Study Contract ETD/99/B5-3000/E/106:

The Economic Impact of Patentability of Computer Programs

REPORT TO THE EUROPEAN COMMISSION BY

Robert Hart
Independent Consultant

Peter Holmes
School of European Studies,
University of Sussex

John Reid
IP Institute

on behalf of
Intellectual Property Institute
Suite 15-17, 2nd Floor
Outer Temple
222-225 Strand
London WC2R 1BA

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Section I
Summary of and conclusions from the Study

The purpose of this study is to provide information on a number of key elements to enable the Commission to assess whether the envisaged Directive should be confined to harmonising the relevant laws of the Member States on the patentability of computer program related inventions on the basis of the *status quo* as defined by the jurisprudence, or whether it should extend the scope of application of the Directive.

In respect of the latter option, we also provide guidance on the possible consequences of more wide ranging harmonisation.

We also provide a first assessment of the main consequences for innovation and competition, in particular for SMEs, of extending patent protection beyond current levels.

More specifically we address the following issues:

- What is the current legal situation in Europe, the United States, and Japan concerning the patentability of computer programs?

- What are the main effects that the law in these regions has had on innovation and competition, in particular for SMEs? In particular, what are the consequences for innovation and competition of the various interpretations of the "inventive step" requirement in the EU, the US and in Japan?

- What are the roles and the interests of European independent software developers including in particular the developers of open-source software in relation to patent protection for software?

- What is the impact of software-related patents on electronic commerce?

- Should patent protection in Europe be available for computer programs with applications outside the areas which are currently considered to be "technical" by the jurisprudence of the European Patent Office and Member States' courts and if so, to what extent? How could such an approach be explained as being in line with basic patent law principles?

Section II of our report is mainly directed to the first specific issue i.e.

What is the current legal situation in Europe, the United States, and Japan concerning the patentability of computer programs?

In summary Section II shows:

The exclusion achieved by the combination of Art 52.2.(c) and Art.53 of EPC of "computer programs" "as such" is, and was not meant to be other than, of negligible practical significance. However the presence in the EPC of these words gives support to the widespread belief particularly in SMEs and independent software developers that computer program related inventions are not patentable. (This links to the need for a continuing, indeed an increased programme to ensure European SMEs and independent software developers are aware of the opportunities and risks from patenting in this area.)

The real difference between the USA and Europe is that in Europe the invention has to be of a technical character whilst in the USA the mere fact that the invention uses a computer/software makes it of the technological arts, if also useful, concrete and tangible results are provided. The position in Japan is very similar to the position in Europe: the invention has to be an advanced creation of technical ideas by which a law of nature is utilised. (Of course in Europe, the USA and Japan whatever is being patented has also to be new and inventive.)

In all three jurisdictions business methods are patentable subject to the requirements indicated above. That the US does not require the invention to be of a technical character means that the restrictions on patenting of business methods are negligible; for almost all business methods, limiting patents on them to when use of a computer/software is involved, does not reduce the value of the patents. (Indeed it may be possible to patent business methods in the States without such a limitation.) But it is also important to realise that many computer-implemented business method inventions are of a sufficiently technical character to be patentable in Europe and in Japan.

Section III is the survey and evaluation of the evidence in the published (including on the internet) literature on the economics of the patent system, in particular in relation to computer program related inventions. The theoretical literature, in general, uses plausible but not fully proven assumptions. Section III also surveys and evaluates a large literature quoting anecdotal evidence. In formulating our views we have also relied when appropriate on our knowledge of the computer program related industries and the results of many discussions with groups and individuals.

But, in summary, Section III shows that the theoretical and other economic literature does not demonstrate, indeed casts doubt, on whether economic efficiency, i.e. increased overall welfare, is achieved by having or making computer program related inventions patentable.

An important preliminary issue in this study is:

What are the roles and interests of European independent software developers including in particular the developers of open-source software in relation to patent protection for software.

Independent software developers and related SMEs play a major and rapidly increasing role in innovation. This is because innovation in commerce and industry has become so dependent on improvements in computer related processes and products. This is clear to any reader of any newspaper and is also supported by the literature and from our consultations. The role of the developers of open-source software is a specific and significant example of the importance of such computer program related innovation.

But what are the roles and interests of European independent software developers including in particular the developers of open-source software in relation to patent protection for software?
Three crucial points are:

Possession of IPRs (intellectual property rights) helps any small company or individual independent software developer to raise finance to develop and market such inventions, and/or to license competitors and/or to sell or license his or her innovation to a major player. Possession of relevant IPRs empowers the SME or individual. A patent is much more powerful in this respect than copyright. (Copyright prevents copying of the

expression of an idea; patenting prevents use of the patented invention, which is much broader.)

As shown by Section II, the legal position on patentability of computer programs related inventions in Europe presents very similar opportunities, and threats, to independent software developers as are presented in the USA or in Japan.

As shown by Section III and by this Section, it is important that the normal, proper standards of patentability are applied to computer program related inventions.

From our research we conclude:

1. There is no evidence that European independent software developers have been unduly affected by the patent positions of large companies or indeed of other software developers. (We return to this point below when discussing the position in the USA.)

2. European independent software developers are making disproportionately little use of the patenting possibilities open to them compared with the use made by large companies and by US SME and even independent software developers.

3. There is increasing but still relatively low use by European independent software developers of patents in raising finance or in licensing i.e. in getting an invention through to being an innovation of benefit e.g. to consumers.

4. There is considerable evidence of concern by European independent software developers about the potential effects of patents on the development of computer program related inventions.

Developers of open-source software

All the above discussion applies to developers of open-source software but there are some important additional features. Open-source software is an important alternative to proprietary platforms. An example of the growing importance of open-source software is the support being given by IBM. (This involvement by IBM is, we believe, a straightforward response to customer needs.) A necessary feature of the propagation of open-source software is copyright and the cascade licensing of it e.g. through the GNU General Public License. The open-source community considers patents a threat to the development of open-source software and aims to ensure that patents do not affect such development. This is a consistent position. The GNU General Public License contains the statement "we have made it clear that any patent must be licensed for everyone's free use or not licensed at all". There is an analogy here to the position on patents in some standards, informal or formal.

However this position on patents could well change. Developers of open source software may find it advantageous to file patents to obtain bargaining positions e.g. licence money from owners of proprietary platforms. In any case the historical postion of the open source community is compatible with recognition that a developer could in any case want to obtain patents on specific applications. This point has been made by a number of people we have consulted. The importance of this can be illustrated by the following quote from one of them:

"I think it's important to draw the distinction that open source is invariably used to create an interoperable platform, i.e., a common body of source code that creates a foundation on top of which applications can be built. The goal of open source is to make sure that IP rights or other proprietary rights do not interfere with that platform. However all platforms exist to support applications built "on top" of that platform. Windows applications, Linux applications, Perl applications, etc. I've yet to see an open source license that required applications built on top of its platform to cede back IP rights - clearly that would destroy incentive to use that platform.

So the value of IP rights which might encompass a platform fall primarily on the value of being able to protect applications built on top of the platform. The rest of the rights necessary to create the platform are often most valuable when given away -open sourced - in order to incent growth of the platform that makes the applications valuable. It's that simple."

What are the main effects that the law in these regions (Europe, United States and Japan) has had on innovation and competition, in particular for SMEs?

Our input on Europe is given above.

Japan:
We have found no evidence that Japanese independent software developers have been unduly affected by the patent positions of large companies or of others. We also understand from Japanese contacts and other sources a) that a major effort has been put into making industry, including SMEs and independent software developers, aware of developments in the law world-wide on the patentability of computer program related inventions; b) that Japanese independent software developers are using the patent system especially because patents help them bring their innovations to the market, world-wide; and c) that the Japanese authorities intend to harmonise Japanese patent law as close to US law as possible.

United States
It is clear however that the United States provides the best test case as the United States has the greatest experience with patents on computer program related inventions.

1. On the one hand there is abounding evidence that the profitability and growth of independent and SME software developers in the States has often been to a significant extent dependent on possession of patent rights. (For how patents help, see above.)

2. On the other hand, there is deep concern

2.1 that patents are being granted on trivial, indeed old, ideas and that consideration of such patents let alone attacking such patents is a major burden, particularly on SME and independent software developers;

2.2 that patents may strengthen the market position of the big players; and

2.3 that the computer program related industries are examples of industries where incremental innovation occurs and that there are serious concerns whether, in such

industries, patents are welfare enhancing.

Our conclusions are that:

factor 1 is clearly important: the patentability of computer program related inventions has helped the growth of computer program related industries in the States, in particular the growth of SMEs and independent software developers into sizeable indeed major companies; and

overall it is not clear on the evidence that factor 1 is outweighed by factors 2.1 to 2.3.

We indicate below where there are doubts and also what the balances are in all the factors listed.

On 1: It is clear that at least in the early stages of the growth of computer program related industries there was relatively little use of patents. On the other hand lack of patents will have made it easier for major players to take ideas of SMEs and independent software developers and market them without recompense to the originators. There is at least ample anecdotal evidence that this indeed occurred.

On 2.1: It is important to understand why this has happened and also what is being done, what can be done to counter the results and what the possible lessons are for Europe.

Why this has happened: The US Patent Office does not have access to a large enough data base on which to judge the patentability of computer program related inventions. Also there is serious doubt whether, where adequately relevant prior disclosures have been found, the Patent Office has applied the criteria of novelty and unobviousness properly. Further the ways in which third parties can present arguments and evidence to the US Patent Office, which would affect the patentability of patent applications, are not as effective as the ways available in Europe.

What is being done and what can be done to counter the results: Clearly invalid patents are recognised as such. Their existence is an embarrassment to the system but is hardly a significant barrier to software developers. The invalidity of patents in these and, the more important, less clear cases is increasingly been brought to public notice by internet exchanges e.g. by the open-source community. Backing this up is the reality that the Courts will not allow invalid patents to be enforced. Knowledge of that makes weak patents a very weak negotiating weapon. But there is a learning curve whilst the computer program developer community becomes aware of these factors.

What are the possible lessons for Europe: We must recognise the importance of good data bases for patentability searches, both for Patent Offices and for third parties. We must ensure that our Patent Offices apply proper standards for patentability, in particular of unobviousness. (This appears to be a major problem, at least in the States and must be guarded against in Europe.) We must recognise our strength in having opposition procedures in addition to the facility (EPC Art 115) of being able to submit observations on the patentability of inventions to the EPO without the expense of opposition procedures. We should be aware that currently we have the disadvantage e.g. compared to the U.S. that there is no central European court dealing with patent matters. But most importantly we must ensure that the relevant players in this market, particularly SMEs and independent software developers, are adequately aware of the issues involved.

On 2.2: As explained in Section II network externalities drive industries like the computer program related industries towards market standardisation. When there are multiple players the evidence shows that there will be provisions for fair, reasonable and non-discriminatory licensing. (The presence of an effective anti-trust regime will often play a major role here.) However where network effects are strong enough the market can be driven to *de facto* standardisation to the dominant player's product or process. Possession of patents can help a dominant player achieve this position. But usually market forces are such that the most significant and potentially dominant player finds that the most profitable route is to license his technology to the market, often in a standardisation process, knowing that he will gain by the greater expansion of the market which then arises. Also, even if the dominance route is chosen, the effect of patents is marginal compared with the effect of the network externalities.

Finally, effective anti-trust regimes can require a company which is abusing its dominant position in particular in the way in which it is exercising its IP rights to licence these rights. We would add that the presence of compulsory licence provisions in patent law in Europe have no or only a marginal effect in such situations, basically because such provisions usually only apply when the market for the patented goods or process is not being supplied in a way, the legal provisions approve and the dominant supplier will in almost all cases be supplying in such a way.

On 2.3: On the one hand we recognise the strength of economic opinion that this is a serious issue. There is clear evidence that, at least in some industries with rapid incremental innovation, a "shot-gun" approach develops on patenting. On the other hand the relevant liteature seems to recognise that patents that are of real value in the "bargaining" are ones which are on inventions which have value in the market i.e. are on products or processes which are or are likely to be used in innovative products. Also the literature recognises that patents empower SMEs and independent developers, e.g. in relations with major companies and in getting venture capital.

There remain two further specific issues:

In particular, what are the consequences for innovation and competition of the various interpretations of the "inventive step" requirements in the EU, the U.S. and in Japan?

What is the impact of software-related patents on electronic commerce?

To the first: As set out in Section II, and summarised above, the opportunities for obtaining business methods are greater in the U.S. than in either the EU or Japan. However in both the EU and in Japan many patents have been granted for business methods i.e. when the requirements for patentability are met - for EU technical character, novelty and non-obviousness. The consequent differences for innovation and competition are particularly difficult to assess. In particular it is clear that the problems summarised above on the grant of patents in the U.S. apparently on trivial "inventions" is of special concern in the area of patents on business methods.

To the second: Electronic commerce is already affected by patents as by other IPRs. This is of course true for electronic commerce in physical articles but is as true for less tangible goods. It is crucially important that SMEs and independent software developers are adequately aware of the opportunities and risks involved. Having a different regime for patentability of computer program related inventions will certainly make the position more complicated than it already is for software

developers who engage in electronic commerce. (There are of course factors relevant to electronic commerce in general e.g. jurisdiction and proof which are also relevant when patent issues arise in the context of electronic commerce.)

We return to the more general aims of the study.

I To provide information on a number of key elements to enable the Commission to assess whether the envisaged Directive should be confined to harmonising the relevant laws of the Member States on the basis of the *status quo* as defined by the jurisprudence, or whether it should extend the scope of application of the Directive.

II In respect of the latter option: to provide guidance on the possible consequences of more wide ranging harmonisation.

III To make a first assessment of the main consequences for innovation and competition, in particular for SMEs, of extending patent protection beyond current levels.

IV Finally, to address whether patent protection in Europe should be available for computer programs with applications outside the areas which are currently considered to be "technical" by the jurisprudence of the European Patent Office and Member States' courts and if so, to what extent. A particular issue is how such an approach could be explained as being in line with basic patent law principles.

On I: we consider that this report has, despite the constraints of time and budget, provided a great deal of useful indeed probably sufficient information on the key elements.

On II and III: There may be other ways of formulating the options for possible more wide ranging harmonisation beyond current levels but we suggest the following three:

Option 1: we could stay with the *status quo*, subject to removal of the exclusion of "computer programs" "as such". This would, we consider, have no consequence except the important one that SMEs and independent software developers will be less likely to consider computer program related inventions unpatentable.

Option 2: European law could ensure that the mere use of a computer program/computer to implement an invention brings an invention within technology, as appears to be the case in the USA. This would be a substantial change from basic principles of Eiropean patent law. It would be highly controversial. But it would bring European law into alignment with U.S. law on patentability of business methods.

Option 3: European law could be altered to have no requirement that patents be limited to technology. If it were accepted that business methods should be patentable *simpliciter* then this is the logical consequence. But any attempt to make such a change would cause great controversy. This would interfere in achievement of option 1 and in achievement of adequate understanding by SMEs and independent software developers of the opportunities and risks from the patentability of computer program related inventions under option 1 or under the *status quo*.

Very relevant to options 2 and 3, as to any extension of patents, is the caution amongst economists specialising in IP rights. As shown in our economic study of the literature (Section III of our report), most economists have doubts whether economic efficiency, i.e. increased overall welfare, is achieved by having or making computer program related inventions patentable. This caution is supported by the continuing, indeed growing, concern in the USA on the issues surrounding patents on computer program related inventions. The debate in the States is not finished.

On IV: This is mainly covered by our input on II and III except for the last sentence of IV: **A particular issue is how such an approach could be explained as being in line with basic patent law principles.**

We consider this in relation to options 2 and 3 above.

Option 2 would allow a patent to be granted on a novel and unobvious invention which had no other connection with technology than that the invention is implemented on a computer. This can be argued to meet e.g. the United Nations definition of technology: "a combination of equipment and knowledge" and so to be in line with basic patent law principles. However it can also be argued that nothing technological is achieved by the combination of the computer (equipment) and the knowledge, which would for the purposes of the argument not be technological. It should be noted that option 2 could similarly be argued to meet the (minimum) requirement of TRIPs Art 27 "that patents shall be available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application. ..... without discrimination as to ..... the field of technology ".

Option 3 stretches the principles perhaps to breaking point in that no connection with technology would be required. Most experts would say that this goes beyond the basic principles of patent law. There is however the reply, which Judge Rich may have articulated in State Street Bank, that if a non-technological invention is new and unobvious and is useful in commerce or industry then society should encourage the making of such inventions and their use as basis for innovation by granting patents on them. We can only warn that the debate will continue.

Section II
The Current legal situations in Europe, the United States and Japan concerning the patentability of computer programs

Before embarking upon an analysis of the legal situations on the patent protection of inventions embodied in computer programs it is important to try to define what is meant by the term "computer program". The European Patent Convention does not include one and there is no internationally accepted legal definition for computer programs although WIPO defined the term as:-

> A set of instructions capable, when incorporated in a machine readable medium of causing a machine having information processing capabilities to indicate, perform or achieve a particular function, task or result.[1]

The Software Directive[2] specifically chose not to include a definition of 'computer program' although the Explanatory Memorandum accompanying the original proposal[3] suggested that "(G)iven the present state of the art, the word `program' should be taken to encompass the expression in any form, language, notation or code of a set of instructions, the purpose of which is to cause a computer to execute a particular task or function". The Explanatory Memorandum explained that upon recommendations "by experts in the field that any definition in a Directive of what constitutes a program would of necessity become obsolete as future technology changes the nature of programs as they are known today".

The Unites States of America's Copyright Law[4] 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 certain result.

From the above it can be concluded that a computer program should be considered as a set of statements or instructions which is capable of causing a machine having information processing capabilities (a computer) to perform a set of functions to achieve a result.

1. The situation in Europe under the European patent Convention (EPC)

Background to the EPC.

At first sight, the EPC[5] specifically excludes programs for computers as such as patentable inventions. It is important to establish why programs for computers were excluded from the EPC. Herr Gunter Gall Director Legal Affairs European Patent Office, Munich, in a paper given at the OFDI Seminar on April 17, 1985 in Paris in introducing the "new" guidelines for examination in the European Patent Office specifically identified that

> "Neither the first draft for a European Patent Convention, which dates from 1962, nor the

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1. WIPO Model provisions on the protection of computer software Geneva 1978.
2. Council Directive on the legal protection of computer programs (91/250/EEL).
3. Proposal for a Council Directive on the Legal Protection of Computer Programs COM(88) final-SYN183.
4. Title 17 of the United States Code.
5. Article 52(2)(c) excluding schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers.

> Strasbourg Patent Convention of 1963 contains a separate provision excluding computer programs. It was only the second preliminary draft for a European Patent Convention dating from 1971 which explicitly excluded computer programs from patentability in line with Rule 39(1) PCT[6]. Before being adapted to the EPC, numerous national patent laws incorporated no special grounds for exclusion in relation to computer programs. Nevertheless, the patentability of computer programs was denied by case law in these countries".

Gunter Gall continues as follows:-

> "Of particular interest in this connection is the Strasbourg Patent Convention, from the provisions of which the substantive elements of the law of patentability as set out in the EPC were derived. There is no indication in the EPC travaux préparatoires that the listing of non-patentable inventions in Article 52(2) EPC was intended to represent a departure from the Strasbourg Convention. The fact that a considerable number of the Contracting States of the EPC ratified the Strasbourg Patent Convention after ratifying or acceding to the EPC proves that these States assumed that the two Conventions tallied with one another in all respects.
>
> The main reason why computer programs are excluded from the range of patentable inventions is therefore to be found in the concept of the Invention, which grew out of national traditions and forms the basis of the EPC. Even if programs for computers were not explicitly excluded from patenting by Article 52(2) EPC, European patents could not be granted in respect of them because they do not constitute a patentable invention as defined in Article 52(1) EPC."

Having reviewed the legal history Herr Gall reaches the following conclusion:-

> "The reason for the exclusion of programs for computers as such is that, like discoveries, scientific theories, mathematical methods and presentations of information, they are not of a technical nature. Patentability requires a specific technical application.
>
> To summarize, therefore, it can be said that the special provisions excluding programs for computers is only of a declaratory nature, i.e. merely affirms something which could already be deduced from Article 52(1) EPC itself. This means that the answer to the question whether computer programs could be patentable in the absence of any explicit exclusion is "no". From this we then also derive the answer to the question whether computer programs are subject to the general rules of patent law, which is of special significance for the practical application of the provision. The answer is in the affirmative. Inventions which relate to

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[6]. 39.1 Definition
No International Searching Authority shall be required to search an international application if, and to the extent to which, its subject matter is any of the following:
(i) scientific and mathematical theories
.
(ii) schemes, rules or methods of doing business, performing purely rental acts or playing games
.
(vi) computer programs to the extent that the International Searching Authority is not equipped to search prior art concerning such programs.

> computer programs or in which such programs constitute an essential element are subject to the general rules of patent law. Thus in the case of inventions relating to programs for computers the relevant question is whether the invention is of a technical nature."

The final words of the above quotation identify the key to the patentability of inventions embodied in computer programs in Europe. As identified in a European Patent Office document[7] proposing a revision to Article 52 EPC, to be patentable an "invention must have a technical character or, in other words, must provide a technical contribution to the art".

Technical Board of Appeal Decisions on programs for computers as such.

The recent two Technical Board of Appeal decisions[8] both involving IBM patent applications identify how the exclusion of programs for computers as such is to be construed. It is firstly important to recognise that the Board addressed, for the first time, the meaning of the exclusion of "programs for computers as such" and has decided in favour of computer program product claims. These decisions over ride the passage in the Guidelines for Examination in the European Patent Office at C-IV, 2.3 where it is stated that "a computer program claimed by itself or as a record on a carrier is not patentable irrespective of its contents" and distinguish the decision in T204/93 reasons, 3.13.

The Board used the same reasoning in both decisions, reaching the following important conclusions:

> "In the view of the Board, a computer program claimed by itself is not excluded from patentability if the program, when running on a computer or loaded into a computer, brings about, or is capable of bringing about, a technical effect which goes beyond the "normal" physical interactions between the program (software) and the computer (hardware) on which it is run."
>
> "Furthermore, the Board is of the opinion that with regard to the exclusions under Article 52(2) and (3) EPC, it does not make any difference whether a computer program is claimed by itself or as a record on a carrier…".

In the first case (T935/97), the invention involved detecting where a second window overlies part of a first window obscuring information in a portion of the first window, and causing the information obscured by the second window to be displayed in another portion of the first window not obscured by the second window. The Examining Division had accepted system and method claims directed to this invention but rejected claims to (i) "a computer program product comprising a computer readable medium, having thereon: computer program code means, when said program is loaded, to make the computer execute procedure to.....", (ii) "a computer program element comprising: computer program code means to make the computer execute a procedure to.....", and (iii) "a computer readable medium, having a program recorded thereon, where the program is to make the computer execute procedure to.....".

In the second case (T1173/97), the invention involved resource recovery in a computer system, including implementing a commit procedure for a work request and, in the event that the commit procedure fails, notifying an application that it may continue, and, while the application continues to run, resynchronising the incomplete commit procedure. Here also, the Examining Division had

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7. SACEPO 6/99.
8. T935/97 and T1173/97.

accepted system and method claims, but rejected claims to (i) "a computer program product directly loadable into the internal memory of a digital computer, comprising software code portions for performing the steps of claim 1 when said product is run on a computer" and (ii) "a computer program product stored on a computer usable medium, comprising: computer readable program means for causing a computer to control an execution of an application.....".

The Board considered that the combination of the two provisions of Article 52(2) and (3) demonstrated that the legislators did not want to exclude from patentability all programs for computers. The fact that only patent applications relating to programs for computers **as such** are excluded from patentability means, in the Board's view, that patentability may be allowed for some programs for computers. The exclusion the Board considered may be construed to mean that programs as such are considered to be mere abstract creations, lacking in technical character, whereas, those programs that have a technical character must be considered as patentable inventions.

Although the EPC does not specify the requirement of technical effect, the Board identified that the **technical character** of an invention is generally accepted as an essential requirement for its patentability, as illustrated, for instance, by Rules 27 and 29 EPC[9].

The Board considered that the normal physical modifications of the hardware (e.g., the generation of electric currents) deriving from the execution of the instructions given by programs for computers cannot *per se* constitute the technical character required for avoiding the exclusion of those programs. However, technical character can be found in further effects deriving from the execution (by the hardware) of the instructions given by a computer program.

The Board also indicated that for the purpose of determining the extent of the exclusion the further effect may "be known in the art".

Where a computer program product produces such a further technical effect when run on a computer, the Board described such a computer program product as having the potential to produce such a further technical effect. Accordingly, in a case where a specific computer program product, when run on a computer, brings about such a further technical effect, the Board could see no good reason to distinguish between a direct technical effect and an indirect technical effect.

Using a similar line of reasoning as in the VICOM decision, the Board found that it would be illogical to grant a patent for a method and an apparatus adapted for carrying out the same method, but not for the computer program, which comprises all the features enabling the implementation of the method and which, when loaded in a computer, is indeed able to carry out that method. Also, bearing in mind the findings in the BBC decision T 163/85, OJ 1990, 379 where it was held that a television signal was patentable, the Board did not consider that it made any difference whether a computer program product is claimed by itself or as a record on a carrier.

The Board did not finally decide on a specific wording for a program product claim in the cases concerned, but instead remitted the cases back to the Examining Division to make this determination. However, it is to be noted that the EPO Board has gone further than the Beauregard

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[9]. Rule 27(1) The description shall: (a) specify the technical field to which the invention relates ....

Rule 29(1) The claim shall define the matter for which protection is sought in terms of the technical features of the invention.

case in the USA, in suggesting that claims may be obtained to a computer program product without a reference to some sort of carrier. This would appear to give considerable flexibility in determining claims appropriate to provide coverage for an invention, for example for a software-implemented invention distributed on-line over the Internet.

A further important issue was addressed by the Board in these two decisions. While pointing out that "the question to be decided upon the present appeal has not been answered earlier by the boards of appeal", the Board felt obliged to comment on case T0204/93 "System for generating software source code/ATT". In this case the Board had recognised "that computer programs may be useful, or applicable to practical ends" and when executed by a computer may control a patentable technical process and had stated "that computer programs as such, independent of such an application are not patentable irrespective of their content, even if that content happens to be such as to make it useful, when run, for controlling a technical process". The Board in these two recent decisions wished "to distinguish the cited decision T204/93, in so far as the latter purports to exclude all computer programs as such, i.e. irrespective of their content".

The Technical Board of Appeal decisions, prior to the above IBM decisions, had identified that the non-patentability of programs for computers *as such* did not preclude the patenting of computer-related inventions. However, as the EPO paper identifies[10], "the real technical contribution to the state of the art which the subject-matter claimed, considered as a whole, adds to the known art, should be ascertained (the subject matter may also be defined by a mix of technical and non-technical features)".

European Patent Office Guidelines

The guidance given by the European Patent Office Guidelines sets out the approach to be used in connection with the operations of search and examination in the EPO on computer program related inventions. They were modified in 1985 in response to pressure applied by the computer industry for a somewhat more liberal line than that adopted in the past. During the discussions at the EPO it was made clear by industry that practical difficulties, which might be involved in searching inventions which include computer programs, should **not** justify a restrictive approach on patentable subject-matter in this field of technology.
The guidelines adopted a medium course. They reject the very radical approach that the mere combination of "computer & program" should be sufficient to justify patentability. Therefore, the guidelines (C-IV, 2.3) make it clear that:

> "A computer program claimed by itself or as a record on a carrier is unpatentable irrespective of its content. The situation is not normally changed when the computer program is loaded into a known computer".

It should be noted, however, that the European Patent Office has produced a "practice note" on the "patentability of programs for computers" as a consequence of the European Technical Board of Appeal decisions T1173/97 and T0935/97 commented on later.
The European Patent Office practice note indicates that:-

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[10]. Ibid at 7.

> Programs for Computers are considered as having **technical character**, if they **cause, when run on a computer, a technical effect** which may be known in the art but must go **beyond the "normal" physical interactions between program and computer**.
>
> Consequently a program that causes, when run on a computer, the required technical effect would be regarded as an invention within the meaning of Article 52(1) EPC.
>
> As a further consequence, such a computer program may, in principle be claimed by itself or as a program product or as a record on a carrier.

This clearly modifies the statement in Section C-IV, 2.3 of the Guidelines noted above.
The guidelines have always indicated that "patentability (of subject-matter claimed) should not be denied merely on the ground that a computer program is involved in its implementation". If the subject-matter as claimed makes a **technical** contribution to the known art "it is not excluded from patentability". Program-controlled machines and program-controlled manufacturing and control processes are cited as examples which "should normally be regarded as patentable subject matter".

If the subject-matter claimed is concerned only with the internal working of a known computer it can be patentable if it provides a **technical** effect:

> "As an example, consider the case of a known data-processing system with a small fast working memory and a larger but slower further memory. Suppose that the two memories are organised, under program control, in such a way that the process which needs more address space than the capacity of the fast working memory can be executed at substantially the same speed as if the process data were loaded entirely in that fast memory. The effect of the program in virtually extending the working memory is of a technical character and might therefore support patentability".

The basic test as to whether the claim is for an "invention" within the meaning of Article 52(1) EPC is to be the same for computer-program-related inventions as for other exclusions in Article 52(2). This test is whether or not the invention is of a "**technical** character". (Guidelines C-IV, 2.3).

It should be noted that the requirement of "technical effect" does not arise from the European Patent Convention, rather from the Rules (27 and 29), and **technical effect** has been the subject of considerable discussion in the Technical Board of Appeal in the EPO and in the UK Patent Office and the Patents and Appeal Courts.

The revised guidelines furthermore make it clear that the basic test of whether there is an invention within the meaning of Article 52(1) EPC is "separate and distinct from the question whether the subject-matter is susceptible of industrial application, is new and involves an inventive step". If the subject-matter claimed is not excluded from patentability as "non-technical subject-matter" the invention must still pass the test whether the invention involves an inventive step (Article 56 EPC).

It must be recognised that patents generally are not granted for methods of performing mental acts, playing games or doing business. The European Patent Office guidelines specifically say "However, novel apparatus for playing a game or carrying out a scheme **might** be patentable". Accordingly, computer programs which, when loaded into a computer system, cause that system to operate to

either perform a new function, or to achieve an old function in a new manner, may well be capable of protection by the patent system by protecting the apparatus and/or the process when performing the new or improved function as well as by drafting claims to the program incorporating the new or improved function. Key to the patentability of such inventions is the identification of a technical contribution.

The appendix to this report addresses the other Technical Board of Appeal decisions which relate to computer programs.

Crucial to many of the Technical Board of Appeal decisions on the patentability of inventions embodied in computer programs as discussed in the Appendix to this report has been the requirement that the **invention** is of technical character.

Technical effect/character

The lack of technical character has been addressed by the Technical Board of Appeal specifically in addition to the cases identified above on the issue of computer programs in two cases T833/91 and T204/93.

It is interesting to note that the Technical Board of Appeal in its decisions in the IBM cases (T935/97 and T1173/97) specifically distinguished them from reasons 3.13 of Case T204/93. The following paragraph appears in 3.13 of T204/93:-

> However, computer programs as such, independent of such an application, are not patentable irrespective of their content, i.e. even if that content happened to be such as to make it useful, when run, for controlling a technical process. Similarly, a programmer's activity of programming would, as a mental act, not be patentable irrespective of whether the resulting program could be used to control a technical process. And finally, automating unconventional means would not render that programming method patentable either, independently of the content of the resulting program.

The claimed invention in T204/93 related to the art of generating "concrete" programs (i.e. those written in a particular programming language). The "concrete" programs were generated from supplied "generic" specifications by selecting and translating program components or modules written in a more generally usable language. The principles of the claimed invention were analogous to the well-know calling-up of stored sub-routines in main programs. The Board considered that the computer would not work in an essentially new way from a technical point of view.

The significance of the Board's decision in T833/91 is that:-

> The Board thus concluded that, in accordance with the consistent case law of the Boards of Appeal, it could be said that the technical contribution to the art rendering a claimed invention within the meaning of Article 52(1) and thus patentable, might lie either in the problem underlying, and solved by, the claimed invention or in the means constituting the solution of the underlying problem or in the effects achieved in the solution of the underlying problem.

The claimed invention of T833/91 concerned the designing or developing of application programs.

The Board considered that as programs for computers were expressly excluded and a programmer's activity involved mental acts the contribution of the invention fell within the exclusions of Article 52(2)(c).

Finally the Board in T935/94 found that the inclusion of the term "physical" in relation to a method of analysing the functional relationship between two parameters, allied to the inclusion of a limitation "extending the range of said one parameter in accordance with the data generated for displaying on a visual display unit the prolongation of said curve for use in the control of said physical process" limited the claim in a technical sense and was not excluded from patentability.

2. The situation in the U.S.

Firstly it must be stressed that the U.S. Patent Law does **not** include statutory exceptions to patentability. The law details what is patentable rather than listing what is not. The only exceptions to patentability are judicially created. The Supreme Court of the United States has identified three categories of subject matter that fall outside the boundary of Section 101[11] as "laws of nature, natural phenomena and abstract ideas"[12].

The U.S. Patent Office Guidelines for Computer-related Inventions[13].

In response to the U.S. appeals court decisions, particularly "In re Alappat"[14] and "In re Lowry,"[15] the U.S. Patent Office issued these Guidelines in 1996. The Guidelines represented a significant change in approach to computer program embodied inventions. Under the heading '**Determines What Applicant Has Invented and Is Seeking to Patent**" the following appears:-

> "Prior to focusing on specific statutory requirements, office personnel must begin examination by determining what, precisely, the applicant has invented and is seeking to patent, and how the claims relate to and define that invention. Consequently, Office personnel will no longer begin examination by determining if a claim recites a mathematical algorithm".

Further, under the heading '**Identify and Understand Any Practical Application Asserted for the Invention**" it is stated:-

> 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**. (emphasis added)

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11. Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title.
12. Diamond v Dieler, 450 U.S. 175,105 (1980).
13. The guidelines identify that "Computer-related inventions" include inventions implemented in a computer and inventions employing computer-readable media.
14. 33F3d 1526(Fed Cir 1994).
15. 32F3d 1579(Fed Cir 1994).

Finally the Guidelines under the heading "**Claims Particularly Pointing Out and Distinctly Claiming the Invention**" identify 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**. (emphasis added)

Since the adoption of the Guidelines there has been two significant U.S. Court of Appeal for the Federal Circuit cases which have had an effect on the scope of protection provided for computer program related inventions in the United States.

Although the Guidelines had assimilated the case law there still was confusion over the issue of whether or not mathematical algorithms were a fourth category of unpatentable subject matter. This confusion was due, in particular, to two statements made in the Supreme Court decision Gottschalk v Benson[16]. The first statement of the Court was:-

> The mathematical formula involved [had] no substantial practical application except in connection with a digital computer

and as a consequence:-

> the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself[17]

The second statement of the Court was:-

> The transformation and reduction of an article to a different state or thing is the clue to the patentability of a process claim that does not include particular machines[18].

The difficulty of deciding which algorithms were patentable and which were not, had led to the development of the *Freeman - Walter - Abele* test which has been articulated as:-

> First, the claim is analyzed to determine whether a mathematical algorithm is directly or indirectly recited. Next, if a mathematical algorithm is found, the claim as a whole is further analyzed to determine whether the algorithm is "applied in any manner to physical elements or process steps" and, if it is it "passes muster under 101".

The United States Court of Appeals for the Federal Circuit in the *State Street Bank & Trust Co. v*

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16. 409 U.S. 63 (1972).
17. Id. at 71-71.
18. Id. at 70 .

Signature Financial Group Inc.[19] case took the opportunity of reviewing the "Mathematical Algorithm" exception noting that the *Freeman - Walter - Abel*e test, after *Diehr*[20] and *Chakrabarty*[21]:-

> has little, if any applicability to determining the presence of statutory subject matter.

The Court of Appeals noted that after Diehr and Alappat:-

> the mere fact that a claimed invention involves inputting numbers, calculating numbers, outputting numbers, and storing numbers in of itself, would not render it non-statutory subject matter, unless, of course, its operation does not produce a useful concrete and tangible result'.

The Court of Appeals, therefore, held that:-

> the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces "a useful, concrete and tangible result" - a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades.

It is important to recognise that, since the Supreme Court denied review of the Federal Courts decision[22] the State Street Bank case represents the resolution of the patentability of algorithms (i.e. if they produce a useful concrete and tangible result, they are statutory).

The decision in *State Street Bank* also clarified the issue regarding the patentability of business methods. Strictly this issue is not directly related to the patent protection for computer programs but it can be seen that it relates to patent protection for inventions embodied in computer programs, since it is the implementation of the business method by a suitably programmed computer that is at issue. The District Court for the District of Massachusetts had granted a notion for summary judgement in favour of State Street Bank & Tryst Co. finding U.S. Patent 5,193,056 invalid[23] on the ground that the subject matter was not encompassed by 35 USC 101 (1994) as the invention was a business method. The Court of Appeals in the *State Street Bank* case stated:-

> (W)e take this opportunity to lay this ill-conceived exception to rest.

This is particularly significant as Visa International Service Association and Master Card International Incorporated had submitted an *amicus brief* supporting State Street and had argued that business methods were non-statutory subject matter regardless of computer implementation or use of any mathematical algorithm.

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19. 149 F.3d 1374 (1998).
20. Diamond v Diehr 450 U.S. 175 (1981).
21. Chakrabarty, 447 U.S. 303 (1980).
22. 119S.ct 851 (1999).
23. 927F Supp. 502, 38UPSQ2d 1530(D. mass.1996).

The Court stated that:-

> the "business method" exception has merely represented the application of some general, but no longer applicable legal principle .... Since the 1952 Patent Act, business methods have been, and should have been, subject to the same legal requirements for patentability as applied to any other process or method.

The Court of Appeals noted that the District Court had used the primary reason for finding the patent invalid under the business method exceptions as follows:-

> If Signatures' invention were patentable, any financial institution desirous of implementing a multi-tiered funding complex modelled on a Hub and Spoke configuration would be required to seek Signature's permission before embarking on such a project. This is so because the '056 Patent is claimed sufficiently broadly to foreclose virtually any computer-implemented accounting method necessary to manage this type of financial structure.

The Court of Appeals stated:-

> (W)hether the patent claims are too broad to be patentable is not judged under 101, but rather under 102, 103 and 112. Assuming the statement to be correct, it has nothing to do with whether what is claimed is statutory subject matter.

It is interesting to note that the Court of Appeals commented on the removal from the Manual of Patent Examining Procedures of the paragraph:-

> Though seemingly within the category of process or method, a method of doing business can be rejected as not being within the statutory classes.

The Court approved of the latest Patent and Trade Mark Office Examination Guidelines for Computer Related Inventions where in its introduction it indicates:-

> Office personnel have had difficulty in properly treating claims directed to methods of doing business. Claims should not be categorized as methods of doing business. Instead such claims should be treated like any other process claims.

It would appear that after *State Street Bank* it is only necessary to decide if the business method is not a law of nature, natural phenomena, or abstract idea for it to be statutory subject matter.

The Signature patent in the *State Street Bank* case only had apparatus claims and the *AT&T v Excel Communications Inc.*[24] case confirmed that the scope of 101 is the same regardless of the form of the claims e.g. either machine or process. The Court held that *State Street Bank* applied fundamental, underlying principles of the law and, therefore, the same reason used there with regard to machine and process claims applied to method claims.

The *State Street Bank* decision has removed two major restrictions on patentability - mathematical algorithms and the business method exception. The focus for patentability in the United States

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[24]. 172 F.3d 1352 (Fed.Cir.1999).

regardless of the subject matter is "utility" which the court defined as "the essential characteristics of the subject matter" and the "practical utility of the invention". Specifically the key to patentability is the production of a "**useful, concrete and tangible result**" and the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation.

3. The Situation in Japan

The Japanese statutory definition of invention is "a highly advanced creation of technical ideas by which a law of nature is utilized".

The Japanese Implementing Guidelines for Inventions in specific fields[25] identifies in Chapter 1, right at the start, that claims may be for a process:-

> where a software related invention is expressed in a sequence of processes or operations connected in time series, or a procedure, the invention can be defined as a process invention by specifying the procedure

or for a product:-

> where a software related invention is expressed as one or more functions performed by the invention, the invention can be defined as a product invention by specifying functions

or for a computer-readable storage medium having a program recorded thereon or a computer-readable storage medium having structured data recorded thereon:-

> where a product is defined by its functions.

The Guidelines specifically identify the forms of claims for computer-readable storage medium inventions.

According to the SOFTIC papers[26] Noaki MIZUTANI indicates that inventions involving computer programs would be subject to the following process by the Japanese Patent Office (JPO):-

> "The JPO examines an invention described in an application in order to evaluate if the invention conforms to the following requirements.
>
> (1) Whether the technology of the application. (Section 2, paragraph 1)
>
> (2) Whether there is a novelty in the invention described in the application. (Section 29, Paragraph 1)
>
> (3) Whether there is an inventive step in the invention described in the application.

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[25]. http://www.jpo-miti.go.jp/infoe/txt/soft-e.txt.

[26]. SOFTIC SYMPOSIUM '99 - Electronic Commerce and Intellectual Property Rights - Nov 30 and Dec 1, 1999.

(Section 29, Paragraph 2)

If the technology described in the patent application is identified as satisfying all of the above requirements, a patent right is granted to the invention thus examined.

"An invention" in the Japanese Patent Law

(1) The Japanese Patent Law, Section 2, Paragraph 1 defines an invention as follows.

"An invention' in this Law means a highly advanced creation of technical ideas by which a law of nature is utilized."

Though a business method presupposes that it is provided by utilization of a computer system, most business methods have their features in commercial utility rather than technical utility. Thus, a question is raised as to whether a business method comes under "the highly advanced creation of technical ideas by which a law of nature is utilized", which is the definition of an invention.

In Japan, conventionally, according to the majority's opinion, a business method does not come under a statutory invention on the ground that it utilizes a commercial experimental rule or an economic rule mainly, but it does not utilize a law of nature.

This problem is assignable to no other than an issue of an interpretation of the Japanese Patent Law. The patent practice in this regard has been formed mainly by the Japanese Patent Office.

That is, according to "Implementing Guidelines for Examination of Inventions in Specific Technical Fields, Chapter 1. Computer Software-related Inventions" announced by the Japanese Patent Office in 1997, utilization of a law of nature is found when an invention corresponds to any of the following cases:

1. control of hardware resources or processing operation associated with control
2. information processing based on physical property or technical property of an object
3. processing by utilizing hardware resources

As a business method presupposes the use of a computer system, a problem comes up as to whether the business method corresponds to item 3 above in particular.

Incidentally, according to Implementing Guidelines for Examination of "Industrially Applicable Inventions" announced concurrently along with the above-mentioned Implementing Guidelines for Examination of Inventions in Specific Technical Fields, an invention which corresponds to any of the following cases does not conform to a statutory invention.

a. a law of nature per se
b. a mere discovery, not a creation
c. violation of a law of nature

d. a law other than a law of nature and utilization of such law only
e. a skill (which can be achieved by an individual person and lacks in objectivity to allow to convey it to a third party as knowledge.)
f. mere presentation of information (where a technical feature resides solely in the content of the presented information and a main object is directed to presenting the information.)
g. a mere aesthetic creation
h. those which present means for resolving a problem to be solved by an invention but apparently, such means cannot achieve that problem.

As business methods are emphasized in their economic utility or commercial utility in many cases, a question is raised as to whether a business method may come under the above case d. as failing to correspond to a statutory invention.

In any case, this problem is related to a question of whether utilization of a law of nature is found in a business method. In this regard, according to the above Implementing Guidelines, there is a possibility that a business method comes under "processing by utilizing hardware resources" at item 3 above, so long as the business method can be provided by utilizing a computer system even though mostly the business method has its feature in the aspects of economic utility or commercial utility.

Therefore, as far as the above-said case is concerned, utilization of a law of nature can be affirmed by the above Implementing Guidelines.

More specifically, as a specific example of the business method which can be affirmed as a statutory invention, the Implementing Guidelines exemplifies:

"an apparatus for forecasting sales of a commodity product" (a system for forecasting future sales of a commodity product based on data on fluctuation factors in past sales including such as the weather, a day of the week, events, status of competing stores, etc.) In the Implementing Guidelines, this apparatus is affirmatively regarded as corresponding to a statutory invention because processing operation therein is carried out by utilizing hardware resources.

In addition, the Implementing Guidelines further sets forth that the above example ("an apparatus for forecasting sales of a commodity product") corresponds to a statutory invention because it defines how to use a computer rather than the mere use of the computer.

The above passage is directed to the mere introduction of the Implementing Guidelines announced by the Japanese Patent Office. In view of the fact that the Japanese patent practice has been conducted thus far substantially in accordance with the Implementing Guidelines, it should be permissible to predict to a certain extent based on the Implementing Guidelines as to a question of whether a business method will be regarded as a statutory invention in the future patent practice in Japan. (Needless to say, handling in the practice by the Japanese Patent Office is subject to ex post facto review by the Court.)

In this connection, it is possible that a business method or a business model may be

> affirmatively regarded as corresponding to a statutory invention in the patent practice in Japan, though a question of whether a business method is affirmatively regarded as a statutory invention depends on substance or claim language of an actual claim (relating to e.g. "how to" as pointed above)".

Tentative conclusions.

All three systems permit claims to computer programs on a carrier for computer program related inventions.

The U.S. does not have statutory exclusions for inventions and it identifies four categories of patentable subject matter: process, machine, manufacture and composition of matter. The Supreme Court has identified three categories of subject matter that do not fall within the boundary of the statute: "laws of nature, natural phenomena, and abstract ideas".

The U.S. Patent Office Guidelines specifically identifies that the utility of an invention must be within the **technological** arts. A computer related invention is within the technological arts Claims to computer programs on a carrier are statutory on the grounds that they define an article of manufacture.

The State Street Bank Case has removed the mathematical algorithms and method of doing business "exceptions" and has defined that the focus for patentability in the United States is "utility" which is defined as "the essential characteristics of the subject matter" and the key to patentability is the production of a "useful, concrete and tangible result".

The European Patent Convention has specific exclusions which includes programs for computers and methods of doing business. The Technical Board of Appeal has defined what is meant by the exclusion of programs for a computer as follows:-

> In the view of the Board, a computer program claimed by itself is not excluded from patentability if the program, when running on a computer or loaded into a computer, brings about, or is capable of bringing about a **technical effect** which goes beyond the "normal" physical interactions between the program (software) and the computer (hardware) on which it is run.

The key to patentability of inventions under the EPC is the identification of the technical contribution the invention makes. It appears that **technical contribution** is more restrictive than the production of **a useful, concrete and tangible result**. The European system, however, on the point of claim scope may be considered as broader than the U.S. in that claims for computer programs not on a carrier are acceptable.

The Japanese system has exceptions and requires that inventions be **a highly advanced creation of technical ideas by which a law of nature is utilized**. The Japanese system does permit claims to a computer-readable storage medium as a product with the programs functional features defined.

The Board of Appeal decisions in the IBM Cases (T935/97 and T1173/97) are of considerable significance in extending to Europe patent protection for computer programs on a carrier in a similar manner to that available in the United States and Japan. This is based on the fact that the Board of

Appeal considered that a computer program product may possess a technical character because it has the potential to cause a predetermined further technical effect when the program runs on a computer. Accordingly the supply of an infringing computer program on a carrier would be a direct infringement of the claims. In addition the Board of Appeal indicated that claims to a computer program product independent of any carrier or media are acceptable as long as the computer program has technical character or a further technical effect. This latter form of claim will have impact on the on-line distribution of computer programs using for example the Internet. It remains to be seen, however, how the Courts will interpret these claims.

The extension of scope provided by the Technical Board of Appeals decisions in the IBM Cases (T935/97 and T1173/97), permitting claims to computer programs, raises an important issue in respect to the considerable number of patents on computer program related inventions granted prior to the publication of the above cases which have been granted without the benefit of such claims. It will be recognised that the major impact such claims have is in connection with infringement. Some interest has been expressed indicating that there should be a change in the law of infringement to make it an infringement of a patent for an invention which may be implemented by a computer program to make, sell, supply, import or export the computer program itself. The supply of the computer program should include on-line delivery from outside the jurisdiction of the courts of the contracting states. The constitutional and administrative legality of such a retroactive change to the legislation of the Member States is an issue to be considered.

The fundamental difference, however, between the United States and Europe turns on the requirement that the invention **must** provide a **technical contribution** in Europe, whereas, in the U.S. to be patentable computer program related inventions are of the technological arts and they need only provide **a useful, concrete and tangible result** which for example includes the computerised transformation of data representing dollar amounts into a final share price using a practical application of a mathematical formula or calculation. It is the requirement of technical contribution that will bar a large number of business method inventions that will be patentable in the U.S. It should be noted that the similar issue appears to be the contention in Japan, business methods being arguably the utilisation of a law other than a law of nature.

To address the difference between the scope of protection in the U.S. and Europe it would be necessary to either amend the implementing regulations (rules 27 and 29) or to give a broader interpretation to technical contribution, such as that suggested by the United Nations where technology is defined as "a combination of equipment and knowledge".

Supplementary comments on
Computer program implemented
Methods of doing Business - Patentability

Introduction

Methods of doing business as such are excluded by Article 52(2)(c) of the European Patent Convention. The requirement of the European Patent Office that inventions must provide a technical contribution creates a greater difference in the field of patents for e. commerce between the US and Europe than is experienced due to the exclusion of programs for computers as such. The European Patent Office object to those inventions that do not in themselves provide a technical contribution in the following manner:-

> the claimed subject-matter, considered as a whole, does not provide any contribution to the art in a field not excluded from patentability under Article 52(2) EPC i.e. the present application does not relate to non-patentable subject-matter as such.

The consequence of the above is that for example many of the e. commerce inventions protected in the United States as a result of the State Street Bank decision will not be patentable at the European Patent Office unless the **invention** provides a technical contribution outside of a method of doing business.

European Case Law

The Case Law of the Boards of Appeal of the European Patent Office is identified in the European Patent Office document[27] proposing a revision to Article 52 EPC and under the heading of "Methods of doing business" four decisions are identified

In the first[28] of these decisions, which involved a method for operating an electronic self-service card activated dispenser involving an "electronic application form" for use in deciding upon authorisation of users, the board ruled that the invention was not patentable because parts of the method claimed were merely instructions for using the machine, and although technical components were used this did not alter the fact that what was being claimed was a method of doing business.

The second case[29] involved a method of distributing material transported in bulk by ship using quayside mounted weighing and bagging apparatus which could be shipped in standard containers and was used to unload and bag the material before moving on to the next port. Claims were also directed to the bagging apparatus itself. In opposition proceedings the board took the view that the method claimed clearly did have technical character, involving as it did the use of technical equipment (bagging apparatus) to achieve a technical end (the production of sealed, weighted bags of material).

The third case, the SOHEI case[30], is considered in detail in the annex to the main report. The

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27. SACEPO 6/99.
28. T854/90 (OJ 1993,669).
29. T636/88.
30. T769/92 (OJ 1995,525).

applicant claimed a computer system for plural types of independent management including at least financial and inventory management and a method for operating said system. Data for the various types of management which could be performed independently from each other with this system could be inputted using a single "transfer slip", in the form of an image displayed on the screen of the display unit of the computer system, for example.

Although financial and inventory management would generally fall under "doing business", the board held that the invention was not excluded from patentability under Article 52(2)(c) and (3). In its view the particular kinds of management mentioned were not decisive; the fact that they were of different "specific" types to be performed "independently" of each other was found to be important. The application contained the teaching to provide, in the memory unit of the computer system, certain files and processing means for storing and further processing the data entered and causing the processing unit to perform these functions. The implementation of this teaching required the application of technical considerations. In the board's view the non-exclusion from patentability also applied to inventions where technical considerations were applied concerning particulars of their implementation. The very need for such technical considerations implied the occurrence of an at least implicit technical problem to be solved and at least implicit technical features solving this problem.

Furthermore, the provision of the single transfer slip required the application of technical considerations. This "user interface" implied that, in effect, independent financial and inventory management systems were combined by a common input device allowing data entered for use in one of the said systems also to be used, if required, in the other system. The implementation of such an interface in the claimed computer system was not merely an act of programming, but rather concerned a stage of activities involving technical considerations to be carried out before programming could start.

In the view of the board, restricting the application to financial and inventory management did not give rise to an objection under Article 52(2)(c). By this restriction, the claimed subject-matter only gained, in addition to the combination of features which were not excluded from patentability, a further feature which, as such, would be excluded. However, it was established board of appeal practice to allow patentability for a mix of technical and non-technical features.

The fourth case[31] involved a system for determining the queue sequence for serving customers at a plurality of service points. The board held that the wording of the claim left no doubt that protection was sought for a three-dimensional object with certain capacities. The claim was directed to an apparatus which comprised computer hardware operating according to a particular computer program. The program-determined output signal of the hardware was used for the automatic control of the operation of another system component (the information unit) and thus solved a problem which was completely of a technical nature. Moreover, the fact that one of the practical applications of the system concerned the service of customers of a "business equipment" did not mean that the claimed subject matter must be equated with a method of doing business as such.

When considering the issue of computerised equipment for performing business methods it is important to have in mind the comments in the Guidelines For Examination in the European Patent Office where in Part C it specifically identifies "a scheme for organising a commercial operation

[31]. T1002/92 (OJ 1995,605).

would not be patentable. However, novel apparatus for ..... carrying out a scheme might be patentable".

German position

A recent German Federal Patent Court decision[32] has addressed the method of doing business exception. In this case the claims of the main request were addressed to:-

> "1. A method of automatically controlling the sales of a number of goods and/or services by using a digital processing system, said method being characterized by the following (method) steps:
> - electronically storing (30) time-related sales prediction data for at least one particular selling price of said goods/services;
> - electronically collecting (31) current sales data for said number of goods/services;
> - electronically selecting (33, 35) an adjusted selling price as a function of the deviation of said current sales data from said sales prediction data;
> - displaying (46) the selected selling price".

Independent patent claim 7 related to a corresponding vending machine.

It was held that the part of the solution provided by the invention was automatically controlling the sales by technical means (i.e. the automatic succession of the individual methods steps and their automatic execution). Further the Court held that the technical character of the teaching of the invention is not challenged by a program run on a conventional computer. The claims of the main request, however, were found to be obvious to an expert. The Court remanded the matter on an Auxiliary Request to the German Patent and Trademark Office.

UK position

Consideration of the exception for methods of doing business would not be complete without noting the contra position in the UK as identified by the Merrill Lynch Case[33] where the Court indicated:

> The fact that the method of doing business may be an improvement on previous methods of doing business does not seem ... to be material. The prohibition ... is generic; qualitative considerations do not enter into the matter. The section draws no distinction between the methods by which the mode of doing business is achieved. if what is produced in the end is itself an item excluded ... the matter can go no further. Claim 1 ... is directed to "a data processing system for making a trading market". That is simply a method of doing business.

This decision is in our opinion at odds with the German and Board of Appeal decisions.

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Section III
The economics of the patent system in particular in relation to computer program related inventions*

Intellectual property rights systems have two basic justifications. The first is that the creator or inventor has a moral right to his or her creation. This is given especially forceful expression in some countries' copyright laws.

The mainstream economics literature takes a different approach however and views the allocation of patent and other IP rights as a means to an end. IP Rights are socially useful to the extent that they promote a level of innovation which is economic and social efficient. They are therefore means to an end. "To reward those who invest their time and money in technological invention and innovation, and thus to encourage such investment has been the classic function of invention patents since the first patents were awarded in fifteenth century Italy", (Scherer and Ross, 1990,p 621)

Economists see patent protection as a trade-off between the need to encourage innovation and the necessary evil of allowing a temporary monopoly for the innovator. Of course the monopoly is less heinous than most because a patent is only valid if the invention is unobvious i.e. the particular product or process would not have been discovered without the inventor's input. This point is however to some extent weakened because R&D applied to solving a problem quite often gives rise to competing solutions, all of which can be patentable, or sometimes to identical solutions, when only one will get a patent. There are disagreements between schools of thought on the extent to which innovation necessarily justifies some form of monopoly. There is in fact no clear consensus in the literature about the effects of the patent system, beyond the agreement that it should be judged and if necessary modified or subject to competition rules in the light of its impact on efficiency. The balance of the literature has moved in recent years towards a more favorable appreciation of the need for appropriability of inventions, following a period where the work of Arrow in particular had created a climate of scepticism about the impact of the patent system, (see Martin 1993 and Scherer and Ross 1990 for reviews).

The increasing importance of information technology and computer program related inventions and innovations (CPRIs) has provoked a further rethinking in the literature, which has led some authors to raise new questions about the balance of the positive and negative impacts on the efficiency of patents.

The core of the economic literature is to identify the trade-off between:

1. The incentive given to an innovator by the patent system by the knowledge that they will be able to profit from creating the invention and its potential in the market through the creation of a temporary monopoly and

2. the anti-competitive impact of slowing down the diffusion of the product through the exclusion of competitors in the industry and the high price the monopolist will be able to charge consumers and users.

***** This Section draws heavily on an unpublished manuscript by Béatrice Dumont.
Some writers argue that the second effect will be negligible as the very existence of high profits will induce imitation, albeit at the cost of R&D duplication.

Two further positive and negative factors have been receiving increased attention in recent years

3. the existence of a patent system by allowing safe publication of new results discourages business secrecy and facilitates the creation of an efficient licensing market for new ideas

but

4. where innovations are typically of a cumulative nature building on previous generations, what is an incentive to a first generation innovator is a burden placed on the next generation.

Scotchmer has written very extensively on this point and has identified a number of problems with current rules. In the case of CPRIs recent literature has placed a lot of attention on both points 3 and 4, especially the work of Merges.

To summarise, the economic rationale for the patent system is that on account of the appropriable nature of inventions it is necessary to grant patents so as to provide an incentive to invent and publish. This increase in incentives is then balanced against pricing distortions that may arise when IPRs lead to market power in product markets and development distortions that may arise if an innovator does not efficiently license to other parties who could otherwise build on its innovations (O'DONOGHUE, SCOTCHMER & THISSE, 1998). It has been commented that such development distortions are to some extent compensated by competitors being stimulated by the marketing of the patented product and/or by the publication of the patent specification to develop alternatives, outside the scope of the patent.

The logic of the economic approach is that it should be an empirical and pragmatic matter whether patent protection should be given in the same way to all activities. From an economic rather than a moral perspective patent protection needs to be stronger when the risk of worthwhile innovations not being made or, if made, suppressed, is highest, in particular when the cost of initial research and subsequent development is at its highest and riskiest. So we might want to ask if the same protection should apply to CPRIs as to other forms of inventions. This is of course subject to the costs that might be generated by creating a system which differentiated the degree of protection according to the nature of the innovation. A patent system that is the best uniform system we can devise will inevitably give too much protection to some activities and too little to others from an efficiency perspective.

Patents and the new information

The economics of the IT industry has been extensively studied in recent years. The best overview is given in Varian and Schapiro (1999). Their view is essentially that the new "information economy" does not have new features that call for a rejection of traditional economic concepts once sophisticated concepts such as network effects are allowed for. However they show that the balance between various aspects of these new industries and activities may be quite different from that in some more traditional industries. They point out that the US economy in the 19th Century was dominated by the growth of the "network industries", railways, telephones and electricity. So too the new industries of today are network industries with characteristics that are different from pharmaceuticals or chemicals. The same fundamental factors apply but in different proportions.

So, points 1 – 4 identified in the previous section all still apply. IP protection can encourage innovation. The patent system has not lost its effectiveness, but the balance between the positive and negative impacts may be different from that in the rest of the economy.

Key factors in the software industry that place it at the end of a the range of the spectrum in certain dimensions include the following.

> The pace of innovation is very rapid so products have short lives or need constant updating.
>
> Technological change takes the form of many incremental steps that necessarily build on earlier developments.
>
> The costs of initial innovation and development to market are likely to be high relative to the actual production costs, but the initial cost of creating new software or at least the idea for a new CPRI may often be small in relation to what it is in some other industries.
>
> Costs of production are low in relation to development, and scale economies are important in production and distribution.
>
> "Network effects" are pronounced. Just as the more users there are on a phone network the more valuable that network is to existing users, the more people use a piece of software the more existing users are likely to find themselves "locked in". *De facto* standardisation can create dominant positions.

Friedman (1998) observes that "a single program incorporates many different algorithms, some invented by the programmer, some borrowed from general practice and some perhaps deliberately copied from a known originator. If algorithms are private property the costs of figuring out which of the ones you are using belong to whom and negotiating the necessary licences may be high. So the argument against making algorithms private property is similar to the argument against making words private property", (Friedman p.379). None of these effects is unique to the software industry as Varian and Schapiro (1999) point out. However they would appear to be particularly pronounced in this area. Many industries experience incremental innovation but the effect noted by Friedman is thought to be especially pronounced in this area. Friedman also argues that "programming exhibits extreme diseconomies of scale" and argues that these two factors alone "argue against patent protection" for software. If it is true that much software can be developed or at least incrementally improved in socially useful ways at relatively low cost, the force of the argument that we need strong protection to ensure innovation is diminished. The fact remains that even if this is true the costs of bringing products to market remain high. Nevertheless, many authors stress the fact that much of the basis for current generations of software was laid in a period before US firms became accustomed to patenting software, and indeed the high valuations placed on "dot.com" share offerings currently suggest that firms can sometimes raise money without being able to patent business methods.

Network effects are a key issue. If positive feedback is very powerful, the strong get stronger and the weak get weaker. The end result in a world of increasing returns may be the leading product's becoming dominant and thus, the tendency of the market may be towards monopolization (RICHARDSON, 1997). Network effects can constitute a significant barrier to entry and lead to a collective lock-in in an established technology (SHEREMATA, 1997). Combined with economies

of scale in production this creates the possibility of monopoly.

Katz and Schapiro (1998) devote a lot of time to the phenomenon of "tipping" where one supplier's initial lead rapidly becomes cumulative:

"Because they can lead to tipping to monopoly, network effects are important to antitrust analysis."(p.5) They add "Markets with large production and demand-side economies of scale are prone to tipping. Dominance, once achieved, may be very hard to unwind. Doing so would either require the coordinated movement of lots of consumers—with the possibility that they would have to incur significant switching costs—or forcing open a network, which we have seen poses its own substantial set of problems." (p.40)

Strong IPRs can re-enforce such a dominant position. But the nature of network industries is such that there are a variety of appropriation mechanisms for innovation other than strong IPRs. Varian and Schapiro and above all Raymond write at length about the ways firms may profit from allowing free or at least IPR-free access to their CPRIs in order to create a user base that will be willing to pay for complementary services which includes the providers' skills in the manner of supply and support. Raymond argues that being first to market is more important than securing IPRs and that allowing your rivals to copy your innovation is actually a smart way to distract them from the real challenge of making something better. He of course draws attention to the value of open systems and shareware. Varian and Schapiro argue strongly that from the point of view of business strategy a policy of maximising the strength of IP held is not always optimal. They argue for example that it was likely to be unprofitable for American music copyright holders to sue girlguides for singing copyrighted songs around campfires - because this will diminish sales of CDs. However not even Raymond argues that IPRs are never valuable, and indeed there are many firms for whom the open system approach is inappropriate. But the argument is that tight IPR protection appears to have overall less of a role to play in this industry than has been the case in say pharmaceuticals.

It must be stressed that the factors discussed above do not eliminate the advantages that strong and clearly defined IPRs have in permitting SMEs to raise funds to bring their product to market without fear that its idea will be stolen by another firm who already has access to capital. By turning CPRIs into saleable commodities software patent rights may have facilitated specialization in the software industry and may well have supported a market for know-how or technology exchange with either suppliers or customers (ARORA, 1995; MERGES, 1996, MERGES, 1998). Merges 1999 welcomes this but cautions however that this positive effect is crucially dependent on the patent system operating correctly without an excessive number of bad patents, (a point to which we will return below).

The positive effects of patent protection in this area remain strong and indeed it may be that where SMEs are competing with very large firms possession of patents to process patents is particularly important. What we are saying however is that the balance of positive and negative effects in this area of the economy is likely to be somewhat different from other industries that do not have the same characteristics. As Hall and Ham note:

> "A longstanding literature has established, however, that the effectiveness of patents varies greatly across industries and technological areas (Scherer 1959; Taylor and Silberston 1973; Mansfield 1986), and that firms in only a handful of industries, such as pharmaceuticals and chemicals, rely heavily on patents to recoup their R&D investments

(Levin et al. 1987)." (p.7).

The economics literature does not show that the balance of positive and negative effects lies with the negative. All it says is that there are grounds for supposing that the negative forces are stronger relative to the positive forces in this area than in some others and that any move to strengthen IP protection in the software industry cannot claim to rest on solid economic evidence.

What has been the effect of stronger IPR on innovation in the US?

Several surveys have been carried out to assess how far the strengthening of IPR has led to an upsurge in innovation. It has to be said that the conclusions of the literature are very agnostic. We cannot be sure that the increased opportunities of patenting have been the primary cause of the upsurge in overall innovation in the US. It is worth citing Jaffe's (1999) conclusions in full.

> "In summary, there is at best limited evidence that the upsurge in patenting resulted, at least directly, from the strengthening of patent protection in the 1980s. Much of the increase can be associated with an increase in real R&D spending that began much earlier. At the end of the day, it is extremely difficult to identify the causal effects of multiple interacting endogenous variables. It seems plausible that the combination of technological opportunities, the buildup in government R&D spending and defense procurement, increased international competitive pressure and other factors increased the returns to R&D in the late 1970s and early 1980s. It is likely that these increases would have led over some time horizon to more patenting, even if there had been no changes in the patent regime. But the strengthening of the patent system presumably reinforced these incentives. It is possible that the R&D boom would not have been so large or lasted so long without this reinforcement. It is disquieting, however, that there is so little empirical evidence that what is widely perceived to be a significant strengthening of intellectual property protection had significant impact on the innovation process." (Jaffe 1999 p.20)

But what is striking about the literature Jaffe surveys is that many authors have seen the rise in software patenting as driven not so much by new inventiveness stimulated by stronger IPR, but rather by uncreative motivation deriving from the new scope for blocking patents, for example:

> "Cohen and his co-authors suggest that the reconciliation of the jump in patenting and lack of increase in perceived effectiveness may lie in the multiple ways that firms use patents. In particular, their survey shows that, in addition to protecting the returns to specific inventions, firms use patents to block products of their competitors, as bargaining chips in cross-licensing negotiations, and to prevent or defend against infringement suits. It is possible that respondents did not consider these benefits of patents when answering the question about the effectiveness of patents in protecting the returns to innovations. More fundamentally, firms using patents for these purposes are engaging to a significant extent in a zero- or negative-sum game. If all firms do more blocking, accumulating of bargaining chips, and patenting to fend off infringement suits, it could easily be the case that, in the end, none of them has succeeded in increasing their returns to innovation. Under this hypothesis, what has happened is that everyone is patenting more because the private, marginal return to patenting is high— but firms' actions largely offset each other so that the perceived value of patents overall is no higher." (Jaffe 1999)

A profitable return on R&D can be achieved by gaining the ability to prevent your competitor from making a profit from your invention or to obtain a cross-licence of valuable technology or to gain access to a standard. But the social productivity of R&D undertaken for the purposes of enhancing the bargaining power of a firm vis-a-vis others is different from the case where a new innovation is developed that is directly productive.

Hall and Ham in a survey of the semiconductor industry find:

> "Our preliminary evidence suggests that the "pro-patent" shift in the 1980s has altered the patent strategies of semiconductor firms, but in ways that go beyond the "classic" incentives provided of the patent system. On the one hand, stronger patent rights may have facilitated specialization in the industry and may well have supported a market for know-how exchange involving entrant firms (Merges 1996; Arora and Fosfuri 1998). On the other hand, such positive effects are countered by a socially inefficient process whereby firms amass vast patent portfolios simply as "bargaining chips". In essence, a "patent portfolio race" may ensue. In principle, patent portfolio racing is not an inevitable outcome of strengthening patent rights in cumulative technological areas. If patent rights were strictly awarded to inventors of "non-obvious", "useful", and "novel" inventions, then it should become increasingly difficult to obtain a patent when a thicket of prior art exists, and the number of successful patent applications should fall."
>
> Their own survey leads them to conclude:
>
> "Thus we agree that the increase in patenting in the semiconductor industry arises partly from a shift in the management of R&D, but we do not believe that the shift is solely explained by a move toward more applied R&D. Instead, our interviews suggest that many firms in this industry increased their propensity to patent in response to an increasing threat of "hold-up" when they are sued for infringement. The threat has increased because patents are more likely to be upheld and because the nature of innovation in this industry has become more complex and depends on technological inputs from more actors."

Interestingly they find that both large capital intensive firms and smaller "design firms" have a disproportionate tendency to use patents , the latter for obvious reasons i.e. to gain venture capital and market share, the former because they are more vulnerable to patent "hold up".

The reason these findings are worrying is that there is a difference between the social consequences of patenting leading to the promotion of new innovations, and patenting being used to extract zero sum concessions from other firms.

They add:

> "At the same time, there is a dubious overall social gain to other firms in the industry from the information disclosed in patents related to semiconductor technologies. An interesting topic for future research is why the exchange of intellectual property in this industry has evolved in this way, rather than towards the development of shared patent pools."

This observation by Hall and Ham indicates that the normal solution which the market can be

expected to provide, namely patent pooling, does not always occur.

Jaffe summarises the critiques of software patenting in the US as follows:

> "Software products tend to be "systems" constructed from many different pieces. Allowing patents on pieces of software creates an untenable need to secure or at least consider many different licenses in order to market any given product.
>
> The above need for multiple licenses will favor large firms that can amass patent portfolios and thereby bargain for cross-licensing. The genius of the software industry is in small firms that will be driven under.
>
> In order to work, distinct pieces of software need to interface with each other, to provide inter-operability. Standards are needed. Patents on elements of standards or interfaces can provide very broad monopoly power.
>
> Software changes so quickly that it will have changed by the time a patent is issued. Many of the patents being issued are for software ideas that have been around a long time.
>
> It wasn't broke; we shouldn't have tried to fix it." (Jaffe p.41)

He argues that point 1 is not unique to software, though this does not mean no problem exists (citing Hall and Ham). Point 2 he suggests can go either way. Point 3 will be dealt with *if* cross licensing functions correctly. He thinks point 4 should not in principle be a problem but it may be in practice – that will have to be corrected by the courts: "It is unclear how the courts will sort this out", he adds.

> "The last point should be taken seriously, at least by researchers," he concludes; the balance of advantage is as yet unsure."

Bad Software patents and the rise of e-commerce

It is clear that much of the alleged problems referred to above are not simply the result of the wider application of existing patent law in new areas but arise rather from what is said to be a worsening of the quality of the working of the system as it extends to a new area where Patent Offices have less expertise and where greater *ex post* reliance may have to be placed on courts to rectify mistakes, or on the ability of defendants in infringement suits to simply call the bluff of those who hold patents which should not have been granted.

The US literature focuses on several aspects of the actual economics of the legal process as such. Thus a repeated element in the argument e.g. of Aharonian and cited by Merges is not simply about patents for software as such but "bad" patents. From an economic point of view a patent can be considered economically damaging if it raises monopoly power or imposes transactions costs which are not justified by the stimulus to innovation, but here we are concerned with patents that are accepted by the patent office despite doubts as to their legal merits.

Aharonian in particular, but also Merges, suggest that too many patents are being accepted without proper investigation of prior art. They argue that this is more dangerous for patents than copyright as copyright gives less strong protection and is easier to challenge. Merges contrasts the European and

US procedure, welcoming the European opposition procedures. (Furthermore it has to be noted that bad patents can be challenged in the courts or simply ignored if someone uses them as the basis for litigation. But even if bad patents can be overturned in these ways, there is still a social cost to their being issued.)

Merges in his paper on "IP Rights Input Markets and the value of Intangible Assets" 1999 argues that there is a good case for making a property right that is tradeable to make subcontracting and licensing easier. This will have a positive economic effect. But this is only valid he notes if there is adequate scrutiny of prior art. If this is not done, he suggests we will see Heller's "The Tragedy of the anti-commons". Thus the "law of economics" argument bounces back to the "economics of law". Are adequate resources invested in assessing new patents?

Aharonian argues and Merges seems to concur that the danger of "bad" patents is especially strong in the software and above all the business methods field including e-commerce. Patents risk being bad if there is inadequate prior art surveyed. It appears that in the US this is a systematic problem as the Patent Office is ill-equipped for example to know what is obvious. Merges in "Six impossible patents before breakfast" asks:

> "Why Is Patent Quality So Poor? There are persistent reports that patents in the software area, and perhaps especially, patents for "business methods" implemented in software, are of extremely poor quality. People familiar with the technology involved and the history of various developments in it report that patents in this area are routinely issued which overlook clearly anticipating prior art. The average number of prior art references cited in software-implemented business concept patents has been said to be fewer than five."

He refers at length to the experience of Walker Digital and similar cases where "formerly impossible" patents on business concepts have been filed. He is cautious about the implications:

> "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."

Nevertheless, Merges argues that the increased volume of patent applications stemming from this newly patentable subject matter has pushed the US patent system into crisis. In particular, he focuses attention on determining an acceptable "error rate" for issued patents, with an eye toward reducing the number of invalid business concept patents that are actually issued.

He comments at length on the Priceline.com case and the link between "business concept" patents and the patentability of software. He points out that Priceline has tried to secure patents for very loosely defined ways of doing business. Whether these patents will be upheld or indeed effective even if they were (cf. The Amazon one-click case) is another matter. But the point made by Merges is that the economic impact of patent protection on e-commerce is potentially ambiguous and can be negative without an adequate check on bad patents.

The recent exchanges between Jef Bezos of Amazon and Tim O'Reilly are too recent to discuss in full. They do show the seriousness of the debate. Bezos argues that:

"1. That the patent laws should recognize that business method and software patents are fundamentally different than other kinds of patents.

2. That business method and software patents should have a much shorter lifespan than the current 17 years -- I would propose 3 to 5 years" (http://www.amazon.com/exec/obidos/subst/misc/patents.html/103-9302967-7241443).

O'Reilly (see http://www.oreilly.com) welcomes what he sees as a change of heart by Amazon, but remains convinced that a serious problem exists. In one of his final comments he notes that following his exchange with Bezos he believes that Amazon has not been frivolous in patenting the one-click. His conclusion is that this patent might indeed be upheld in the face of a challenge – and is all the more pernicious in his view. Bezos and O'Reilly both agree that the future success of Amazon will have to depend on the quality of its service not on its ability to use business methods patents to prevent imitation.

The market for IP and the role of competition/antitrust policiesmarket

The downside of this however is that while market exchanges of rights are now more possible they may well become more necessary. This poses several problems. The first is known as the "tragedy of the anti-commons" (Heller). This means that new CPRI developments which inevitably draw on a host of earlier developments risk could be threatened with legal action unless they negotiate with a host of prior rights holders. Patent pools are one possible answer to this but they bear the risk that a group of incumbents may exclude new entrants. Anti-trust law and economics face genuine difficulty in distinguishing between patent pools that primarily diminish monopoly power and those that create cartels. It has been suggested that firms may be overcautious about possible anti-trust risks of sharing arrangements. Nevertheless it is a broad conclusion from the literature that where patents are widely held there are good grounds for supposing that easily available cross licensing will avoid most problems. Katz and Schapiro argue that anti-trust authorities should in general expect cooperative standard setting to assist competition.

But as Hall and Ham noted patent pools do not always emerge spontaneously. Voluntary cross licensing cannot solve all the problems caused by the market, where there are significant asymmetries. As Katz and Schapiro note cooperative standard setting can act as a barrier to entry, but the more serious issue concerns the case where one firm rapidly secures a dominant role for its *de facto* standard via "tipping effects".

There is a risk of dominance that can be created by *de facto* standardisation via network effects which we noted above i.e. a standard determined by the market leader. There is a possibility that if network effects are strong enough, the market for certain kinds of software may gravitate towards such a single industry standard (see LEMLEY, 1996; GANDAL, 1995). Indeed the need for intercommunication favours a certain standardization of the products so that the presence of network effects means that it may actually be profitable to engage in predation because once the rival has been put at a sufficient disadvantage in terms of actual and anticipated installed base, it may be impossible for that firm to compete effectively in the future (FARRELL, 1989). As a result, there are some concerns when an IPR provides a mechanism of control over such a *de facto* standard. If the specifications and technology that embody a standard are the protected IPRs of one party, then it can unilaterally block other suppliers from producing compatible products e.g. patent protection allows the possibility of leveraging the monopoly into complementary hardware and software

(FARRELL & SALONER, 1992). This contrasts with the traditional market-driven standardisation process where there are multiple participants and where there is an effective anti-trust regime. Here normally standardisation includes provisions for fair, reasonable and non-discriminatory licensing.

Katz and Schapiro (Antitrust in software markets 1998) argue that network effects do risk creating dominant players and that there is a potential case to be made for treating patents on interfaces as "essential facilities". They argue that there is a case for some policy intervention:

> "The prospect that a single firm, controlling a key input (interface), can protect a dominant position, or extend its dominance into new areas, raises a number of classic antitrust questions."

They add:

> "Having said this, we are wary of imposing a duty to deal on owners of intellectual property, including Microsoft. Such a duty is fundamentally at odds with the granting of the intellectual property rights themselves, which explicitly involve the power to exclude others from infringing on those rights. Furthermore, invoking the essential facilities doctrine raises a host of practical problems regarding the terms and conditions on which the dominant firm will be forced to deal."

As this quote shows they are cautious about applying the full force of the essential facilities doctrine. Instead they argue for the use of other less severe remedies. Katz and Schapiro argue that it may be more appropriate to use divestiture of rights in the context of merger approval. Much legal literature, perhaps not in contrast, seems confident about the ability of anti-trust authorities to require reasonable, even free, licensing of IPRs including patents, when there is abuse of a dominant position.

Barton (1998) in the context of biotechnology argues that in that industry almost everyone is likely to be infringing everyone else's patents and amassing portfolios for strategic reasons. He adds:

> "Moreover as exemplified in the analogous situation in the semiconductor manufacturing industry, litigation incentives become quite perverse. There is more incentive to sue outsiders seeking to enter the industry that to sue other major participants, for these major participants can reply in kind. And a firm that is losing market share is the most likely to sue its competitors, for it has the least to lose." (p.309)

Patent pools are clearly an answer, but will only work well if there is symmetry:

> "the inner group may be able to finance successive litigation over a variety of patents in order to bar a newcomer from the industry. It may therefore be desirable to apply patent-misuse or antitrust concepts to allow an outsider a defense against patent infringement actions, in some circumstances in which the technology involved is already freely licensed (explicitly or implicitly) among the major competitors of a concentrated industry, but is not offered on reasonable terms to other firms." (p.311)

This section of the report is not the appropriate place to analyse the law in depth. Suffice it to say that many of the potential abuses of legally valid patents can be dealt with if a sufficiently rigorous

stance is taken by the competition authorities on abuse. But Korah in the same OECD report as Barton's contribution raises doubts about the scope for this:

> "Professor Gallini(1998) said that the patent offices often do not know when a patent application is too broad, so it seems natural to turn to the competition authorities to require a compulsory licence long after the patent was granted and the investment leading to it is water under the bridge. Would the reader, however, want the Commission and courts of the European Communities to make difficult trade-offs between the need for incentives to the original research and those for follow up developments? It is unlikely that officials or judges would understand either the scientific background or the importance of incentives being in the right place." (Korah 1998, p.366)

Prof. Korah welcomes the step back that the Oscar Brunner decision seems to take from Magill.

From an economic perspective all we can say is that this is a costly slow and uncertain route to go and cannot revive the fortunes of an unfairly excluded firm. However it is an instrument that will have to be developed.

Conclusions: the economics of patents on CPRIs:

This short review can do little more than scratch the surface of the vast literature which exists and has been studied for the purpose of this report. It has sought to identify a number of key points in the literature.

The core conclusion is that while patent protection of CPRIs has broadly similar potential effects to that in other industries, these effects are both positive and negative and the balance between them may be distinctive. In particular the sequential incremental character of software patents and the importance of network effects are crucial; they require attention to the possibility of blocking patents and dominance via *de facto* standardisation. This can be addressed in principle either by a patent regime tailored to the needs of this field, or by careful application of competition law. Considerable debate exists about the merits and feasibility of these two approaches (Dumont and Holmes 1999). Neither Katz and Schapiro nor Korah seem confident that we can rely on the use of forced licensing within antitrust, but this remedy is certainly something that would have to be studied

Furthermore the favourable economic outcomes from the patent regime are critically dependent on ensuring as the European system has sought to do in the past a thorough discipline on patents, an issue that has to be important in e-commerce. This debate has been reopened by the debate between Jeff Bezos of Amazon and Tom O'Reilly. Bezos and O'Reilly are in surprising agreement that a loosening rather than a tightening of protection is needed to help e-commerce flourish to ensure that firms seek to profit from the quality of their products not simply the nature of their patent portfolios.

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Section V
Appendix to Section II
Other Technical Board of Appeal decisions relating to computer programs

At the same time as the guidelines were being revised the issue of the patent protection of computer program based inventions was being considered by the Technical Board of Appeal at the EPO in its decision of 15th July 1986 in respect of VICOM Systems Inc. Patent Application No. 79.300,903.6 (Published No. 0,005,954). The Board of Appeal accepted that "even if the idea underlying an invention may be considered to reside in a mathematical method, a claim directed to a technical process in which the method is used does not seek protection for the mathematical method **as such**". Claims to "a method for digitally filtering data ...." were rejected whereas claims to "a method of digitally processing images ...." were accepted.

The Board was also "of the opinion that a claim directed to a technical process which process is carried out under control of a program (be this implemented in hardware or in software), cannot be regarded as relating to a computer program **as such** within the meaning of Article 52(3) EPC, as it is the application of the program for determining the sequence of steps in the process for which in effect protection is sought. Consequently such a claim is allowable under Article 52(2)(c) and (3) EPC".

In the view of the Board a computer of known type set up to operate according to a new program cannot be considered as forming part of the state of the art. Claims which can be considered as being directed to a computer set up to operate in accordance with a specified program (whether by means of hardware or software) for controlling or carrying out a technical process cannot be regarded as relating to a computer program **as such**.

The Board considered that "making a distinction between embodiments of the same invention carried out in hardware or software is inappropriate as it can fairly be said that the choice between these two possibilities is not of an essential nature but is based on technical and economical considerations which bear no relationship to the inventive concept as such".

Accordingly, it can be stated that an invention which would be patentable in accordance with conventional patentability criteria should not be excluded from protection by the mere fact that for its implementation, modern technical means in the form of a computer program are used. Decisive to the decision is what "technical contribution the invention as a whole makes to the known art".

In a second Technical Board of Appeal decision dated 21st May 1987, consideration was given to the patentability of an X-ray apparatus, which was well known from the prior art. According to the invention the X-ray apparatus was controlled "to ensure optimum exposure with sufficient protection against overloading of the X-ray tube within any given routine" by a data processing device arranged to operate according to predetermined functional requirements. The functional requirements being embodied in the computer program loaded into the data processing device. The opponents argued that Article 52 should be interpreted so as to exclude such a case where the invention was a pure computer program without any constant interaction with the X-ray apparatus hardware. The opponents argument was based upon the contention that the invention is not of a technical nature. The appellant had adduced the case law of the German Federal Court of Justice which effectively is that the subject matter is not patentable because the invention essentially consists of the program, which is excluded from patentability by Article 52(2)(c) EPC.

We can do no better than to quote directly from the Board's decision:-

> "According to the case law of the Federal Court of Justice referred to above, the principle factor determining whether an invention is of a technical nature is the substance of the claimed teaching, that is the main field involved. To the Federal Court of Justice a teaching is not technical if in its essence it states a rule that can be carried out without employing controllable natural forces other than human brainpower, even if the use of technical means appears expedient or indeed the only sensible and hence the necessary procedure, and even if reference is made to these technical means in the claims or description.
>
> The Board is unable to share this view because it makes the field in which an invention essentially lies crucial to the issue of whether that invention is or is not technical in nature. The Board holds that an invention must be assessed as a whole. If it makes use of both technical and non-technical character means, the use of non-technical means does not detract from the technical character of the overall teaching. The European Patent Convention does not ask that a patentable invention be exclusively or largely of a technical nature; in other words, it does not prohibit the patenting of inventions consisting of a mix of technical and non-technical elements.
>
> Apart from the fact that the Board fails to find any legal basis in the European Patent Convention for the theory of the Federal Court of Justice concerning the essence of inventions, it also sees practical objections to a need to give a weighting to technical and non technical aspects because according to the Federal Court of Justice the criterion to be applied is which aspect makes the essential contribution to the invention's success. Not only is such a decision fraught with difficulties in practice it also has the effect of making the teaching unpatentable in its entirety if the greater part is non-technical and even though the technical aspect which is found to be subordinate is in fact judged to be novel and to involve an inventive step.
>
> The Board therefore regards it as unnecessary to weigh up the technical and non-technical features in a claim in order to decide whether it relates to a computer program as such. If the invention defined in the claim used technical means, its patentability is not ruled out by Article 52(2)(c) and (3) EPC and it can be protected if it meets the requirements of Article 52 to 57 EPC".

From the above it can be seen that the fact that the invention lies within the program should not be bar to patentability as such.

In both of the above cases the central issue was "technical effect". There have been a significant number of cases relating to computer programs considered by the European Patent Office Board of Appeal based on the Vicom and X-ray decisions. Six of these relate to text processing, (i) a document abstracting and retrieving system (T22/85-1988), (ii) a method of proof reading a text document and automatically detecting and replacing linguistic expressions (T38/86-1989), (iii) a system for listing semantically related linguistic expressions (T52/85-1989), (iv) a spell-checking arrangement for use in word processing systems (T121/85-1989) (v) a method for automatically detecting and correcting contextual homophone errors in a text document (T65/86-1989) and (vi) a method of processing data set out in table form (T95/86). In all these six text processing cases the

Board found that the **inventions** related to non-technical subject matter (i.e. document abstracting, linguistic expression processing, text error detection, table processing and correction and spell checking) and were, in the absence of other patentable features, unpatentable. All six cases involved IBM.

The major point to come from the six text processing cases we believe is that the claimed invention must be reviewed to identify the art the **invention** relates to and if that art is excluded by Article 52(2) then so is that invention unless the method used is patentable. In the above cases the Board has decided that the inventions claimed did not (i) relate to any physical entity nor (ii) to a new and inventive method of automating an otherwise excluded activity. On this latter point the Board has identified that methods and apparatus for (i) abstracting a document, (ii) detecting linguistic expressions, (iii) spell checking, (iv) generating synonyms and antonyms and (v) detecting contextual homophone errors and (vi) methods of processing data as text, which use the same steps as a mental process and when automated employ conventional equipment ordinarily programmed, are not patentable inventions.

Two further cases have been rejected T158/88 and T603/89. T158/88 relates to a method of representing characters (letters) on a VDU and was found to be an idea for a program and as the data to be processed represented neither operating parameters or a device, nor had a physical or **technical** effect on the way the device works and no **technical** problem was solved by the claimed method, the invention did not make use of any **technical** means and could not therefore be regarded as being patentable. Case T603/89, which was considered to be in line with cases T26/86 (the X-ray case) and T158/88, was considered not patentable although a mix of technical and non-technical elements because the invention did not solve a **technical** problem. The invention consisted of an apparatus for and a method of learning how to play a keyboard instrument. Conventional notation was used on the sheets of music but the notes were also marked numerically. The same numbers appeared on the keys along side the traditional notation. The technical feature claimed was the marking of the keys.

Two program related cases which have been found to include a technical effect are; (i) for a data processing network and the operation of its communications co-ordination and control program (T6/83-1988) and (ii) a method of displaying one of a set of pre-determined messages giving a visual indication about conditions prevailing in an apparatus (T115/85-1990). This latter case is interesting in that the application (Publication No. 0,052,757) related to a text processing system and was used in a method of decoding stored phrases and obtaining a read-out of events in such a system using a message build program. On appeal from a refusal from the Examining Division, the Technical Board of Appeal accepted newly drafted claims directed to "a method of displaying one set of a set of pre-determined messages comprising a phrase made up of a number of words, each such message indicating a specific event which may occur in the input/output device of a text processing system....". The text processing system was in fact incidental to the invention since it related to the arrangements used to generate screen messages for use as operator action prompts. The originally filed claims were for "a method of decoding stored phrases and obtaining a read-out of events in a text processing system....". The new claims were submitted during the Appeal Procedure after a provisional opinion from the Board agreeing with the examiner's refusal.

The method used in the invention was to cause the detection of a specific event to call into operation a message-build program. This program is used to address a message frame index table containing pointers to a phrase table. The arrival of a message from the index table causes the phrase table

pointer to be advanced to the next pointer. The difference between the pointer positions in bits indicates the number of bits in the phrase, thereby enabling a match to be found in a decode table containing words ordered on a byte-frequency basis. The resulting match provides a pointer to a table containing words encoded on a user basis, which are transferred to a buffer whose contents are displayed when a test determines that the end of the phrase has been reached. The Board began the reasons for allowing the appeal with the following observations:

> Generally the Board takes the view that giving visual indications automatically about conditions prevailing in an apparatus or system is basically a technical problem.

The Board further observed that the claims were expressed in functional terms and that they must be understood as referring to the technical means necessary for carrying out the functions. These means might or might not involve a computer program, and the Board appears to conclude that even if they did the claims were nevertheless not directed to the program "as such".

The network case is helpful in defining what is to be regarded as being technical, although achieved by software. The application claimed procedures to enable a network of computers to maintain concurrent connections between a terminal and more that one application program and to provide for simultaneous on line processing using several data files located at remote processors. The Board considered the claims to be for improved communication facilities between programs and files in a multi processor system network and, therefore, to be concerned with the internal workings of the processor network irrespective of the data files or the way application programs operated on the data.

The following EPO Board of Appeal decisions further define the line between patentable and unpatentable subject matter for inventions embodied in computer programs.

Case T110/90 (IBM) concerned a method of transforming text including transforming of printer control items. The Board found that the transformation of printer control characters from one format to another allowing documents to be converted from one text processing format to another involved conversion of printer control items which are technical features of the text processing system. The application was **not** a method of performing mental acts **nor** a program for a computer and was accordingly remitted for further prosecution.

Case T236/91 (TEXAS INSTRUMENTS INC.) concerned a menu-based natural language command input system. The Board found that the invention was not a presentation of information, was not a mental act as such nor a computer program as such and that it did include an inventive step including new features in combination not rendered obvious by the prior art. The case was remitted for further prosecution.

Case T109/90 (IBM) concerned a methodology for transforming a source document prepared by an interactive text processing system to a second editable document form usable by an interactive or batch text processing system. After amendment to claim "A method of transforming text which is represented in the form of digital data ..... said method comprising the steps of: determining ..... defining ..... and digitally processing the text ....." the Board found that the invention as claimed in the amended claims was not a method for performing mental acts nor was it a program for a computer and the application was remitted for further prosecution.

Case T769/92 (Sohei Yamamato and Moriyama Teruko) relates to a computer based file data-entry management system in which a single electronic transfer slip is used to enter debit, credit and commodity items to update a journalised daybook file, an item master file, a commodity master file, a journalised daybook accumulation file and an inventory file and the computer file-management system is arranged to process information entered by way of the single transfer slip into the day book file and thereafter automatically to update the other files as required. The Technical Board of Appeal found that the claimed system, both apparatus and method claims, was a mix of technical (computer hardware) and processing implemented by software. They found, however, that "if a contribution to the (computer) art can be found either in a technical problem (to be) solved, or in a technical effect achieved by the solution, said mix may not be excluded from patentability under Articles 52(2), (3) EPC following T38/86". The Board was of the view that "the non-exclusion from patentability also applies to inventions, where technical considerations are to be made concerning the particulars of its implementation". The Board indicated that the "need for such technical considerations implies the occurrence of an (at least implicit) **technical problem** to be solved (Rule 27 EPC) and (at least implicit) **technical features** (Rule 29 EPC) solving that **technical problem**" (emphasis added). The Board found that what was not part of any conventional computer is "the particular significance of all the different files in the memory and the manner in which, by the different processing means or in the different processing steps, the input data and the data stored are handled". The Board also found that the claims although generalised to:-

- the first processing means controls the display unit and the storing of all entered data in the first file;

- the second processing means updates the data stored in the second and third files using the data entered;

- the third processing means transfers the data updated in the second file to, and stores them in, the fourth file and relates them with data stored therein for the purposes of the first type of management, or activity;

- the fourth processing means transfers the data updated in the third file to, and stores them in, the fifth file and relates them with data stored therein for the purposes of the second type of management, or activity; and

- the fifth processing means reads, and outputs, data necessary for a specific one of the two different types of activity ("management") to be performed with the respective format for that specific type of activity, or management;

did not relate to doing business as such and clearly required technical considerations. The Board accepted the appellants argument that the transfer slip was "a user interface requiring technical considerations of the person implementing the claimed invention" and considered "that said interface within the context of the whole of each of "the claims" constitutes neither only presentation of information nor only computer programs (or programming) as such".

Case T107/67 Data (De) Compression Method. The originally filed claims related to a redundancy - reducing coding method which permits, due to the redundancy occurring in a predetermined data sequence, the data sequence to be arranged in such a manner which, compared with the original

sequence, is more compact. The Board of Appeal found that such a method is not technical in character as neither are technical means used for its implementations nor does it immediately produce a direct specific technical result. The coding method thus is **a rule for performing a mental act**. The applicant amended the claims to apply the redundancy - reducing coding method to electronic storage and/or transfer of redundant serial data elements and the Board of Appeal accepted the new claims referring the application back to the Examining Division.