



The Patentability of Software under the EPC

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Introduction

The invention of the microprocessor and the resulting digital revolution has created an ever increasing variety of software-controlled products and services, which have led to what is referred to as the age of information technology, e-commerce and global competition. The protection of costly investments in innovative technology in these fields is of strategic importance for the competitiveness of any market participant, be it a global player or a small start-up company.

Although the justification of patent protection for software-related inventions may still be prone to controversy among policy-makers, lobbyists and the media in Europe, case law of the Boards of Appeal of the European Patent Office has clarified various fundamental issues in this respect so that patentability of software-related inventions under the EPC has become relatively predictable.

The following executive summary explains the legal status quo under the European Patent Convention (EPC) and elucidates the possibilities available for and the limits imposed on the obtaining of European patents for software-related inventions.

1. What is an “invention” under the EPC?

The EPC does not define the term “invention”. However, the EPC specifies the qualities an invention must have if it is to be patentable, *i.e.* it must be new, involve an inventive step and be susceptible of industrial application. Under the EPC, the term “invention” should therefore be understood as “subject-matter generally eligible for patent protection” without *a priori* having the required qualities of being novel, inventive and industrially applicable. The EPC contains an exemplary list of items that are not regarded as inventions and are excluded from patent protection regardless of whether they have the above qualities. Among the excluded items on the list are

- mathematical methods,
- schemes, rules and methods for performing mental acts, playing games or doing business, programs for computers, and
- presentations of information.

The legal situation is even more complex, since the listed examples are only excluded from patentability to the extent that they are claimed “as such”. Consequently, the EPC does not consider these items to be non-inventions under all circumstances, but postulates the development of suitable criteria by case law that will distinguish patentable subject-matter from subject-matter excluded “as such” for all the items on the list. With respect to computer programs, the criteria developed by the case law are explained below.

2. Software/Computer programs/Computer-implemented inventions?

Computer programs are on the list of items excluded “as such” from patentability. In order to underline the fact that computer programs may only be inventions if they meet the criteria explained below, it seems appropriate to coin a new term for patentable subject-matter involving the use of computer hardware and/or software, *i.e.* “computer-implemented inventions” (CIIs). This term is regularly used by the European Patent Office (EPO) when assessing the patentability of software under the EPC.

The term “invention”

Computer-implemented inventions

The term „technical“

3. Technical character

The basic criterion for deciding whether the subject-matter defined in the claims of a European patent application may be regarded as an invention is the presence of a “technical character”. This requirement is grounded in traditional European understanding and has been firmly established by the judicial practice of the Boards of Appeal of the EPO for CIIs and indeed for all fields of technology. In a first step of the examination whether a European patent can be granted, the claimed subject-matter is therefore to be assessed to determine whether it has a technical character, i.e. is an invention. This is followed by a second assessment (see sections 5 ff. below) to determine whether the invention meets the other requirements for patentability, i.e. novelty, inventive step and industrial applicability.

The term “technical” (here synonymous with technological), though mentioned at various places in the EPC, is defined neither by the Convention nor by case law. Moreover, the general understanding of this term is not static, but may change over time. However, the situation is not hopeless in that, on the basis of its historic roots, the core area of the meaning of “technical” is

clear and gives reliable directions for future extrapolations. In particular, the items on the “as such” exclusion list should be regarded as non-technical.

The extrapolation approach may be illustrated by the example of a washing machine. In the past, the various steps in the operation of a washing machine (pumping, soaking, tumbling etc.) were performed under the control of some kind of mechanical control unit. There can be no doubt that such a mechanism and the controlled steps in the washing process had a technical character and were thus eligible for patent protection. Modern washing machines no longer use a mechanical control unit but instead a combination of hardware and software. There is no reason why the transition to computer-controlled operation of the washing machine should affect its general eligibility for patent protection. Moreover, an innovation in the operation of such a washing machine should be patentable regardless of whether it is implemented in a mechanical controller, dedicated hardware or only in software running on an off-the-shelf micro-processor. A narrow definition of the term “technical” that would exclude such innovations is not appropriate.

It is self-evident that when any computer program is loaded to and running on a computer it causes physical transformations of bit patterns by modifying electrical charges with the aid of electrical voltages and currents. If these phenomena themselves were considered to be sufficient for the required technical character, a dilemma would arise: either all computer programs would be eligible for patent protection, in contradiction to the law, or – in the absence of a discriminating criterion – no programs would be patentable.

This dilemma has been solved by judicial practice holding that the above-mentioned self-evident technical effect achieved by all computer programs is not sufficient for the grant of patent protection. A further technical effect beyond that self-evident effect is required to distinguish patentable programs from programs “as such”, the further technical effect residing in the nature and purpose of the computer program. In particular, programs serving a technical application by *e.g.* controlling technical processes or apparatuses may be seen to achieve such a further technical effect and are hence eligible for patent protection. Illegal use of such controlling software may therefore be regarded, and prosecuted, as a direct patent infringement.

In the above example, the controller for a washing machine may be implemented by a conventional hardware processor and an innovative controlling program running on this processor. The program causes a further technical effect beyond its standard interaction with the hardware processor by controlling a technical apparatus and may therefore be separately claimed and protected.

Since a computer itself is also a technical apparatus like the washing machine discussed above, the same approach may be applied in that all programs which control the internal functioning of a computer (*i.e.* which make or keep the computer running) so that it can be used as a platform for any applications should be patentable, such as the BIOS or the operating system.

Further technical effect

In summary, a computer program is not necessarily a technical means, and the art of programming is not necessarily a technical activity. Only those programs that lend themselves to a technical application are considered to have a technical character, *i.e.* to have become a technical means.

4. Assessment of technical character under the EPC

Abstract or aesthetic concepts

Solution of a technical problem

Purely abstract or aesthetic concepts devoid of any technical implications are not considered to be inventions. They generally fall under the “as such” exclusions explicitly mentioned in the EPC (see above). In all other cases, judicial practice has greatly simplified the assessment of technical character by establishing that concrete man-made products/devices/apparatus have *per se* a technical character. Methods/processes have a technical character if they employ technical means, irrespective of whether or not these means are conventional, provided that they are explicitly set out in the claims of a European patent application.

Hence, the first hurdle to patentability requiring the presence of an invention is rather low, and any claimed subject-matter with an explicit technical bearing is taken “on board”. This applies in particular to mixtures of technical and non-technical features in a claim, which are common practice. For the assessment of technical character, no prior art is taken into account because the technical character is an absolute requirement regardless of whether the subject-matter claimed is known or obvious from the prior art. Technical character is therefore already present if a method claim sets out hardware components or peripherals, in particular a conventional PC, or if a device claim relates to a conventional data carrier storing a program.

Industrial applicability

Novelty

5. The assessment of the further patentability requirements for CIIs

At this stage of the examination procedure, available prior art arrives on the scene and serves as a basis for evaluating the above mentioned qualities of an invention. This assessment, in particular with respect to inventive step, is the second hurdle to patentability for a computer-implemented invention, and is by far more difficult to overcome than the first hurdle.

5.1 Industrial applicability

Computer-implemented inventions are normally susceptible of industrial application, so that this requirement is easily fulfilled.

5.2 Novelty

Novelty is generally present if not all features of a claim are known from a single item of prior art. Whether non-technical features of a claim alone may establish novelty over the prior art does not appear to have been conclusively decided by case law. This issue is, however, of minor practical importance since it can normally be bypassed by directly considering inventive step.

5.3 Inventive step

When examining inventive step, a major problem arises for a claim containing a combination of technical and non-technical features: Can an inventive step be acknowledged on the basis of a non-technical feature only? However, since in this context not only differences have to be considered, but also their effects, which must be of technical nature, judicial practice has given a clear answer to this question by laying down that an inventive step can only be based on one or more features that contribute to the required technical character. More specifically, a feature justifying the acknowledgment of an inventive step must serve the technical solution of a technical problem.

This approach has important consequences for the practical assessment of inventive step: Based on the above approach, the relevant skilled person is a person skilled in the technical (or technological) arts. He is neither competent in, nor does he take account of, non-technical knowledge. Any non-technical input is

considered to be transferred by a non-technical expert to the technically skilled person as a framework within which the skilled person may become active. In other words, features which do not contribute to the technical character of the claimed subject-matter are to be separated off in the assessment of inventive step and treated as pre-existing constraints for the technical problem to be solved. The prior art is then used for assessing whether the novel technical features were obvious in view of the technical problem and the pre-existing constraints. In this context, it is regularly held that the mere automation of non-technical concepts (*e.g.* in business or financial services) by means of conventional hardware and normal programming skills lacks an inventive step.

All in all, inventive step proves to be the barrier that sorts the wheat from the chaff in the field of computer-implemented inventions.

Inventive step

6. Summary of current EPO practice

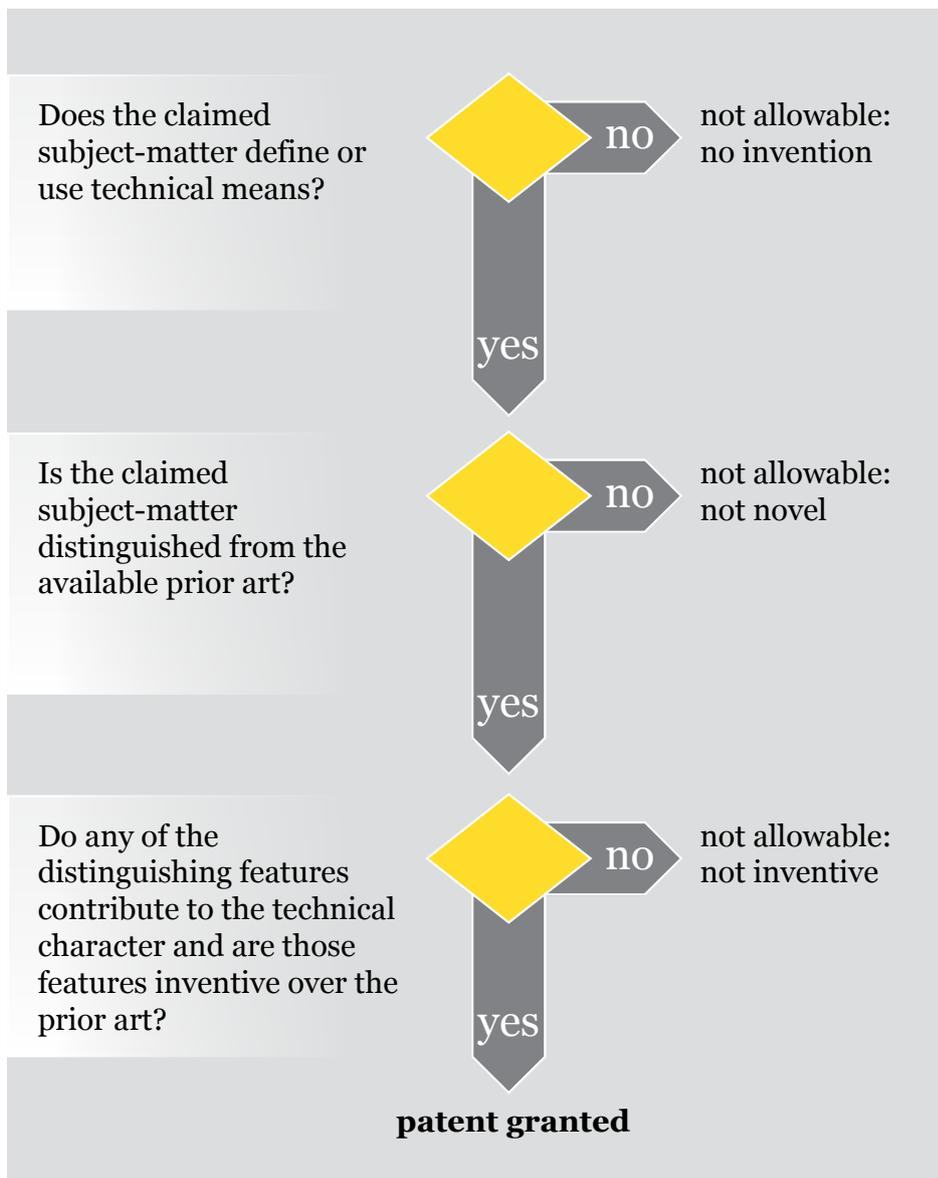
Following the structured approach developed by the Boards of Appeal, the EPO's current practice in examining software related inventions may be summarised by the following sequence of questions:

(i) Does the claimed subject-matter define or use technical means?
If no, the claimed subject-matter is not eligible for patent protection and hence not allowable for this reason.
If yes, it has the required technical character and is an invention. The first hurdle has been overcome.

(ii) Is the claimed subject-matter distinguished from the available prior art?
If no, the claimed subject-matter lacks novelty and is hence not allowable for this reason.
If yes, it is novel.

(iii) Do any of the distinguishing features contribute to the technical character and are those features inventive over the prior art?
If no, the claimed subject-matter does not involve an inventive step and is hence not allowable for this reason.
If yes, a patent may be granted. The second hurdle has been overcome.

The following figure illustrates the above sequence of steps:



7. Claim format for computer-implemented inventions

Claim format

Software-related inventions are predominantly claimed as computer-based methods or processes where the basic concept of an underlying program is expressed by method steps. This formulation normally highlights the main thrust of such a program: it will be apparent from the method what the program is aiming at and what effects are achieved. Computer programs may also be claimed by themselves or as records on a carrier. The category of computer programs (or computer program products) has to be distinguished from method claims since programs are only an inanimate sequence of computer readable instructions that have the potential for achieving concrete effects when loaded to and running on a computer, whereas in a method steps are actually carried out and effects are actually achieved. If claimed as a computer program, computer program product or a record on a carrier, such a claim is in most cases added and refers back to a corresponding method claim. A literary presentation of all program instructions, such as for copyright purposes, is neither required nor useful. Device/apparatus claims, or, in case of “distributed” inventions like client-server architectures, system claims or claims to sub-units of such systems are also possible, and frequently refer to program constructs as modules or means. Finally, the claiming of data and signal structures or formats is conceiv-

Information modelling

Database technology

able, albeit such may be approaching the grey zone to patentable. Further programs judged favourably in terms of technical character relate to garbage collection in a computer memory and aspects of data retrieval.

8. Specific aspects decided by case law

8.1 Information modelling

Information modelling, though a precursor for program design, has been considered to be a non-technical activity as such. It might contribute to the technical character only if specifically applied in a technical environment.

8.2 Database technology

Database technology, in terms of the technical functions and data structures actually stored in the computer, has been found to be technical. Similarly, the exchange of data among various application programs by functional data structures (*e.g.* clipboard formats) was considered to enhance the internal operation of a computer system and hence to be patentable. Further programs judged favourably in terms of technical character relate to garbage collection in a computer memory and aspects of data retrieval.

8.3 Mathematical methods/simulation/computer-aided design

On the one hand, mathematical methods as such are also on the list of non-inventions. On the other hand, mathematics easily qualifies for technical applications. Simulation of an electrical circuit subject to $1/f$ noise was found to constitute neither a mathematical method as such nor a computer program as such, even if mathematical formulae and computer instructions were used to perform the simulation. Similarly, designing an optical system in accordance with an algebraic condition using an optics design program represented a technical activity. In both cases, the inclusion of an actual production step in the simulation or design method was not required.

8.4 Business methods/Financial transaction

Excluded as such, these concepts are difficult to conceive of as being prone to technical applications and therefore cannot be taken into account for assessing inventive step. What might nevertheless be patentable are specific implementation aspects involving hardware designs or pro-

gram constructs that themselves have technical character. It is therefore important to include as many concrete technical implementation details as possible to support sufficiency of disclosure and patentability prospects for innovations in this field.

8.5 Information/Translation

Pure information contents are not patentable. However, the use of a piece of information in a technical system, or its usability for this purpose, may confer a technical character on the information itself in that it reflects the properties of the technical system in which it exists, *e.g.* by being specifically formatted and/or processed. Linguistic aspects of a translation process may also in principle assume a technical character if they are used in a computer system and form part of a technical problem solution.

8.6 Graphical user interfaces (GUIs)

Judicial practice is reluctant to attribute technical character to the design of graphical user interfaces, in particular if they are only based on aesthetic considerations or solely aim at facilitating human perception or mental

Simulation

Translation

Business methods
Graphical user interfaces

processing. Visual indications of the internal states of a technical system in the form of visual feedback for human interaction with the system have, however, been accepted as technical. All in all, for the time being it appears that different Boards of Appeal, though using one and the same structured approach for assessing patentability, do not draw the line in respect of technical character of GUIs consistently, but very much depending on whether a broader or narrower construction of the meaning of “presentations of information” (which are excluded “as such”) is applied

Bioinformatics

8.7 Computer games

Computer games naturally involve a mixture of non-technical aspects of schemes, rules and methods for playing games, computer programs and presentations of information through graphical user interfaces. All of these aspects have to be carefully checked to see whether they make a technical contribution. Aspects purely driven by game rules have to be ignored.

Computer games

8.8 Bioinformatics

Albeit not abundant at present, the existing case law throws light on the realms of technicality in bioinformatics and follows the established view in other technical fields that features excluded “as such” must not be ignored or separated if they serve a technical purpose and thus contribute to the technical character of the claimed subject-matter. In particular, an automated genotype determination is technical and improving the confidence of the genotype estimate relates to a technical problem. Any means contributing to the solution of that problem therefore qualifies as technical means.

9. Referral G 3/08

At the end of 2008, the above case law was challenged by the President of the EPO, who referred questions to the Enlarged Board of Appeal and alleged divergences between various decisions on the patentability of computer programs, in particular on how narrowly the exclusions from patentability were to be construed. In its Opinion of May 12, 2010, the Enlarged Board decided that the Referral was inadmissible since no di-

vergenes in the sense of “conflicting decisions” could be identified. Hence, the case law on CIIs must be considered to be firmly established as it stands, thus promoting legal security.

10. Summary

Inventions involving computer hardware and software are patentable under the EPC

- if they have technical character by relating to a technical product or to a method employing technical means, and
- if the combination of such of their features that contribute to the said technical character is novel and inventive over the prior art.

If these requirements are met, claims in the format of method, system, apparatus and computer program (with and without carrier) are allowable. It is therefore important to include concrete technical implementation details to support sufficiency of disclosure and patentability prospects.



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