending order, were: software development (i.e. systems integration software, computer aided design (CAD) software, human resource management software) – 24 per cent; electronic commerce applications – 18 per cent and consulting services – 18 per cent. In addition, 75 per cent of the respondent SMEs indicated that their respective organization sold its software in markets outside of the European Union.

Within the PRO group, only one respondent indicated that his organization targeted its products/services to large business clients. Of the remaining PROs, two noted that their products/services were aimed at medium sized business clients, four reported that they did not restrict the types of clients targeted, and one did not provide a response for this particular part of the questionnaire. Given that each of the entities in this group had strong university affiliations, it was not particularly surprising to find that all the PRO representatives indicated that their respective institution's core business focused primarily on information technology related research and education. It is worth noting, however, that approximately three-quarters of the organizations comprising this group also attempted to commercially exploit their respective software creations by selling them in markets outside of the European Union.

All of the representatives of the large companies who participated in our study indicated that their products/services were targeted at large business clients. The primary core businesses of these participants were the development of systems technology, security applications, and hardware. Each of the organizations represented in this group also sold its software products in markets outside of the European Union.

Figure 8. The SME Respondents' Target Clients (N=12)

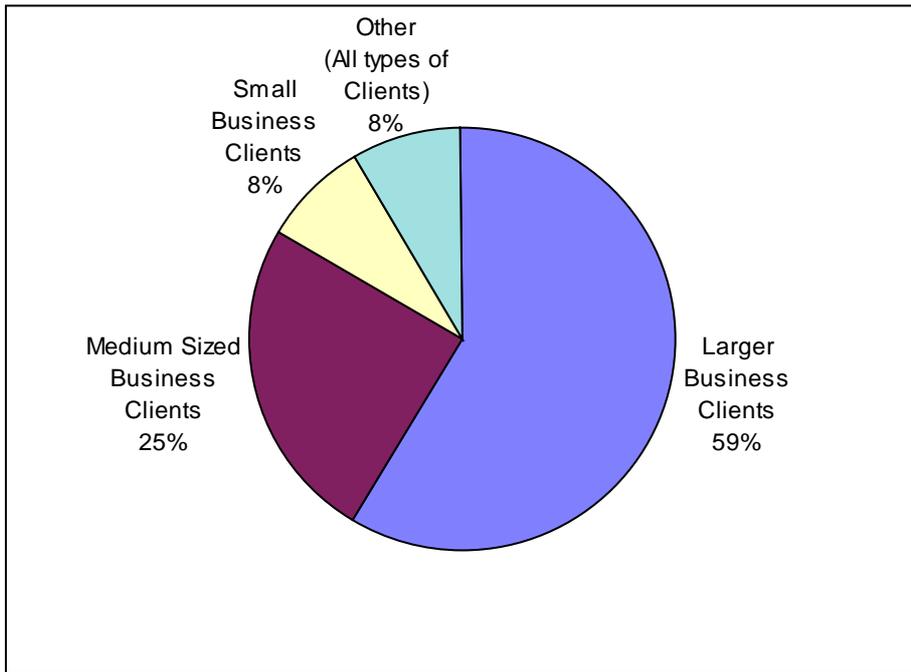
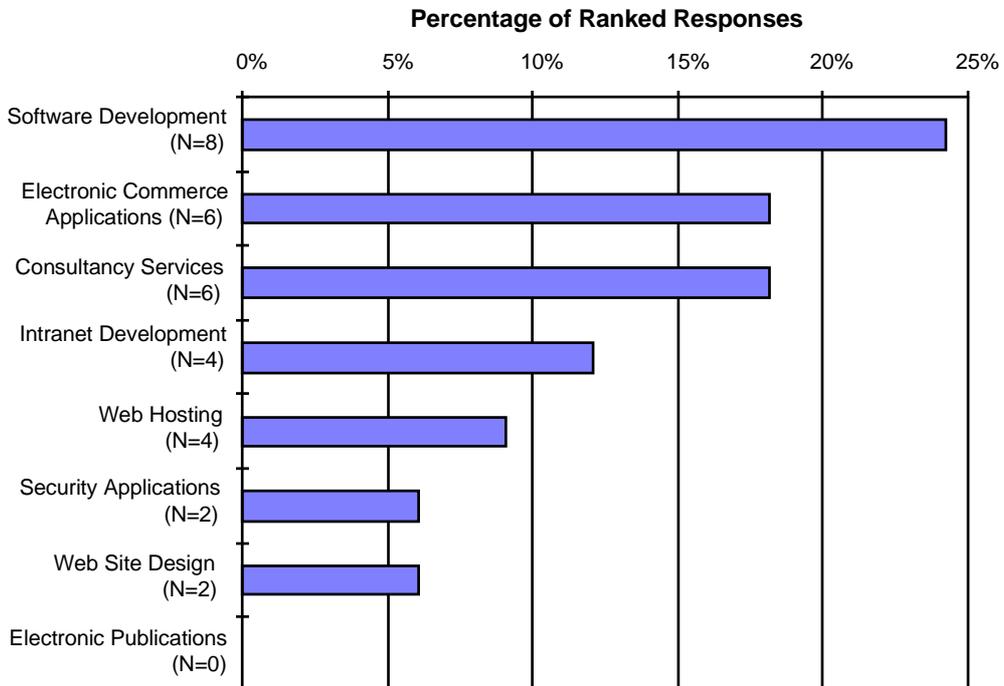


Figure 9. Ranked Order of SME Respondents' Grouped Core Businesses



Concerns Regarding Software Protection

The data presented below in Table 7 show the ranked primary concerns of all the respondent organizations *vis-à-vis* the protection of their software creations. The data suggest that SMEs and large companies are most concerned about the unauthorized use of their computer software inventions. A participant representative from a large company particularly noted that the primary software protection concern of his organization was competitors taking ‘ideas’ from its products. Drawing on their support for an Open Source approach to software creation and distribution, some participant SMEs ranked the creation and implementation of ‘unwanted legislation’ as being among their primary concerns.

In contrast to the anxieties of the two above groups, an analysis of the data obtained from PROs suggests that their main concerns regarding IP infringements focus on the unauthorized duplication of their software creations.

Table 7. Ranked Concerns About Protecting Software Creations

	Unauthorized Use	Unauthorized Duplication	Unauthorized Distribution	Reverse Engineering	Other
SMEs	28%	24%	23%	14%	11%
PROs	18%	35%	26%	21%	0%
Large Companies	29%	10%	26%	22%	13%

Strategies for Protecting Software Creations

All of the individual representatives of large companies that participated in our study indicated that the protection of software creations is a major concern, and that their respective organizations had adopted an active software protection policy. An active policy included adopting various mechanisms for IP protection and keeping abreast of IP legal and regulatory developments. In contrast, only three-quarters of the SME representatives expressed similar concerns about the protection of their respective software creations. It was somewhat surprising to find, however, that three of the organizations that claimed that protecting their software creations was a major concern indicated that they had not adopted an active protection policy. Within the PRO group, fewer than 50 per cent of respondents from this group expressed concerns about protecting their software creations and only two entities reported that an active protection policy had been implemented.

What of SMEs and protecting software?

Paralleling some of the conclusions of the *Intellectual Property Initiative* projects that were discussed in Part II, the information provided below in

Table 8 appears to support the notion that, despite making only limited use of patent protection, SMEs have an awareness of the prevailing systems for protecting their IP. The data show that 27 per cent of the SMEs ranked licensing as the most important means of protection; 24 per cent SME respondents declared technical systems of protection as the most important, with patenting (8 per cent) being utilized the least often.

Copyright was ranked third, with 21 per cent reporting that they regarded copyright as their prime means of protection. This lower figure is indeed interesting as it could suggest that SME software developers are aware of the “vulnerabilities” of copyright, as explained below. On the other hand, it also could suggest that further “copyright education” might be needed, given that copyright protection is indeed a “basic” form of protection to all literary works, including software. At the same time, the data suggest that SMEs could benefit from information on the wide availability of technical systems of protection.

Only one quarter of the SMEs indicated that they were aware of the fact that the European Patent Office has expanded the scope of software-related inventions that may be patented, that is claims to a program are now possible. Similarly, only one respondent SME organization indicated that they had used the European patent system to protect some of their software inventions.

Table 8. Methods for Protecting Software Creations – SMEs

Method of Protection	SME Use of Method (% , ranked according to importance and effectiveness)
Licensing	27
Technical Systems of Protection	24
Copyright	21
Trademark	12
Patenting	8
Other (i.e. Self-Hosting, Open Source, No Protection)	8
Total	100

With regard to using copyright as a method of IP protection for software creations, the respondent SMEs seemed to be well aware of the advantages and disadvantages of this method of protection. Despite the lower figure for the importance of copyright, the data presented in Table 8, show that members of this group perceived the three main advantages of this particular form of IP protection to be:

- ☞ it offers a sufficient means of protection (25 per cent);

- copyright law is less complicated than patent law (25 per cent); and
- no evidence of prior art is required (25 per cent).

Despite these perceived advantages, the data in Table 9 suggests also that the respondent SMEs were equally aware that the level of protection offered by copyright is relatively weak (44 per cent). Furthermore, it can be easily infringed upon (25 per cent) when compared to other methods of IP protection.

Further analysis of the data obtained from the survey, revealed that 83 per cent of the SMEs either had never attempted to acquire a patent for their software-related inventions, or seldom did so. The results presented below in Table 10, reveal three of primary reasons underpinning this course of action. They are:

1. the patenting of software is not seen as offering a competitive advantage (27 per cent);
2. other methods of protection are seen to offer sufficient protection (27 per cent); and
3. a lack of familiarity with using the patent system (27 per cent).

The third explanation points clearly to the need for an enhancement of the general level of awareness of the European patent system among SMEs. Moreover, the two other responses, as listed above, appear to echo the views expressed by SMEs about the limited relevance of “patent roadshows” in Oppenheimer’s (1998) study (already discussed in Part II).¹⁵¹ Simply put, our findings suggest that SMEs might perceive attempts to promote the view of patenting to be the route to successful commercialization of software products as rather disingenuous.

Table 9. Perceived Advantages and Disadvantages of Copyright

Advantages (N=16)	SME Responses (%)	Disadvantages (N=16)	SME Responses (%)
1. Copyright provides a sufficient means of protecting our software creations.	25%	1. Copyright provides only a weak means of protection our software creations.	44%
2. Copyright law is less complicated than patent law.	25%	2. Copyright law is more complicated than patent law.	6.3%
3. Copyright does not require evidence of prior art.	25%	3. Copyright is easily infringed upon.	25%
4. Copyright is indicative of a sufficient level of innovativeness.	12.5%	4. Copyright does not indicate high degree of innovativeness.	6.3%
5. Copyright promotes innovation as effectively as patents.	12.5%	5. Copyright does not promote innovation as effectively as patents.	12.5%
6. Other (ie. Copyright is automatic)	0%	6. Other (i.e. Does not protect against third party creation)	6.3%
Total	100%	Total	100%

Table 10. Reasons for Varying Levels in the Use of Patent Protection

Always/Very Frequently Patent (N=2)		Seldom/Never Patent (N=10)	
Reason:	SMEs	Reason:	SMEs
1. My organization supports the patenting of software	20%	1. My organization is opposed to the patenting of software.	4%
2. My organization has the resources required to partake in the patent application process.	20%	2. My organization does not have the resources to partake in the patent application process.	15%
3. Patenting software provides my organization with a competitive advantage.	10%	3. Patenting software would no provide my organization with a competitive advantage.	27%
4. Other methods of protection do not provide sufficient protection for our software.	10%	4. Other methods of protection provide sufficient protection for our software.	27%
5. My organization is familiar with using the patent system to protect software related inventions.	20%	5. My organization has little familiarity with using the patent system to protect software related inventions.	27%
6. Other (i.e. Patents provide economic return on R&D investment)	20%	6. Other (i.e. Give software away and subsequently generate income from consultancy services)	0%
Total	100%	Total	100%

The views expressed in the “Comments” section of the questionnaire, coupled with the information obtained in the follow-up interviews with the representatives of the participant SMEs provide additional insights into their apprehensions about software patentability. For example, some SME respondents noted that their respective organization’s lack of use of the patent system was related, in part, to two important factors. The first was the belief that the incremental nature of innovation *vis-à-vis* computer software is incompatible with patenting. Supporters of this view noted that, since computer software is based on algorithms, instances wherein the achievement of a desired end is restricted to only one approach are extremely rare. Therefore, even if a patent exists for a particular software invention, other ways of achieving the same end are likely to be developed. Consequently, some SME representatives claimed that in the light of the limited life span of most software applications, the time required to put together software patent applications was better spent trying to bring new applications to market as quickly as possible.

The second factor was based on the belief that the patenting of computer software is akin to a *double-edged sword*, an analogy already referred to in Part II. On the one hand, SME participants recognized, for the most part, that the ownership of software patents might assist them in acquiring both venture capital and corporate financing.¹⁵² In addition, when interviewed, a representative from a company that licenses much of its software to entities outside of Europe made an interesting remark. He pointed out that in his firm’s experience, the willingness of American and Japanese based potential clients to invest in a license for software was becoming increasingly contingent upon that software being patented. The notion that the ownership of software patents might facilitate licensing, however, was not widely supported by several SMEs in our study who license their software primarily to entities within Europe. Representatives of these companies tended to emphasize the fact that, at present, when negotiating software licences with European clients the issue of patents very rarely arises.

Despite recognition by respondents of the potential investment benefits that software patents might confer, this was tempered by a strongly held view that the ownership of such patents would not help them to compete against other industry players. The perceived lack of competitive advantage to be gained by software patents was linked repeatedly to a belief that, SMEs lack, generally, the financial resources required to defend themselves against any legal challenges to the validity of the patent(s) they might own. Only one of the firms we interviewed felt that the ownership of patents would help them to expand in terms of revenue and market share. The representative of this company pointed out that the potential benefit of patent ownership in this context was related directly to the taxation laws of the country within which they are based. Specifically, within this particular country, the royalties derived from patented creations are granted a tax-free exemption. The remaining interviewees asserted that either it was too difficult to tell if the

ownership of patents would help their respective company to expand in terms of revenues and market share, or that they could see no relationship between these benefits.

The comments that one individual wrote in the final section of the questionnaire summarizes succinctly SME apprehensions about software patentability. He wrote:

Fast moving businesses, like almost all SME software businesses, work and grow at such a rate that following up their own legal rights is a distraction. You can make more money, faster, by just doing something else and getting on with it. The only possible exception is if a big company steals an idea and proceeds to make a lot of money from it – but your chances of bringing a big company to book on this is effectively zero.

The difficulty with defending one's legal rights for SMEs was also illustrated by the answers the respondents provided when queried about whether their respective organization had ever initiated legal action against another party for software related IP infringement. Only three of the respondents within this group indicated that their company had, at one time, pursued this course of action. In one instance legal action had been initiated for patent infringement, while the two other cases were for copyright infringement.

An analysis of the data obtained from the questionnaire revealed also that none of the respondent organizations had themselves ever been subject to litigation for software related IP infringements. Interestingly, in the follow-up interviews it was often noted that although the patenting of computer software would provide a much stronger form of IP protection than copyright, it would not facilitate the policing or enforcement of IPR. Furthermore, it was repeatedly argued that patent protection would not lighten, in any way, the difficult task of ensuring one is not infringing on a third party's IPR.

What of Public Research Organizations and protecting software?

The information provided below, in Table 11 shows that within the PRO group, the two most commonly preferred methods of IP protection, in terms of ranked importance, for their software creations are copyright (29 per cent) and licensing (24 per cent).

Table 11. Methods for Protecting Software Creations - PROs

Method of Protection	PRO Use of Method (% , ranked according to importance and effectiveness)
Licensing	24
Technical Systems of Protection	17
Copyright	29
Trademark	6
Patenting	12
Other (ie. Self-Hosting, Open Source, No Protection)	12
Total	100

Paralleling our findings for the SME group, one quarter of the respondents in the PRO group indicated that they were aware that the European Patent Office has expanded the scope of software-related inventions that may be patented. Moreover, two of the PROs indicated that they had used the European patent system to protect some of their software creations. Also reflecting the findings for the SME group, the data for ranked importance of the methods of protection show that only 29 per cent of the PRO respondents regard copyright as the most important means of protection.

Again, as with the SMEs, the PROs appeared to be aware of the advantages and disadvantages that copyright protection offer. The data provided below in Table 12, show that the representatives from the PROs believed copyright law to be less complicated than patent law, and were of the opinion that copyright offered a sufficient level of IP protection. Significantly, the latter two were regarded as being the most advantageous aspects of copyright protection. However, the respondents reported that despite these perceived advantages, copyright as a form of protection is easily infringed upon (33 per cent), and that it does not promote innovation as effectively as patenting (28 per cent).

Only one institution within the PRO group indicated that it attempted frequently to patent its software creations. The three primary explanations given by the other respondents for not patenting computer software related inventions were (see Table 13):

1. a belief that others modes of IP protection provide a sufficient level of protection (29 per cent);
2. a preference for giving away software creations and generating income from consultancy services thereafter (21 per cent); and

3. a lack of familiarity with the patent system (21 per cent).

Although none of the PROs had ever initiated legal action against another party for software related IP infringement, when taken as a whole, our PRO-related findings suggest that SMEs might not be the only entities that would benefit from a drive to enhance awareness of the European patent system.

Table 12. Perceived Advantages and Disadvantages of Copyright

Advantages (N=14)	PRO Responses	Disadvantages (N=18)	PRO Responses
1. Copyright provides a sufficient means of protecting our software creations.	22%	1. Copyright provides only a weak means of protection our software creations.	22%
2. Copyright law is less complicated than patent law.	43%	2. Copyright law is more complicated than patent law.	0%
3. Copyright does not require evidence of prior art.	7%	3. Copyright is easily infringed upon.	33%
4. Copyright is indicative of a sufficient level of innovativeness.	14%	4. Copyright does not indicate high degree of innovativeness.	17%
5. Copyright promotes innovation as effectively as patents.	7%	5. Copyright does not promote innovation as effectively as patents.	28%
6. Other (ie. Copyright is automatic)	7%	6. Other (ie. does not protect against third party creation)	0%
Total	100%	Total	100%

Table 13. Reasons for Varying Levels in the Use of Patent Protection

Always/Very Frequently Patent (N=1)		Seldom/Never Patent (N=7)	
Reason:	PROs	Reason:	PROs
1. My organization supports the patenting of software	20%	1. My organization is opposed to the patenting of software.	7%
2. My organization has the resources required to partake in the patent application process.	20%	2. My organization does not have the resources to partake in the patent application process.	15%
3. Patenting software provides my organization with a competitive advantage.	20%	3. Patenting software would no provide my organization with a competitive advantage.	29%
4. Other methods of protection do not provide sufficient protection for our software.	20%	4. Other methods of protection provide sufficient protection for our software.	7%
5. My organization is familiar with using the patent system to protect software-related inventions.	20%	5. My organization has little familiarity with using the patent system to protect software-related inventions.	21%
6. Other (ie. Patents provide economic return on R&D investment)	0%	6. Other (ie. give software away and subsequently generate income from consultancy services)	21%
Total	100%	Total	100%

What of large companies and protecting software?

Copyright and technical systems of protection were the most often cited means of protection used by members of the large companies surveyed. Each of the organizations comprising this group indicated their awareness that the European Patent Office has expanded the scope of software-related inventions that may be patented. However, only two companies had used the European patent system to protect some of its software creations.

An analysis of the data obtained from large companies suggests that they too value the automatic “granting” of copyright. However, they viewed this particular form of IP protection as failing to

1. be indicative of a high degree of innovativeness;
2. promote innovation as effectively as patents; and,
3. protect from infringement by independent third party creations based on similar ideas.

Only one company did not attempt frequently to patent its software inventions. With regard to initiating legal proceedings against a third party for patent infringement, only one company indicated it had undertaken such actions.

Perspectives about Software Patenting and “IPR help”

The final section of the questionnaire consisted of a series of seven statements relating to broader issues associated with the patenting of computer software. Four of these focused specifically on perceptions of the patentability of computer software. The three remaining statements related to the types of ‘informational’ measures that may be of assistance to SMEs for IPR related matters. The participants were asked to indicate whether they agreed, disagreed, or had no opinion about the issues raised.

The data provided below in Table 14 suggest that, overall, SMEs appear to be the group that is the most apprehensive about the patenting computer software. These concerns are also reflected in the indecision of SMEs regarding the potential benefits that might be derived from a shortened patent life, and/or a reduction in the costs associated with applying for a patent.

Table 14. Perspectives on Software Patenting

Statement:	SMEs (N=12)			Pubic Research Organizations (N=8)			Large Companies (N=3)		
	Agree	Disagree	No Opinion	Agree	Disagree	No Opinion	Agree	Disagree	No Opinion
1. Patenting software promotes innovation.	3	5	4	2	3	3	2	1	0
2. The Linux/Open Source movement is a threat to the European software industry.	1	8	3	0	6	2	0	3	0
3. SME's would benefit from a shortened patent life.	3	2	7	2	2	4	1	1	1
4. The cost of European software patent applications is prohibitively high.	3	0	9	2	0	6	1	1	1

Given the highly contentious nature of the debates surrounding the issue of patenting computer software, particularly with respect to business method patents, it was not surprising to find that the opinions of participants were divided as to whether the patenting of computer software helps to promote innovation. For example, in an open comment to the questionnaire, one respondent expressed the rather extreme view that, “software patenting is going to kill innovation” because among other reasons it will “provide a huge advantage to US industry which already owns the majority of the software industry and is very familiar with patenting and use of [the] legal system to kill the competition.”

Another individual expressed the view that, “patenting of software can actually discourage innovation because other software developers cannot put in new features from competitors”. In contrast to these comments, a third respondent who also represented an SME, expressed his organization’s apparent support for the patenting of computer software by suggesting that it “doesn’t necessarily prevent innovation but can make larger companies reward those whose initial ‘spark’ began the process”.

Although opinions are divided about the impact of software patenting on innovation, in the follow-up interviews with the SME respondents most agreed that the issue of software patentability is likely to become an increasing concern for their respective organization. In line with the *double-edged sword* analogy noted above, a high degree of uncertainty was expressed about whether the focus of these potential concerns would be concentrated on the positive or negative consequences of software patenting. This finding conforms to the extant literature pertaining to the ambiguous effects of patenting that are discussed in Parts I and II.

Furthermore, based on the perspectives expressed by the interviewees, it seems plausible to conclude that in spite of the excitement regarding “Internet patents” or business method patents, younger SMEs are no more anxious to obtain patents for their respective software creations than their older counterparts. This arguably, could be seen as raising some doubt about the extent to which we are in a “pro-patent era.”

In terms of keeping SMEs and other organizations abreast of new developments in European patent policy, the findings of our survey suggest that a greater effort needs to be extended in this direction (see Table 15). Only one-quarter of the participant SMEs surveyed support the view that the European Commission has been successful in keeping SMEs aware of IPR-related developments. To this end, in the follow-up interviews we learned that only one participant SME referred regularly to patent information when seeking to develop new software products. The remainder of the interviewees reported that their respective organizations never, or only very rarely, consulted the above information resources.

It is worth noting that Blackburn’s findings from his project “How SMEs see their intellectual property rights,” (referred to in Part II) also provide some insight into how governments might enhance the use of the patenting system by SME’s. He found that in spite of the high level of

attention given to SMEs by the British government, the latter very rarely sought advice about the protection of IP from the DTI or other government departments, Business Links, and Technical Enterprise Councils.¹⁵³ Instead, SMEs tended to seek advice directly from the UK Patent Office, which has produced several brochures on IP protection for SMEs.¹⁵⁴ This could imply that persistent attempts by IP authorities to explain what the patenting system entails could help encourage more SMEs to use this form of protection.

Table 15. Success of Efforts to Keep SMEs Aware of New Developments in European Patent Policy

Statement:	SMEs (N=12)			Pubic Research Organizations (N=8)			Large Companies (N=3)		
	Agree	Disagree	No Opinion	Agree	Disagree	No Opinion	Agree	Disagree	No Opinion
1. The European Commission is successful in keeping SMEs up to date about recent developments in European Patent Policy.	1	10	1	2	4	2	1	1	0
2. The European Commission IPR Help-desk is a useful resource for my organization.	0	4	8	4	0	4	0	0	3
3. My organization is aware of the European Patent Organisation database service called esp@cenet.	2	6	4	4	2	2	2	1	0

With regard to PROs, a majority of representatives from the institutions that participated in our study indicated that the Commission's activities in this realm had not been, on the whole, successful. However, and in contrast to the views expressed by the SME representatives, approximately one half the PROs surveyed did note that they found the IPR Help-Desk to be a useful resource, and that they were aware of *esp@cenet*, as many of them are involved in Commission funded research projects.

As might be expected, keeping abreast of IP law and IPR-related developments was not found to be a problem for large companies. It is clear that with respect to patenting issues, large companies have the expertise and resources to deal with them effectively.

When taken together, the findings presented above, in Table 14 and Table 15, serve to strengthen our belief that there is a need to increase awareness levels among SMEs and PROs about the issue of software patenting. Specifically, the relatively high numbers of "no opinion" responses to Statements 1 and 4 in Table 14, suggests that much more could be done by the European Commission to improve upon effective measures for informing SMEs and PROs of new developments in European patent policy developments, as well as other IPR-related developments. This, combined with the high rate of "disagree" and "no opinion" responses to all the statements listed in Table 15, provides a clear signal that more widely publicized efforts on awareness raising could be undertaken.

Summary

The analysis of the data obtained from our survey and follow-up interviews suggests that there is a real need to enhance awareness, among SMEs and PROs, of the issues associated with the patenting of computer software. In spite of their avowals of the effectiveness of other methods of IP protection, and their perceived lack of ability to defend patent-related litigation, we conclude that more "practical education" could help to dispel some of their concerns with, or lack of knowledge of, the software patentability issue. SMEs are often critical of the language used in presenting information on patents, and IP law in general. In the light of this observation, we hope that the brochure on methods of software protection that this study is contracted to produce could be used as a precursory measure to inform SMEs, in a "non-intimidating" and comprehensible fashion.¹⁵⁵

PART IV CONCLUSION

The research programme (Intellectual Property Initiative) has established that formal IP regimes are applicable only to a small proportion of business activity, such as large manufacturing companies.

ESRC, DTI and IPI.¹⁵⁶

Research on how the prevailing system for protecting IP is functioning, particularly for SMEs suggests that these companies do know how to manage their intellectual property and that they recognize the importance of IPR. SMEs, however, do not tend to be fully informed about the complexities of, and developments in IP law, or the legalese that accompanies it. For instance, the electronic publishers interviewed in the Initiative project on electronic publishing were generally unaware of the Directive for the Protection of Computer Databases. Certainly in the copyright industries, such as electronic publishing, textiles, and software, for instance, SMEs are generally aware of the automatic copyright protection to which their creations are entitled. On the whole, SMEs tend to prefer informal methods of protection because they (1) are cheaper; (2) are perceived as being within the control of the firm; and (3) have proven to be a successful and efficient means of IP protection.

On the other hand, SMEs do not appear to regard patents as providing any particular advantage to their operations. The findings of empirical research conducted in this realm are perhaps best summarized in Macdonald's unambiguous comment that "the patent system is at best an irrelevancy for most small firms." Negative perceptions of the patenting system on the part of SMEs seem to be associated with the characteristics of the patenting process itself.

But what also needs to be noted is that the use of the patenting system is, in large part, related to the size of the SME. Research has shown that medium-sized enterprises tend to patent more than smaller companies. The availability of resources and experience with the patent regime account, in large degree, for this pattern.

Despite this rather bleak view of the patenting system as expressed by the smaller SMEs, it does appear that they could indeed benefit from a greater understanding and familiarity with the patent system. For instance, SMEs may not be aware that the UK Patent Office has reduced its fees for filing patent applications. They could also benefit from the assistance provided by the *INSTI* project funded by the German Federal Ministry of Education, Science, Research and Technology, and the eventual introduction of measures as outlined by the Danish Government. Furthermore, our survey results show that SMEs share the opinion of Susan Nycum, an IP attorney, when she

said, “patents are a sword and a shield. Normally, intellectual property protection is used as a shield; it gives companies protection against competitors. But when competitors feel threatened, intellectual property becomes a sword.”¹⁵⁷ The authors Kevin G Rivette and David Kline of *Rembrandts in the Attic: Unlocking the Hidden Value of Patents* similarly discuss the value of IP in the Open Source “contest.” Further information on these Janus-faced attributes of IPRs in general, and patents in particular, could likely benefit SMEs.

Internet-enabled electronic commerce has generated heightened activity in software development, and with it, allegedly, an increasingly “pro-patent” awareness. It is well known that the current breed of “dot coms” is largely made up of smaller companies developing and offering multiple software-based services and applications. It is arguable that this new genre of entrepreneurs may regard patenting of software as a more useful and necessary measure to protect their IP than when compared to their “pre electronic commerce” counterparts. Furthermore, given the widespread notion that patents help to raise venture capital or attract external funding/financing, one could expect new Internet companies would be more inclined toward patenting their creations.

Yet, the empirical evidence gathered from our survey and interviews do not bear this conclusion. Instead, there persists a general resistance to the use of patents for their software creations. For those SMEs that are “younger” than 5 years old, involved in the development of Internet-based applications, and were likely “born” during the “dot.com frenzy,” they too, appear to be critical of software patenting. In short, our results from our survey do not reveal a trend toward a greater appreciation of the patent system developing among developers of Internet-based software applications. However, they appeared to be receptive to more information on the patenting system, particularly with respect to any developments that it was undergoing.

The data found from our survey on how SMEs rank the importance of methods of IP protection reveal that 27 per cent of them regard technical systems of protection as the most effective means of protection. Combining this with 24 per cent and 8 per cent for copyright and patents, respectively, one could contend that additional information on all these forms of IP protection could be beneficial to SMEs. A similar argument also could be made for PROs, although 12 per cent from this group claimed that they regarded patenting as the most important form of protection for their software creations.

In sum, in spite of their avowals of the effectiveness of other methods of IP protection, and their perceived lack of ability to defend patent-related litigation, we conclude that more “practical education” could help to dispel some of their concerns with, or lack of knowledge of, the software patentability issue. The analysis of the data obtained from our survey and

follow-up interviews suggests that there is a perceptible benefit in enhancing the awareness of SMEs and PROs of the issues associated with the patenting of computer software.

With respect to how policymakers can help to improve the awareness of SMEs to the IPR related issues, the research suggests that such measures must address the heterogeneous nature of SMEs. Hence, information materials could be tailored in such a way as to be relevant to this diversity, and cover a range of IP appropriation mechanisms. Information also needs to be presented in a plain and intelligible way, and made widely available to them in a variety of media. In the knowledge that that SMEs are often critical of the language used in presenting information on IPRs, we hope that the brochure that this study is contracted to produce could be used as a guide to inform SMEs, in a “non-intimidating” and comprehensible fashion. The brochure provides a discussion and description of formal and informal methods of IP protection.

ANNEX 1 The Questionnaire

SEE NEXT PAGE

The Protection of Commercial Software Applications

Instructions:

Please answer the following questions by ticking the boxes, and/or writing in the spaces provided. Instructions are provided in italics for each question.

The information you provide will not be passed on to any third party. Your response will be treated confidentially. Company names will not be reported and the survey data will be aggregated to ensure your company's anonymity.

Part I: Business Origins and Make-up

Organisation:

Name:

Position:

1. In which year was your organisation established? *(Please write your response in the box)*

2. What is the total number of employees employed by your organisation?
(Please write your response in the box)

3. What is the ownership structure of your organisation? *(Please tick only one box)*

Private

Subsidiary

Non-profit

Other (please specify

4. What are your organisation's core businesses? (Please rank your top three choices in order of importance to your business by putting a 1, 2, or 3 in the corresponding spaces)

	Intranet Development		Security Applications		Electronic Publications
	Web Site Design		Web Hosting		Consultancy Services
	Database Design		Electronic Commerce Applications		Other (please specify): _____

5. For which type of clients does your organisation target its products/services? (Please tick only one box)

Large Business Clients
 Medium Sized Business Clients
 Small Business Clients
 Other (please specify): _____

Part II: Protection of Software Creations

- | | |
|---|------------------------------------|
| <p>6. The protection of our software products is a major concern for my organisation. (Please tick only one box).</p> | <p>Yes No Don't Know</p> |
| <p>7. Does your organisation conduct an active software protection policy? (Please tick only one box).</p> | <p>Yes No Don't Know</p> |
| <p>8. Is your organisation aware that computer software is automatically copyright protected? (Please tick only one box).</p> | <p>Yes No Don't Know</p> |
| <p>9. Has your organisation ever registered formally copyright for the computer software it creates? (Please tick only one box).</p> | <p>Yes No Don't Know</p> |
| <p>10. Has your organisation used the European patenting system to protect any of its software creations? (Please tick only one box)</p> | <p>Yes No Don't Know</p> |

11. Was your organisation aware that European Patent Office has expanded the scope of software-related inventions that may be patented? *(Please tick only one box).*

Yes No Don't Know

12. Please rank your organisation's primary concerns regarding the software protection?
(1=Greatest concern, 2 = Next highest, etc., NA for not applicable) .

Unauthorised Duplication	Unauthorised Use	Unauthorised Distribution	Reverse Engineering	Other (please specify):

13. Please rank in terms of frequency of use the methods your organisation uses to protect the software it produces? *(1= Most frequently used method, 2=Next most frequently used method, etc., NA for not applicable).*

Patenting	Copyright	Technical Systems of Protection	Licensing	Trademark	Other (please specify)

14. How frequently does your organisation attempt to patent the software-related inventions it creates? (Please tick one box and complete the table corresponding to your response).

Always	Very Frequently	Seldom	Not at All	Don't Know
--------	-----------------	--------	------------	------------

Reasons for patenting software	
	My organisation supports the patenting of software.
	My organisation has the resources required to partake in the patent application process.
	Patenting software provides my organisation with a competitive advantage.
	Other methods of protection do not provide sufficient protection for our software.
	My organisation is familiar with using the patent system to protect software related inventions.
	Other (please specify): _____ _____

Reasons for NOT patenting software	
	My organisation is opposed to the patenting of software.
	My organisation does not have the resources to partake in the patent application process.
	Patenting software would not provide my organisation with a competitive advantage.
	Other methods of protection provide sufficient protection for our software.
	My organisation has little familiarity with using the patent system to protect software related inventions.
	Other (please specify): _____ _____

(Please check as many boxes as apply)

(Please check as many boxes as apply)

15. Please indicate what your organisation believes are the advantages and disadvantages of copyright protection for computer software. (For each box please tick the responses that correspond with your opinion).

ADVANTAGES of copyrighting software	
<input type="checkbox"/>	Copyright provides a sufficient means of protecting our software creations.
<input type="checkbox"/>	Copyright law is less complicated than patent law.
<input type="checkbox"/>	Copyright does not require evidence of prior art.
<input type="checkbox"/>	Copyright is indicative of a sufficient level of innovativeness.
<input type="checkbox"/>	Copyright promotes innovation as effectively as patents.
<input type="checkbox"/>	Other (please specify): _____ _____

DISADVANTAGES of copyrighting software	
<input type="checkbox"/>	Copyright provides only a weak means of protecting our software creations.
<input type="checkbox"/>	Copyright law is more complicated than patent law.
<input type="checkbox"/>	Copyright easily infringed upon.
<input type="checkbox"/>	Copyright does not indicate high degree of innovativeness.
<input type="checkbox"/>	Copyright does not promote innovation as effectively as patents.
<input type="checkbox"/>	Other (please specify): _____ _____

16. Does your organisation sell its software in markets outside of the European Union? *(Please tick only one box)*

Yes

No

Don't Know

If no, please go to question 18.

17. Does your organisation's approach to protecting its intellectual property change when operating in foreign markets? *(Please tick only one box).*

Yes

No

Don't Know

18. Has your organisation ever initiated legal action against another party for software infringement? *(Please tick only one box).*

Yes

No

Don't Know

(Please tick only one box).

If no, please go to question 20.

19. On what grounds did your organisation initiate this legal action? *(Please tick only one box).*

Patent
Infringement

Copyright
Infringement

Trademark
Infringement

Other (please specify):

20. Has a third party ever initiated legal action against your organisation software infringement? *(Please tick only one box).*

Yes

No

Don't Know

(Please tick only one box).

If no, please go to question 22.

21. On what grounds did the third party initiate this legal action? *(Please tick only one box).*

Patent
Infringement

Copyright
Infringement

Trademark
Infringement

Other (please specify):

Part III: Opinions on the Patenting of Software

22. Please tick the box which corresponds with your opinion about the following statements:

- | | | | |
|---|-------|----------|---------------|
| A. Patenting software promotes innovation in the software industry. | Agree | Disagree | No
Opinion |
| B. The European Commission is successful in keeping SME's up to date about recent developments in European Patent Policy. | Agree | Disagree | No
Opinion |
| C. The Linux/Open Source movement is a threat to the European software industry. | Agree | Disagree | No
Opinion |
| D. SME's would benefit from a shortened patent life. | Agree | Disagree | No
Opinion |
| E. The European Commission IPR Help-desk is a useful resource for my organisation. | Agree | Disagree | No
Opinion |
| F. My organisation is aware of the European Patent Organisation database service call <i>esp@cenet</i> . | Agree | Disagree | No
Opinion |
| F. Cost of European software patent applications is prohibitively high. | Agree | Disagree | No
Opinion |

Do You Have Any Comments?

Thank you for your participation

If you would like to receive a complimentary summary of the results of this survey please tick this box .

Please indicate how you would like to receive the summary:

Via Post	Via Email	Via Fax
Address:	Address:	Fax No.:
.....
.....	
.....	
.....		
.....		

The summary will be sent to you in the last quarter of 2000.

Please return the completed questionnaire by email or post to:

Daniel Paré
SPRU, Science and Technology Policy Research
Mantell Building,
University of Sussex
Falmer, Brighton, BN1 9RF

Email: d.j.l.pare@sussex.ac.uk

Bibliography

“Lisbon pledges under threat from row over patents (2000),” *European Voice*, 12-18 October, p. 21.

“Methods for doing business...are not always excluded from patentability.”
http://www.european-patent-office.org/news/pressrel/2000_08_18_e.htm

“Semiconductor makers take patent battles to court,” *Findlaw Legal News*,
<http://news.findlaw.com/legalnews/2000831/n3156390.htm>.

“Software-Erfindungen sind patentierbar,”
<http://www.patente.bmbf.de/inform/down/software.pdf>

37 CFR, Parts 1 and 5.

Aharonian, Gregory (2000), “Walker Assets trivial/obnoxious business methods patents,” <http://lists.essential.org/pipermail/random-bits/2000-April/000143.html>

Arundel, Anthony (1996), *Europe: 1993 Community Innovation Survey*. European Commission, Brussels.

_____ (forthcoming), The Relative Effectiveness of Patents and Secrecy for Appropriation, “*Research Policy*.”

Arundel, Anthony and I Kabla (1998), “What percentage of innovations are patented: Empirical estimates for European firms” *Research Policy*, no. 27.

Berger, Roland (1993), *Utilisation of Patent Protection in Europe*, , European Patent Office, Munich.

Blackburn, Robert (1998), *How SMEs see their intellectual property rights*, Summary Report to the ESRC.

Blount, Steven (1992), “The use of delaying tactics to obtain submarine patents and amend around a patent that a Competitor has designed around,” *Journal of the Patent and Trademark Society*, 81.

Cohen, Larry (1999), “The Patenting of Software,” *European Intellectual Property Review*, vol.21, issue 12, December.

Chittenden, F. M Robertson and D Watkins (eds.) (1993), *Small Firms: Recession and Recovery*, Paul Chapman, London.

Cohen, Wesley M, Richard R Nelson and John P Walsh (2000), “Protecting their intellectual assets: Appropriability conditions and why U.S. manufacturing firms patents (or not),” *National Bureau of Economic Research Working Paper 7522*.

Comley, Pete (1996), “The Use of the Internet as a Data Collection Method. SGA Market Research,” <http://www.sga.co.uk/esomar.html>.

Danish Ministry of Trade and Industry, *Industry Policy in Denmark*, http://www.dkpto.dk/english/content/publications/indu_policy/index.htm.

Department of Trade and Industry, ESRC and Intellectual Property Institute (1999), *Intellectual Property Initiative, Research Programme on Intellectual Property*, London.

Dickson, Keith (1998), *Design Protection Practices in the Textiles Industry*, Summary Report prepared for the ESRC.

_____ (1998), *Design Protection Practices in the Textiles Industry*, Final Report prepared for the ESRC.

Eaglesham, Jean (2000), "Using monopolies to protect methodologies," *Financial Times*, October 26.

European Commission (1998), *Green Paper on Innovation*, and the *First Action Plan for Innovation in Europe*.

_____ (1998), *Promoting innovation through patents: Follow up to the Green Paper on the Community Patent and the Patent System in Europe*, Communication from the European Commission to the Council, the European Parliament and the Economic and Social Committee.

_____ (2000), *Innovation Policy in a Knowledge-Based Economy*, Enterprise Directorate General, Luxembourg.

_____ (2000), *Innovation Policy in a Knowledge-Based Economy*, Enterprise Directorate General, Luxembourg.

ETAN Expert Working Group (1999), *Strategic dimensions of Intellectual Property Rights in the context of S&T Policy*, Report prepared for the European Commission, June.

Fellas, John (1999), "The Patentability of Software-related inventions in the United States," *European Intellectual Property Review*, 330.

_____ (1999), "The Patentability of Software-related Inventions in the United States," *European Intellectual Property Review*, vol. 21, issue 6, June.

Gadbaw, R Michael (1989), "Intellectual Property and International Trade: Merger or Marriage of Convenience", *Vanderbilt Journal of Transnational Law*, vol. 22, no. 2.

Gall, Herr Gunter, Director Legal Affairs European Patent Office, in a paper given at the OFDI Seminar on April 17, 1985, Paris.

Gambetta, Diego (ed) (1988), *Trust: Making and breaking cooperative relations*, New York, Blackwell.

Graham, Stuart and David C Mowery (1999), "Intellectual Property Protection in the Software Industry, Haas School of Business, Berkeley.

Granovetter, M and R Swedberg, eds. (1992), *The sociology of economic life*, Boulder, CO, Westview Press.

Hart, Robert, Peter Holmes and John Reid (1999), *The Economic Impact of Patentability of Computer Programs*, Report to the European Commission.

<http://eon.law.harvard.edu/property00/patents/Hayes.html>

<http://eu.conecta.it/>

<http://www.acd.i.e.uip/archive-news/aprpat.html>
<http://www.busi.de>
http://www.carolinapatents.com/pat_articles/pat_article23.htm
<http://www.education.gouv.fr/actu/assisinn/DATA/LOMBARD.HTM>
http://www.eff.org/pub/Intellectual_property/oracle_patent.ofc.testimony
<http://www.Eurolinux.org>
http://www.europa.eu.int/comm/internal_market/en/intprop/indprop/studyintro.htm
<http://www.insti.de/>
http://www.insti.de/ORGA_11.htm
<http://www.european-patent-office.org.tws/appendix>
<http://www.georgetown.edu/Fed-Ct/Circuit/fed/opinions/97-1327.htm>
<http://www.mewburn ellis – intellectual property/European Patent Office/Opposition proceedings>
http://www.olswang.com/scripts/patent_study.pl
<http://www.opensource.org/halloween>
http://www.patente.bmbf.de/foerde/inhalt_2.htm
<http://www.tuxedo.org/~esr/writings/cathedral-bazaar/>
<http://www.uspto.gov/offices/dcom/olia/aipa/summary.htm>
<http://www.uspto.gov/web/offices/com/chats/index.html>
<http://www.uspto.gov/web/offices/com/sol/actionplan.html>
<http://www.uspto.gov/web/offices/pac/doc/general/interfer.htm>
<http://www.walkerdigital.com>
<http://www.petition.eurolinux.org/reference>

Intellectual Property Initiative (1998), “Research Programme on Intellectual Property”, London.

_____, (1998), “What the patent system offers the small firm,” Research Programme on Intellectual Property, London.

_____, (1998), “How industry sees protection of its intellectual property,” Research Programme on Intellectual Property, London.

_____, (1998), “How SMEs see their intellectual property rights,” Research Programme on Intellectual Property, London.

_____, (1998), “How SMEs use the patent literature,” Research Programme on Intellectual Property, London.

_____, (1998), “How UK textile companies protect their designs,” Research Programme on Intellectual Property, London.

Jaffe, Adam B. (1999), “The U.S. Patent System in Transition: Policy Innovation and the Innovation Process, Working Paper 7200, *National Bureau of Economic Research*, August.

- Kitching, John and Robert Blackburn (1999), "Intellectual Property management in the small and medium enterprise (SME)," *Journal of Small Business and Enterprise Development*, vol. 5, no. 4.
- Kortum, Samuel and Josh Lerner (1997), "Stronger protection or technological revolution: What is behind the recent surge in patenting?" *National Bureau of Economic Research*, Working Paper 6204.
- Legal Advisory Board (1995), *Reply to the Green Paper on Copyright and Related Rights in the Information Society*, Luxembourg.
- Lemley, Mark A, Peter S Menell, Robert P Merges and Pamela Samuelson (2000), *Software and Internet Law*, New York, Aspen Law and Business.
- Lerner, Josh and Jean Tirole (2000), "The Simple Economics of Open Source," *National Bureau of Economic Research Working Paper Series*.
- Lessig, Lawrence (2000), "Europe's me-too patent law," *FT.com*, July 11.
- Levin, R, A Klevorick, Richard R Nelson and S G Winter (1987), "Appropriating the returns from industrial R&D," *Brookings Papers on Economic Activity*.
- Licht, G, et al (1997), *Results of the German Service Sector Innovation Survey*, Mannheim, ZEW, Karlsruhe, ISI.
- Likhovski, Michal, Michael Spence, and Michael Molineaux (2000), *The First Mover Monopoly*, Oxford Intellectual Property Research Centre and Olswang Solicitors, October.
- Macdonald, Stuart (1998), *What the patent system offers the small firm*, Summary Report, prepared for the ESRC.
- Mehta, Raj, and Eugene Sivadaa (1995), "Comparing response rates and response content in mail versus electronic mail surveys," *Journal of the Market Research Society* 37 (4): 429-439.
- Merges, Robert P (1999), "As many as six impossible patents before breakfast: Property Rights for Business Concepts and Patents System Reform," *Berkeley Technology Law Journal*, vol. 24.
- _____, (1999), "As many as six impossible patents before breakfast: Property Rights for Business Concepts and Patents System Reform," *Berkeley Technology Law Journal*, vol. 24.
- _____, (1999), "Who Owns the Charles River Bridge? Intellectual Property and Competition in the Software Industry, UC Berkeley School of Law.
- _____, (1997), *Patent Law and Policy*, Charlottesville, VA, Michie.
- Merges, Robert P and Richard R Nelson (1994), "On limiting or encouraging rivalry in technical progress: The effect of patent scope decisions," *Journal of Economic Behavior and Organization*, vol. 25.
- Michael, R and T Richards (eds.) (1998), *Intellectual Property Rights: Global Consensus, Global Conflict?* Boulder, CO: Westview Press.

- Miles, Ian (1998), *How knowledge-based services manage their intellectual property*, Summary Report prepared for the UK Economic and Social Research Council.
- Miles, Ian, Birgitte Andersen, Mark Boden and Jeremy Howells (2000), "Service production and intellectual property," *International Journal of Technology Management*, vol. 20.
- Rutter, Nancy (1997), "The Great Patent Plague," *Forbes ASAP*.
- Nappo, Stefano and Melissa Clarke (2000), "Seek protection on the Web," *Financial Times*, August 10, 2000.
- Newman, Jonathan (1997), "The Patentability of Computer-related Inventions in Europe," *European Intellectual Property Review*, vol. 19, issue 12.
- Oppenheim, Charles (1998), *How SMEs use the patent literature*, Summary Report for the UK Economic and Social Research Council.
- Orr, Shakked, Da-Shan Shiu, Mark Safe and Barbara Stone (1998), "Patents, do they help or hinder the software industry?"
- Richardson, Julie H. and Kenneth D. Sibley Myers Bigel Sibley & Sajovec (1999), "The Intellectual Property and Communications Omnibus Reform Act of 1999."
- Riordan, Barry J (2000), "What's driving patent and trade mark application filings?" *European Intellectual Property Review*, vol 22, issue 8, August.
- Rivette ,Kevin G, and David Kline (2000), *Rembrandts in the Attic: Unlocking the Hidden Value of Patents*, Cambridge, MA, Harvard Business School Press.
- Sakakibara, Mariko and Lee Branstetter (2001), "Do stronger patents induce more innovations? Evidence from the 1988 Japanese patent law reforms," *Rand Journal of Economics*, forthcoming, Spring.
- Shapiro, Carl and Hal R Varian (1999), *Information Rules: A Strategic Guide to the Network Economy*, Massachusetts, Harvard Business School Press.
- Sirilli, G and R Evangelista (1998), "Technological innovation in services and manufacturing: results from Italian surveys," Paper presented at Systems and Services Innovation Workshop, CRIC, University of Manchester, March.
- Stoneman, P (ed.), (1995), *Handbook of Economics of Innovation and Technological Change*, Blackwell Publishers, Oxford.
- Tang, Puay (1997), "Use of Copyright as a Measure of Innovation: Software Applications in the Digital Age," *Intellectual Property Quarterly*, Launch Issue.
- _____, (1998), *Managing Intellectual Property: UK Electronic publishing and biotechnology SMEs*, Final Report for the UK Economic and Social Research Council.

_____, (1998), *Managing Intellectual Property: Electronic Publishing SMEs*, SPRU.

Tang, Puay and Dr Tom Sinclair (1998), *Exploitation of Social Science Research at the University of Sussex*, Final Report for the UK Economic and Social Research Council.

United States Patent and Trademark Office (2000) *Automated Financial or Management data processing methods (business methods)*, White Paper, Washington, D.C.

Wallerstein, Michael B, Mary Ellen Moguee and Roberta A Schoen (eds.) (1993), *Global Dimensions of Intellectual Property Rights in Science and Technology*, National Academy Press, Washington, D.C.

Webster, Andrew (1998), University Spin-Offs, *SMEs and the Science Base: The Effective Use of Intellectual Property*. Final Report prepared for UK Economic and Social Research Council.

Yun, Gi Woong, and Craig W. Trumbo (2000), "Comparative Response to a Survey Executed by Post E-mail, & Web Form," *Journal of Computer-Mediated Communication* 6 (1).

<http://www.ascusc.org/jcmc/vol6/issue1/yun.html>

Endnotes

¹ Stefano Nappo and Melissa Clarke, "Seek protection on the Web," *Financial Times*, August 10, 2000, p. 11. Both are attorneys at the London-based firm, Linklaters and Alliance.

² European Commission, *Innovation Policy in a Knowledge-Based Economy*, Enterprise Directorate General, Luxembourg, 2000, p. 58. See also Samuel Kortum and Josh Lerner, "Stronger protection or technological revolution: What is behind the recent surge in patenting?" *National Bureau of Economic Research*, Working Paper 6204, 1997.

³ Carl Shapiro and Hal R Varian, *Information Rules: A Strategic Guide to the Network Economy*, Massachusetts, Harvard Business School Press, 1999.

⁴ ETAN Expert Working Group, *Strategic dimensions of Intellectual Property Rights in the context of S&T Policy*, Report prepared for the European Commission, June 1999, p. X.

⁵ Robert Hart, Peter Holmes and John Reid, *The Economic Impact of Patentability of Computer Programs*. <http://www.europa.eu.int/comm/internal_market/en/intprop/indprop/softpaten.htm> and http://www.europa.eu.int/comm/internal_market/en/intprop/indprop/studyintro.htm>. Visited on October 26, 2000. Gregory Aharonian, of *Patent-news*, the avid critic of "trash software patents" as exemplified by several e-commerce/Internet patents reviewed the study moderately favourably.

⁶ European Commission, *Innovation Policy in a Knowledge-Based Economy*, p. 58.

⁷ European Commission, *Green Paper on Innovation*, and the *First Action Plan for Innovation in Europe*, 1998.

⁸ *Promoting innovation through patents: Follow up to the Green Paper on the Community Patent and the Patent System in Europe*, Communication from the Commission to the Council, the European Parliament and the Economic and Social Committee, 1998.

⁹ Robert Hart, Peter Holmes and John Reid.

¹⁰ Robert P Merges, "As many as six impossible patents before breakfast: Property Rights for Business Concepts and Patents System Reform," *Berkeley Technology Law Journal*, vol. 24, 1999, pp. 579-581

¹¹ For a detailed account of the U.S. system, see Mark A Lemley, Peter S Menell, Robert P Merges and Pamela Samuelson, *Software and Internet Law*, New York, Aspen Law and Business, 2000.

¹² Title 17 of the United States Code

¹³ Lemley, et al, chapter 3, at p. 301.

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ J Fellas, "The Patentability of Software-related inventions in the United States," *European Intellectual Property Review*, 330, 1999, at p. 333.

¹⁷ 37 CFR, Parts 1 and 5.

¹⁸ A key provision of the AIPA is Subtitle E, The "Domestic Publication of Foreign Filed Patent Applications Act of 1999. This subtitle "provides for publication of patent applications 18 months after filing unless the applicant requests otherwise upon filing and certifies that the invention has not and will not be the subject of an application filed in a foreign country." <<http://www.uspto.gov/offices/dcom/olia/aipa/summary.htm>> Visited December 12, 2000.

¹⁹ Adam B Jaffe, "The U.S. Patent System in Transition: Policy Innovation and the Innovation Process, Working Paper 7200, National Bureau of Economic Research, August 1999. Steven Blount, "The use of delaying tactics to obtain submarine patents and amend

around a patent that a Competitor has designed around,” *Journal of the Patent and Trademark Society*, 81, 1992, pp. 11-32. According to Blount, submarine patents are not new. George B Selden, a Rochester New York patent attorney, kept a patent pending on the first automobile for 16 years!

²⁰ See Blount.

²¹ Jaffe, p. 43.

²² On line discussion with customers, December 5, 2000.

<<http://www.uspto.gov/web/offices/com/chats/index.html>> Visited December 12, 2000.

²³ USPTO, “Interferences,” <<http://www.uspto.gov/web/offices/pac/doc/general/interfer.htm>> Visited October 15, 2000.

²⁴ For more details, see *ibid*.

²⁵ The EPC mirrors the national laws of a number of Member States in its exclusion of computer programs from patent protection.

²⁶ Herr Gunter Gall, Director Legal Affairs European Patent Office, in a paper given at the OFDI Seminar on April 17, 1985 in Paris.

²⁷ Larry Cohen, “The Patenting of Software,” *European Intellectual Property Review*, vol.21, issue 12, December 1999, pp. 667-668.

²⁸ Thomas C Vinje, “Computer Program product Claims Allowed by the European Patent Office – Impact on Software Patent Claiming,” in Lemley, et al, p. 717.

²⁹ The first case T0935/97-3.5.1, the invention relates to detecting where a second window in a computer display overlies part of the first window, obscuring information in a portion of the first window. The invention allows the obscured information in the first window to be displayed in another portion of the first window not obscured by the second window. The second case T1173/97-3.5.1, the invention relates to resource recovery in a computer system and a capability to continue an application while the system resynchronizes a failed or incomplete procedure.

³⁰ Vinje, in Lemley, et al., p. 718.

³¹ “Methods for doing business...are not always excluded from patentability.”

<http://www.european-patent-office.org/news/pressrel/2000_08_18_e.htm> Visited on December 14, 2000.

³² The EPO Board of Appeal rejected an application for an “Improved pension benefits system” which was regarded by the Board as a “typical” business method patent. The decision was made on September 8, 2000. See T0931/95. <<http://www.european-patent-office.org/dg3/biblio/t950931eu1.htm>> Visited on December 17, 2000.

³³ “Methods for doing business...are not always excluded from patentability.”

<http://www.european-patent-office.org/news/pressrel/2000_08_18_e.htm> Visited on December 14, 2000.

³⁴ <<http://www.european-patent-office.org.tws/appendix 6.pdf>> Visited July 25, 2000, as quoted in Likhovski, Spence and Molineaux, p. 2.

³⁵ Lemley, et al., p. 706.

³⁶ For more details and the methodology used for the survey, see Michal Likhovski, Michael Spence, and Michael Molineaux, *The First Mover Monopoly*, Oxford Intellectual Property Research Centre and Olswang Solicitors, October 2000.

<http://www.olswang.com/scripts/patent_study.pl> Visited October 27, 2000. See also Jean Eaglesham, “Using monopolies to protect methodologies,” *Financial Times*, October 26, 2000, p. 21.

³⁷ <<http://www.mewburn ellis – intellectual property/European Patent Office/Opposition proceedings>> Visited October 19, 2000.

³⁸ Julie H. Richardson and Kenneth D. Sibley Myers Bigel Sibley & Sajovec “The Intellectual Property and Communication Omnibus Reform Act of 1999.” See <http://www.carolinapatents.com/pat_articles/pat_article23.htm>; visited October 13, 2000.

³⁹ A district court for the District of Massachusetts had found the patent invalid. <<http://www.georgetown.edu/Fed-Ct/Circuit/fed/opinions/97-1327.htm>.> Visited October 13, 2000.

⁴⁰ Ibid.

⁴¹ David L. Hayes, “What the general Intellectual Property Practitioner should know about Patenting Business Methods, < <http://eon.law.harvard.edu/property00/patents/Hayes.html>> Visited October 13, 2000. Also, it is useful to note that despite popular belief, the USPTO has been granting patents for business methods although they did not call them business methods. Instead, they were referred to as processes or steps for doing something.⁴¹ See also Mark A Lemley, Peter S Menell, Robert P Merges and Pamela Samuelson, *Software and Internet Law*, New York, Aspen Law and Business, 2000.

⁴² USPTO White Paper *Automated Financial or Management data processing methods (business methods)*, Washington, D.C, 2000

⁴³ Hayes. Also in conjunction with the increase in applications, the PTO added 725 new examiners in 1999, bringing the total staff of examiners to 2,594. The PTO plans to add another 1,200 examiners in the next two years. Twenty new examiners were recently hired for the division responsible for reviewing most electronic commerce patents.

⁴⁴ <<http://www.uspto.gov/web/offices/com/sol/actionplan.html>> Visited on October 18,2000.

⁴⁵< <http://www.walkerdigital.com>.> Visited August 18, 2000.

⁴⁶ “Random bits: Gregory Aharonian: Walker Assets trivial/obnoxious business methods patents,” <<http://lists.essential.org/pipermail/random-bits/2000-April/000143.html>> Visited on August 13. 2000.

⁴⁷ See again, Robert Hart, Peter Holmes and John Reid. Also, Jonathan Newman, “The Patentability of Computer-related Inventions in Europe,” *European Intellectual Property Review*, vol. 19, issue 12, 1997, pp. 701-708; John Fellas, “The Patentability of Software-related Inventions in the United States,” *European Intellectual Property Review*, vol. 21, issue 6, June 1999; Robert P Merges and Richard R Nelson, “On limiting or encouraging rivalry in technical progress: The effect of patent scope decisions,” *Journal of Economic Behavior and Organization*, vol. 25, 1994; pp. 1-24; and Robert P Merges, “As many as six impossible patents before breakfast: Property Rights for Business Concepts and Patents System Reform,” *Berkeley Technology Law Journal*, vol. 24, 1999, pp. 579-615.

⁴⁸ Michael B Wallerstein, Mary Ellen Mogee and Roberta A Schoen (eds.), *Global Dimensions of Intellectual Property Rights in Science and Technology*, National Academy Press, Washington, DC., 1993.

⁴⁹ R Michael Gadbow”Intellectual Property and International Trade: Merger or Marriage of Convenience”, *Vanderbilt Journal of Transnational Law*, vol. 22, no. 2. 1989; Michael R Michael and T Richards (eds.) *Intellectual Property Rights: Global Consensus, Global Conflict?* Boulder, CO: Westview Press, 1988.

⁵⁰ Lawrence Lessig, “Europe’s me-too patent law,” *FT.com*, July 11, 2000.

⁵¹ Ibid.

⁵² For an explicit discussion on the planned removal of the software exclusion in Europe, see <http://www.education.gouv.fr/actu/assissinn/DATA/LOMBARD.htm>.

⁵³ <<http://www.Eurolinux.org>> Visited August 13, 2000.

⁵⁴ <<http://www.petition.eurolinux.org/reference>> Visited August 13, 2000.

⁵⁵ Ibid.

⁵⁶ <<http://www.Eurolinux.org>> Visited August 13, 2000.

⁵⁷ Open source software is characterized by the freedom each user of it has in its use of it, such as to use it on many computers, to improve it, and to redistribute it for free, or at a charge not fixed beforehand. Importantly, the user must have access to the software's source code. For a full discussion, see Working Group on Libre Software, "Free Software/Open Source: Information Society Opportunities for Europe?" December 2000, <<http://eu.conecta.it/>> Visited on October 9, 2000. This working group was created at the initiative of the European Commission Information Society Directorate General.

⁵⁸ Josh Lerner and Jean Tirole, "The Simple Economics of Open Source," *National Bureau of Economic Research Working Paper Series*, 2000.

⁵⁹ Available on <http://www.tuxedo.org/~esr/writings/cathedral-bazaar/>

⁶⁰ These documents were posted on October 31, hence Halloween documents. Kevin G Rivette and David Kline, *Rembrandts in the Attic: Unlocking the Hidden Value of Patents*, Cambridge, MA, Harvard Business School Press, 2000, p. 190. Also see <http://www.opensource.org/halloween>.

⁶¹ For a detailed discussion on the advantages, see Working Group on Libre Software.

⁶² Rivette and Kline, pp. 192-193.

⁶³ Working Group on Libre Software.

⁶⁴ Rivette and Kline, p. 177.

⁶⁵ Ibid. p. 193.

⁶⁶ Ibid, p. 197.

⁶⁷ Dr. Puay Tang and Dr. Sandy Thomas, also from SPRU, were project holders of "Managing Intellectual Property: The case of UK electronic publishing and biotechnology SMEs."

⁶⁸ Department of Trade and Industry, ESRC and Intellectual Property Institute, *Intellectual Property Initiative, Research Programme on Intellectual Property*, London, 1999.

⁶⁹ About 8 of the 11 projects are relevant to our study. One project that dealt with university spin-offs, concluded that IPR, even when held by the firm, were unlikely to be pursued through formal IPR such as patenting. While this conclusion may not be directly germane to our study, it is worth mentioning that universities cannot be assumed to be *au fait* with the IPR regime, nor to prefer to resort to legal mechanisms for protection. For details on this project, see Andrew Webster, University Spin-Offs, *SMEs and the Science Base: The Effective Use of Intellectual Property*, Final Report prepared for the ESRC, 1998.

⁷⁰ Department of Trade and Industry, ESRC and Intellectual Property Institute, *Intellectual Property Initiative, Research Programme on Intellectual Property*, London, 1999.

⁷¹ In another ESRC-funded project, "Exploitation of Social Science Research at the University of Sussex," undertaken by Dr. Puay Tang and Dr. Tom Sinclair in 1998, both researchers found a similar finding. Where there was potential for exploitation of research results, such as in computing, researchers were frustrated by a lack of institutional support for the management of IP.

⁷² Ibid.

⁷³ Orr Shakked, Da-Shan Shiu, Mark Safe and Barbara Stone, "Patents, do they help or hinder the software industry?" 1998. Yet, Lotus launched legal action against Borland, Paperback Software and Mosaic Software, Inc., for using the same look and feel as the Lotus 1-2-3 spreadsheet. Judgement was held for the defendant Borland as Judge Boudin argued

that “the efforts of the users in learning a new work, such as the computer protocol, rather than the efforts of the creator in designing the work, account for the success of these kinds of works.” Discussed in Robert P Merges, “Who Owns the Charles River Bridge? Intellectual Property and Competition in the Software Industry, UC Berkeley School of Law, 1999, p. 9.

⁷⁴ The project on “Managing Intellectual Property: UK electronic publishing and biotechnology SMEs,” was undertaken by Dr. Puay Tang and Dr. Sandy Thomas. Keith Dickson undertook the project on “Design Protection Practices in the UK Textiles Industry”.

⁷⁵ For details, see Puay Tang, *Managing Intellectual Property: Electronic Publishing SMEs*, SPRU, 1998. Also the Final Report *Managing Intellectual Property: UK Electronic publishing and biotechnology SMEs*, prepared for the ESRC, 1998.

⁷⁶ Puay Tang had to contact by phone more than 100 companies to verify their electronic publishing activities before selecting the 31 companies.

⁷⁷ For more details, see Tang, *Managing Intellectual Property: Electronic Publishing SMEs*.

⁷⁸ In contrast, non-technical means refer to unique abbreviations and seednames, the latter are fabricated names that appear on copyrighted mailing lists, for instance. Non-technical also refers to the reliance on collecting societies and trading standards officers to undertake surveillance of suspected pirates.

⁷⁹ Tang, *Managing Intellectual Property: Electronic Publishing SMEs*, p.7.

⁸⁰ Ibid.

⁸¹ Legal Advisory Board, *Reply to the Green Paper on Copyright and Related Rights in the Information Society*, Luxembourg, 1995, p. 12.

⁸² Stewart Macaulay “Noncontractual relations in business: A preliminary study “in M Granovetter and R Swedberg, eds., *The sociology of economic life*, Boulder, CO, Westview Press, 1992, pp. 265-284.

⁸³ Diego Gambetta, “Can we trust trust?” in D Gambetta, ed., *Trust: Making and breaking cooperative relations*, New York, Blackwell, 1988, pp. 213-237.

⁸⁴ Tang, *Managing Intellectual Property: Electronic Publishing SMEs*, p. 6.

⁸⁵ This section is based on Keith Dickson, *Design Protection Practices in the Textiles Industry*, Final Report prepared for the ESRC, 1998.

⁸⁶ Keith Dickson, *Design Protection Practices in the Textiles Industry*, Summary Report prepared for the ESRC, 1998. p. 3.

⁸⁷ Dickson, *Design Protection Practices in the Textiles Industry*, Final Report.

⁸⁸ Ibid.

⁸⁹ “How UK textile companies protect their designs,” *Intellectual Property Initiative, Research Programme on Intellectual Property*, 1998, p. 1

⁹⁰ Ibid.

⁹¹ On 8 June 2000, the European Commission announced the political agreement reached between Member States on this Directive. The Directive was first tabled in 1997.

⁹² There were some firms in this sample that had taken out patents.

⁹³ Intellectual Property Initiative, “What the patent system offers the small firm,” *Research Programme on Intellectual Property*, 1998, p. 2.

⁹⁴ Stuart Macdonald, *What the patent system offers the small firm*, Summary Report, prepared for the ESRC, 1998.

⁹⁵ These responses are drawn from Stuart Macdonald’s project and Charles Oppenheim, *How SMEs use the patent literature*, which is discussed below.

⁹⁶ John Kitching and Robert Blackburn, "Intellectual property management in the small and medium enterprise (SME)," *Journal of Small Business and Enterprise Development*, vol. 5, no. 4, p. 333. This article is based on the project conducted by Robert Blackburn on *How SMEs see their intellectual property rights*, which will be discussed below. See also Nancy Rutter, "The Great Patent Plague," *Forbes ASAP*, 1997, pp. 59-66.

⁹⁷ *Ibid.*, p. 5.

⁹⁸ "What the patent system offers the small firm," *Intellectual Property Initiative, Research Programme on Intellectual Property*, 1998, p. 3.

⁹⁹ *Ibid.*

¹⁰⁰ For more details, see Stuart Graham and David C Mowery, "Intellectual Property Protection in the Software Industry, Haas School of Business, Berkeley, a paper based on presentations at the International Symposium on Innovation and Patents, Tokyo, Japan, 1999 and the National Research Council's conference on "Intellectual Property Rights," Washington, D.C. 2000. The authors, however, do not explain the reasons for the downtrend.

¹⁰¹ Oracle Corporation, Testimony before USPTO Hearings on the Use of the Patent System to Protect Software-Related Inventions,<

http://www.eff.org/pub/Intellectual_property/oracle_patent.ofc.testimony>

¹⁰² R P Merges, *Patent Law and Policy*, Charlottesville, VA, Michie, 1997, p. 129, as cited by Graham and Mowery.

¹⁰³ Wesley M Cohen, Richard R Nelson and John P Walsh, "Protecting their intellectual assets: Appropriability conditions and why U.S. manufacturing firms patents (or not)," *National Bureau of Economic Research Working Paper 7522*, 2000. Thirty-one industries were surveyed, and ranged from textiles to chemicals to communication equipment and electronic components. The sample of firms ranged from less than 25 to over 100,000 employees. See also R Levin, A Klevorick, Richard R Nelson and S G Winter, "Appropriating the returns from industrial R&D," *Brookings Papers on Economic Activity*, 1987, pp. 783-820.

¹⁰⁴ Samuel Kortum and Josh Lerner, "Stronger protection or technological revolution: What is behind the recent surge in patenting?" *National Bureau of Economic Research, Working Paper 6204*, 1997.

¹⁰⁵ Barry J Riordan, "What's driving patent and trade mark application filings?" *European Intellectual Property Review*, vol 22, issue 8, August 2000, pp. 349-352.

¹⁰⁶ Roland Berger, *Study on Utilisation of Patent Protection in Europe*, study conducted by Roland Berger Forschungs Institut, EPO, Munich, 1993.

¹⁰⁷ Synopsis of a study commissioned by the EPO to Roland Berger Forschungs Institut, See "What sort of firms use the patent system?" <<http://www.acd.i.e.uip/archive-news/aprpat.html>> Visited on October 20, 2000.

¹⁰⁸ EPO, *Utilisation of Patent Protection in Europe*, Study carried out by Roland Berger Forschungs Institut, EPO, Munich, 1994, p. 134; p. 175; p. 178. This study provides an extensive data set on various aspects on the utilization of patent protection in Europe.

¹⁰⁹ *Ibid.* p. 182.

¹¹⁰ *Ibid.*, p. xiii; p.88; p. 91.

¹¹¹ Mariko Sakakibara and Lee Branstetter, "Do stronger patents induce more innovations? Evidence from the 1988 Japanese patent law reforms," *Rand Journal of Economics*, forthcoming, Spring 2001.

¹¹² Intellectual Property Initiative "How SMEs use the patent literature," " Research Programme on Intellectual Property, 1998, pp.1-2,

¹¹³ *Ibid.*, p. 2.

¹¹⁴ Charles Oppenheim, *How SMEs use the patent literature*, Summary Report for the ESRC, 1998.

¹¹⁵ Intellectual Property Initiative, "How SMEs use the patent literature," Research Programme on Intellectual Property, 1998, p. 3.

¹¹⁶ Intellectual Property Initiative, "How SMEs see their intellectual property rights," Research Programme on Intellectual Property, 1998, p. 1.

¹¹⁷ Robert Blackburn, *How SMEs see their intellectual property rights*, Summary Report to the ESRC, 1998, p. 2.

¹¹⁸ John Kitching and Robert Blackburn, "Intellectual Property management in the small and medium enterprise (SME)," *Journal of Small Business and Enterprise Development*, vol. 5, no. 4, 1999, pp. 327-335.

¹¹⁹ Intellectual Property Initiative, "How SMEs see their intellectual property rights," Research Programme on Intellectual Property, 1998, p.2.

¹²⁰ See for instance, S Lloyd-Smith, K Dickson and A Woods, "The Industrial Divide in Services, Technological Innovation, Co-operation and Competition in Small Employment, Design, Plant Hire Firms and Garages," in F. Chittenden, M Robertson and D Watkins (eds.), *Small Firms: Recession and Recovery*, Paul Chapman, London, 1993; Stewart Macauley "Noncontractual relations in business: A preliminary study" in M Granovetter and R Swedberg, eds., *The sociology of economic life*, Boulder, CO, Westview Press, 1992, pp. 265-284; and Diego Gambetta, "Can we trust trust?" in D Gambetta, ed., *Trust: Making and breaking cooperative relations*, New York, Blackwell, 1988, pp. 213-237.

¹²¹ Blackburn, *How SMEs see their intellectual property rights*, Summary Report to the ESRC, 1998, p. 4.

¹²² Kitching and Blackburn, p. 333-334.

¹²³ See chapter on "Intellectual Property Rights" in European Commission (2000) *Innovation Policy in a Knowledge-Based Economy*, Enterprise Directorate General, Luxembourg. See also Anthony Arundel, *The Relative Effectiveness of Patents and Secrecy for Appropriation*, "Research Policy", forthcoming.

¹²⁴ Ibid. The sources used for Figure 3 are: *Europe: 1993* Community Innovation Survey (Arundel, 1996); 5,147 innovative firms in Norway, Belgium, the Netherlands, Luxembourg, Ireland, Denmark, and Germany. The measurement scale is the percentage of firms that report that each appropriation method is 'moderately important' or higher on a five-point scale. *Switzerland*: Harabi (1995); 358 innovative firms. The measurement scale is the mean for a seven-point importance scale. *Australia*: McLennan (1995); 1,960 innovative firms. The measurement scale is the percentage of firms that report that each appropriation method is 'moderately important' or higher on a five-point scale plus an option of 'method not used'. *US in 1982*: Levin et al (1987); 650 R&D performing firms. The measurement scale is the importance of each method in the firm's 'line of business' using a seven-point scale. *US in 1993*: Rausch (1995); 236 innovative firms. The measurement scale is the percentage of firms that report that each appropriation method is 'moderately important' or higher on a five-point scale. *US in 1993a and Japan*: Cohen et al: 623 US firms and 497 Japanese firms, standardised to the same industrial distributions so that the results are directly comparable. The measurement scale is the average percentage of innovations for which the mechanism is considered effective.

¹²⁵ Kitching and Blackburn, pp. 331-332.

¹²⁶ A Arundel and I Kabla, "What percentage of innovations are patented: Empirical estimates for European firms" *Research Policy*, no. 27, 1998, pp. 127-141

¹²⁷ Perhaps the question, which the research posed to investigate the formal methods of IP protection, could have been supplemented with “are you aware that copyright is automatic in your written service products/documents?” The question that Ian Miles used in his telephone survey was “Which are the following mechanisms are used to protect the knowledge input/core competencies embedded in your key business activities?” This question is indeed the appropriate one, but judging by the rather peculiar figures for copyright, it appears that respondents may not have known that copyright is automatic.

¹²⁸ Ian Miles, *How knowledge-based services manage their intellectual property*, Summary Report prepared for the ESRC, 1998.

¹²⁹ G Licht, et al, *Results of the German Service Sector Innovation Survey*, Mannheim, ZEW, Karlsruhe, ISI, 1997, as quoted by Miles, Andersen, Boden and Howell, p. 101.

¹³⁰ G Sirilli and R Evangelista, “Technological innovation in services and manufacturing: results from Italian surveys,” Paper presented at Systems and Services Innovation Workshop, CRIC, University of Manchester, March 1998, as quoted by Miles, Andersen, Boder and Howell, “Service production and intellectual property,” *International Journal of Technology Management*, vol. 20, 2000, pp. 95-115, at p. 101.

¹³¹ Ian Miles, Brigitte Andersen, Mark Boden and Jeremy Howells, This article was based on the empirical research undertaken for the project *How knowledge-based services manage their intellectual property*.

¹³² For more details on the INSTI project, see <<http://www.insti.de>> Visited February 26, 2001.

¹³³ For more details, see <http://www.patente.bmbf.de/foerde/inhalt_2.htm> Visited February 26, 2001.

¹³⁴ The Institut is a joint organization of commercial and employer associations and companies. Its main activities include undertaking economic analyses, information dissemination and providing specialized consultancy and advice for technical and commercial organization, as well as to the general public.

¹³⁵ For a comprehensive description of INSTI activities, see <http://www.insti.de/ORGAN_11.htm> Visited February 26, 2001.

¹³⁶ For more information on this, see <<http://www.busi.de>> Visited February 26, 2001.

¹³⁷ Danish Ministry of Trade and Industry, *Industry Policy in Denmark*, <http://www.dkpto.dk/english/content/publications/indu_policy/index.htm> Visited October 8, 2000, and March 4, 2001.

¹³⁸ Ibid.

¹³⁹ For more details on the suggestions, see Danish Ministry of Trade and Industry. For a synopsis of the Bolkstein plan, see “Lisbon pledges under threat from row over patents,” *European Voice*, 12-18 October, 2000, p. 21.

¹⁴⁰ The Danish Bailiff’s court and high court deal with a very limited number of patent cases, resulting in inadequate expertise to deal with such cases.

¹⁴¹ The proposal to set up an insurance scheme has been included in the European Commission Green Paper on the establishment of a European patent, in which it announced that it will take initial steps as part of the process of setting up a Community patent. At the same time the Commission will conduct a survey of the need for a European insurance scheme. <http://www.dkpto.dk/english/content/publications/indu_policy/index.htm> Visited March 4, 2001.

¹⁴² <http://www.dkpto.dk/english/content/publications/indu_policy/index.htm> Visited March 4, 2001.

¹⁴³ <<http://www.education.gouv.fr/actu/assisinn/DATA/LOMBARD.HTM>> Visited October 8, 2000.

¹⁴⁴ <<http://www2.admi.net/evariste/inpi/pi980121.html>>. Visited February 24, 2001.

¹⁴⁵ Ibid.

¹⁴⁶ <<http://www.education.gouv.fr/actu/assisinn/DATA/LOMBARD.HTM>> Visited March 6, 2001.

¹⁴⁷ Kitching and Blackburn, p. 331.

¹⁴⁸ Ian Miles, Birgitte Andersen, Mark Boden and Jeremy Howells, p. 112. See also Puay Tang, "The Use of Copyright as a Measure of Innovation: Software Applications in the Digital Age," *Intellectual Property Quarterly*, Launch Issue, 1997, pp. 71-91; and Pari Patel and Keith Pavitt, "Patterns of technological activity: their measurement and interpretation," in P Stoneman (ed.), *Handbook of Economics of Innovation and Technological Change*, Blackwell Publishers, Oxford, 1995, p. 45.

¹⁴⁹ See for example, Raj Mehta, and Eugene Sivadaa, "Comparing response rates and response content in mail versus electronic mail surveys," *Journal of the Market Research Society* 37 (4): 429-439, 1995; Pete Comley, "The Use of the Internet as a Data Collection Method. SGA Market Research," 1996, <http://www.sga.co.uk/esomar.html>; and Gi Woong Yung, and Craig W. Trumbo, "Comparative Response to a Survey Executed by Post E-mail, & Web Form," *Journal of Computer-Mediated Communication* 6 (1):2000, <http://www.ascusc.org/jcmc/vol6/issue1/yun.html>.

¹⁵⁰ Despite this assurance, some European companies contacted declined to respond on the basis that such information was highly confidential.

¹⁵¹ Recall that according to Oppenheimer's findings SMEs felt that, there is a misplaced belief that patenting will lead to commercialization of their creations/inventions, when in fact this often not the case.

¹⁵² This view was particularly strong among the representatives of UK-based SMEs, many of whom expressed the view that British venture capitalists were risk-averse when dealing with software development companies.

¹⁵³ These are Government funded organizations that assist SMEs with all aspects of business, including setting up new businesses.

¹⁵⁴ Intellectual Property Initiative, "How SMEs see their intellectual property rights," Research Programme on Intellectual Property, 1998, p. 3, and Summary Report on same project.

¹⁵⁵ For those who need a quick overview specifically on key software patenting issues, they could refer to a brochure written in German and edited by Siemens. This brochure outlines four principal questions a potential patentee or interested party will have to consider in patenting software, for instance, what is technical effect. It also summarizes the advantages and disadvantages of patenting software. See "Software-Erfindungen sind patentierbar," <<http://www.patente.bmbf.de/inform/down/software.pdf>> Visited on October 8, 2000.

¹⁵⁶ Intellectual Property Initiative, "How industry sees protection of its intellectual property," Research Programme on Intellectual Property, 1998, p. 6

¹⁵⁷ "Semiconductor makers take patent battles to court," Findlaw Legal News, <<http://news.findlaw.com/legalnews/2000831/n3156390.htm>> visited on September 7, 2000.