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Softwarepatents

A change of Law?

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A. Introduction

In industrial nations a large number of patents have been granted on inventions which wholly or partly are based on computer software. Particularly in the United States of America this granting practice extends to patents on methods of doing business which have been implemented to software. At the same time growing resentment particularly of small and medium enterprises and free software developers can be observed. Notwithstanding these general conflicts of interests most industrial nations did not yet address the issue by legislation but left it to the courts to find solutions.

The Green Paper on Electronic Commerce for South Africa, issued in 2000 by the Department of Communications suggests that the scope of definition and the criterion in rendering a patent had to be widened with emphasis on protection, monitoring and enforcement measures to synchronize South African patent law with a global integrated mechanism for the administration and issuing of patents.¹

This paper examines whether the granting of patents to software is just the consequent application of traditional patent law to a modern form of inventions or constitutes a substantial change of the patent law which, in a democratic society, should only be done by a parliamentary act of legislation. The paper provides a discerning look at the genesis of software patents in the case laws of the United States of America and the European Union, paying attention to the technological facts of the cases and the legal reasoning.

B. Definitions

The term “software patent” itself is a delicate one; those who are in favour of a broad patentability of software therefore try to avoid it rather speaking about “computer-related-inventions” or “computer-implemented-inventions”, e.g. In the “United States Patents and Trademarks Office Manual of Patent Examining Practice” of 1996 or the proposed “Directive on Computer Implemented Inventions” of the European Commission².

Especially in Europe the term gives rise to disputes. The supporters of a more permissive patent law in respect to software products appreciate the statement that they are not demanding the patentability of software as such³ but patent rights in industrial methods that make use of computers and therefore not “software patents”. The objectors however suspect logomachy and politically motivated obfuscation in this terminology. They fear that patentability of mere software, thus “software patents”, will be the very outcome of any opening of the patent law to software products in any manner whatsoever, unless strict

¹ Green Paper on Electronic Commerce for South Africa, sec. 6.6

² Proposal for a Directive of the European Parliament and of the Council on the patentability of computer-implemented inventions (COM/2002/0092 final - COD 2002/0047) OJ C 151 E , 25/06/2002 P. 0129 – 0131 = http://europa.eu.int/comm/internal_market/en/indprop/comp/com02-92en.pdf

³ The term “as such” is problematic in this context and will be discussed later

limitations accompany them. Accordingly they speak about “software patents”.

In fact a patent for an invention that makes use of a computer does not necessarily need to be a “software patent”. But from which angle ever one approaches the matter and however one calls it, two terms will unerringly be encountered: “software” and “patent”. Hence those two must be defined separately in order to achieve any perceptions upon the legal relation between them and related issues.

I. Software

“Software” can be understood as the general term for information that is recorded onto some kind of medium. The medium that stores software - e.g. a CD-ROM, a hard-drive, a piece of paper, etc. - is not software. However “computer software” usually refers to “computer programs” and computer related patents that do not merely claim on invented hardware, normally claim on the used computer program. Hence the meaning of “computer program” as a sub category of “software” is the pivotal element to define here.

A computer program prescribes the actions ("computations") that are to be carried out by a computer. Most programs consist of a loadable set of instructions which determines how the computer will react to user input when that program is running, i.e. when the instructions are loaded.⁴

Basically computer programs appear in two different forms. The so called source code allegorises the program in a human readable programming language, e.g. “Fortran”, “Basic”, “Pascal”, “C”, “Java”. Such programming languages feature a vocabulary that allows the programmer to express steps, procedures and logical relations in a manner which is comprehensible to the human way of thinking. They can be understood as a mathematical language that expresses mathematics in words. Writing a computer program that performs a certain predetermined mathematical algorithm is rather an act of translation than of creation. Digital Processors however do not “think” like the human brain. They only may interpret binary code, numbers that merely consists of zeros and ones. Hence in order to be executed by a digital processor, a program must be further transformed from source form into a binary form, the so called “binary-file” or “executable”. This is done by a “compiler”, which creates a permanent executable or an “interpreter” which transforms source code step by step, i.e. instruction by instruction, into temporary binary code that normally is just kept in the volatile storage of the computer.

The program – in binary form – instructs the processor (or more precisely: the “arithmetic and logical unit”) of a computer to perform elementary operations such as arithmetic operations (addition, subtraction, etc.), logical operations (AND, OR, NOT), and comparison operations (for example, comparing the contents of two bytes for equality).⁵ Every complex operation of a computer can

⁴ Wikipedia “computer program”, http://en.wikipedia.org/wiki/Computer_programs <30. May 2005>

⁵ Wikipedia “computer ”, <http://en.wikipedia.org/wiki/Computer> <30. May 2005>

be analysed into a plurality of such elementary arithmetic or logical operations.

Hence a computer program consists of nothing else than arithmetic or logical instructions, notwithstanding how 'inarithmetic' or 'illogic' the processed information may seem to be. In this regard the famous "Church-Turing thesis"⁶ shall be mentioned, but due to it's mathematical complexity not discussed.

II. Patent

The word “patent” is derived from the Latin “literae patentes” which means open letters. A patent can be understood as an exchange between the inventor and the public. The inventor discloses the invention in some detail so as to enable one of ordinary skill in the art to which the invention pertains to create and make use of the invention. In return the inventor obtains the exclusive right to prevent others from making use of the invention for a certain period (usually 20 years). This means a monopoly on making, using, offering for sale, or selling the invention.⁷ The monopoly does not only comprize a particular form of using the invention but the method or Funktionsweise as such. However the inventor may sell licenses to other to participate in his right.

The purpose of patents are to encourage research and development of new technologies by securing the fruits of an invention to the inventor (for the given period). Patents may not be mixed up with copyrights, which grant exclusive rights on the use of a particular form, way or manner in which an idea or information is expressed and presented. That software is protected by copyright is beyond doubt.

III. Invention

“Invention” is a term that shall and can **not** be defined here, because it's definition is part of the issue this paper is concerned with. However it must be clarified that the term “invention” whenever used in this paper does not necessarily mean “technological invention” or “patentable invention”. It merely means some result of any inventive work which can also be something clearly non-patentable such as tricky riddle or an enthralling murder mystery.

IV. Technical

In this paper the term “technical” is solely used in it's meaning as a byword for “technological” and not “professional”.

⁶ Church, A set of Postulates for the Foundation of Logic, Annals of Mathematics, second series, 33, pp. 346-366; Turing, On Computable Numbers, with an Application to the Entscheidungsproblem, Proceedings of the London Mathematical Society, Series 2, 42 (1936-37), pp. 230-265

⁷ Chisum et al., Principles of Patent Law, p. 2

C. The genesis of software patents

About four decades ago the question arose whether and to what extent patents may be legally issued for inventions that implement software or are based completely upon it. Since then it has been answered more and more discordant by jurisdictions of different industrial nations.

I. United States Of America

1. The Statutes

In the U.S.A. patents may be granted under 35 U.S.C. § 101 which provides:

“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 therefor, subject to the conditions and requirements of this title.”

The following § 102 provides for the additional requirement of “novelty” which means, that the invention must not been known, used or described in a printed publication by others before.

§ 103 limits the subject matter under § 101 to inventions that are non-obvious “at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains”. Moreover it says that “patentability shall not be negated by the manner in which the invention was made”, 35 U.S.C. § 103 (a).

The title is accompanied by some other conditions and requirements, none of which include an *expressis verbis* exclusion for software. In the 1960s, a law commission formed by President Johnson, recommended to amend the statutes by such an exclusion,⁸ This amendment has never been made, but in 1968 the Patent and Trademark Office (USPTO) issued examination guidelines that do not consider computer programs as patentable subject matter.⁹

In the course of the developments this paper investigates, new „Examination Guidelines for Computer-Related Inventions“¹⁰ have been issued by the USPTO.

⁸ President's Commission on the patent system, To promote the progress of useful arts in an age of exploding technology S. Doc. No. 5, 90th Cong., 1st Sess., 20-21 [1966]

⁹ Examination of Patent Applications on Computer Programs, 33 Fed. Reg. 15,609-10 (1968), rescinded by 34 Fed. Reg. 15,724 [1969]

¹⁰ Patent and Trademark Office United States Department of Commerce, „Examination Guidelines for Computer-Related Invention“ Final Version, <http://www.uspto.gov/web/offices/pac/dapp/pdf/ciig.pdf> <8 July 2005> (USPTO Guidelines)

2. Application process and remedies

Patent applications must be filed to the PTO not later than one year after

- public use of the invention;
- the placing on the market of the invention for sale in the United States; or
- the publication of a description of the invention anywhere in the world.

They have to disclose details of the invention, including trade secrets.

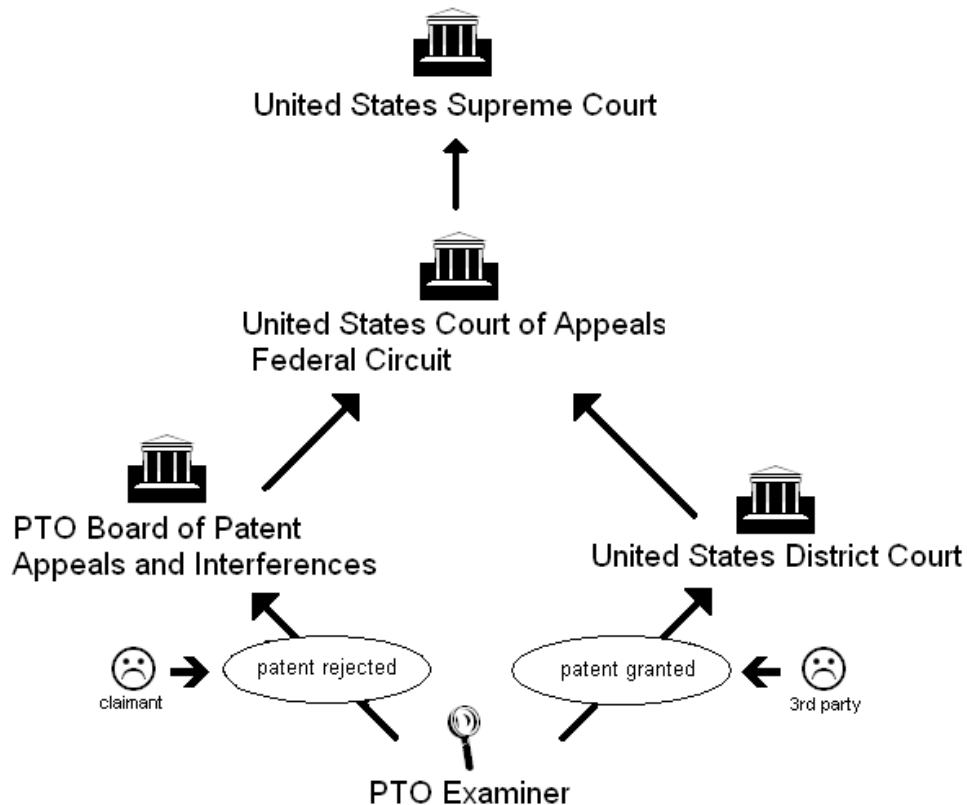


Figure 1: Stages of Appeal

If the PTO examiner rejects an application, the claimant may appeal to the PTO Board of Patent Appeals and Interferences. If the examiner grants a patent, it can be challenged by a third party in a lawsuit filed in a United States District Court. A decision from those courts may be appealed to the United States Court of Appeals for the Federal Circuit and prior to 1982 accordingly to its predecessor the Court of Customs and Patent Appeals (CCPA). Their decisions can – under certain circumstances – be appealed to the U.S. Supreme Court.

3. Caselaw

a. The “Supreme Court Trilogy”

In the 1970s the U.S. Supreme Court had to decide about three patent claims that involved the use of computer software. This “Supreme Court Trilogy”¹¹ lay down a set of rules how to determine the patentability of a computer software.

(1.) *Gottschalk v Benson*

The first was *Gottschalk v Benson*¹² which involved the attempt to patent “a method of programming a general purpose digital computer to convert signals from binary coded decimal form¹³ into pure binary form¹⁴”. This was achieved by an mathematical algorithm that has been implemented into a software. The algorithm could have been executed by existing computers, no specific new machinery being necessary. The Supreme Court described an algorithm as “a procedure for solving a given type of mathematical problem”.¹⁵

The court pointed out, that the relation between decimal numbers and their binary representatives follow a mathematical rule, the application of which can also be performed mentally without use of a computer.¹⁶ With a little logical understanding this rule can be derived from the table to the right:

Our common numeric system is based on ten digits: “0” to “9”. The value represented by each symbol depends on the value of the digit and it's position, i.e. the place. When we count up, we start to count from “0” to “9” in the last place. After the last place has reached “9” we increase the second last place by one value, thus from “0” to “1”, and switch back the last place to “0”. Hence the number following “9” (or “09”) is “10”. Then again we count up to “9” in the last place (or to “19” in respect to both places), again followed by the step of increasing the second last place by one value from “1” to “2” and switching the last place back to “0”. So the number after “19” is “20”. This

decimal number	<i>equals to</i>	binary number
00		0000
01		0001
02		0010
03		0011
04		0100
05		0101
06		0110
07		0111
08		1000
09		1001
10		1010

sequence will be repeated till “99”, after which both, the last and the second last place switch to “0” while the third last place is increased by one. Using this system, we can express an unlimited array of numbers by just ten symbols.

The binary numeric system works similar, but on the basis of two symbols: “0” and “1”. Hence whenever a place reaches “1”, the next place will be increased

¹¹ As named e.g. in *State Street v Signature*, 927 F.Supp. 502 (@508) [1996]

¹² *Gottschalk v Benson*, 409 U.S. 63 [1972]

¹³ Numbers in a mathematical system with the base 10

¹⁴ Numbers in a mathematical system with the base 2

¹⁵ *Gottschalk v Benson*, 409 U.S. 63 (@65) [1972]

¹⁶ *Gottschalk v Benson*, 409 U.S. 63 (@67) [1972]

by one, which soon results into very long numbers – the year 2005 expressed as a binary number is the year 11111010101 – and therefore not easy to be handled by the human brain. However computers always “think” in binary code, because the electric status in a computer’s transistor can only express two values: “no electric current” (for “0”) and “electric current” (for “1”). Since a computer contains billions of transistors, it can store and handle so complex data. But actually everything is encoded in binary numbers. Therefore the conversion of decimal numbers to binary numbers is not only a trivial mathematical law, but also a vital element of any digital computer.

In binary encoded decimal numbers each symbol (place) of a decimal number is replaced in separate blocks by the four digit binary correspondent (compare figure 1 again). Thus “53” equals - expressed as binary encoded decimal number - to “0101 0011”.

The conversion of binary encoded decimal numbers to pure decimal numbers consists of no more than applying the above explained mathematic rule two times successively, first in respect to each four digit segment of the binary encoded decimal numbers, then (in the 'other direction') in respect to the resulting decimal numbers.

The Supreme Court stated that in accordance to precedents, a scientific truth, or the mathematical expression of it, was not a patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be.¹⁷ A principle in the abstract was a fundamental truth, an original cause, a motive; and these could not be patented, as no one could claim in either of them an exclusive right.¹⁸ Moreover the court quoted *Rubber-Tip Pencil Co. v. Howard*: “An idea of itself is not patentable.”¹⁹

Supreme Court held in *Benson* that the process claimed is no more than the mere expression of a mathematical truth, too abstract and sweeping to be patented.²⁰ The scope of possible end use may vary from the operation of a train to verification of drivers’ licenses to researching the law books for precedents. A reference to *O’Reilly v Morse*²¹ has been made, where the court rejected Samuel Morse's broad claim covering any use of electromagnetism for printing intelligible signs, characters or letters at a distance.

Hence this software was held non-statutory subject matter. The court pointed out, that there is a lack of certainty in connection with software and patent law that should be addressed by the U.S. Congress.²² By some the decision was already accepted as a “final” determination that computer programs were not patentable.²³ However the Supreme Court expressly stated that the decision did not preclude any computer program from patenability.²⁴ The question where to draw the line between a patentable and an non-patentable computer program

¹⁷ *MacKay Co. v. Radio Corp.*, 306 U.S. 86 (@94)

¹⁸ *LeRoy v. Tatham*, 14 How. 156 (@175)

¹⁹ *Rubber-Tip Pencil Co. v. Howard*, 20 Wall. 498 (@507)

²⁰ *Gottschalk v Benson*, 409 U.S. 63 (@68) [1972]

²¹ *O’Reilly v. Morse* 15 How. 62

²² *Gottschalk v Benson*, 409 U.S. 63 (@73) [1972]

²³ Goldman, Ed. The Oyez Project, *Oyez: Gottschalk v. Benson*, 409 U.S. 63

²⁴ *Gottschalk v Benson*, 409 U.S. 63 (@71) [1972]

was not answered yet.²⁵

(2.) *Parker v Flook*

The second decision in the trilogy was in the case *Parker v Flook*.²⁶ An individual (Flook) applied for a patent on a method for updating alarm limits during catalytic conversion processes, the only novel feature of which was a mathematical formula. The patent claim covered a broad range of potential uses, but not every conceivable application of the formula. The PTO examiner's rejection of the application as “not eligible for patent protection” was sustained by the Board of Appeals of the PTO, but reversed by the Court of Customs and Patent Appeals (CCPA).²⁷ The US Supreme Court however held Flook's invention to be non statutory subject matter.

Abiding by their basic rule of *Gottschalk v Benson* that a mathematic formula is not patentable,²⁸ the Supreme Court now had to decide whether the identification of a limited category of useful conventional post solution applications of such formula makes it eligible for a patent.

During a catalytic conversion process certain operating conditions such as temperature, pressure and flow rates have to be constantly monitored. When any of these values exceed a predetermined alarm limit an abnormal situation is indicated that may require certain arrangements by the operator of the machine. During transient operating situations - such as start up – it might be necessary to update alarm limits periodically. Flook's patent application described a method of updating alarm limits. This method did not differ from prior art alarm limit updating except for the mathematic algorithm that was used to calculate the new alarm limits.²⁹

The court pointed out that a process was not unpatentable simply because it contains a mathematical algorithm. But the algorithm itself may not be the only inventive step in it. A mere scientific principle was not subject of a patent, since it just revealed a relationship that had always existed. The court drew a comparison to Newton's formulation of the law of universal gravitation, which had always been existing even before Newton announced it. Such “mere recognition of a therefore existing phenomenon carries with it no rights to exclude others from its enjoyment”.³⁰

With the notion that the algorithm itself cannot constitute a novel invention since it has been existing ever since, only a new way – in terms of 35 U.S.C. § 102 – of applying it in order to estimate new alarm limits may justify a patent claim. Flook's invention however lacked of any novelty beside the algorithm. Hence it was held nonstatutory subject matter. Again the court emphasized that any change of that understanding of the law could only be made by the Congress.³¹

²⁵ Hollaar, Legal Protection of Digital Information, p. 299

²⁶ *Parker v Flook* 437 U.S. 584 [1978]

²⁷ *In Re Flook* 559 F.2d 21 [1977]

²⁸ *Parker v Flook* 437 U.S. 584 (@585) [1978]

²⁹ *Parker v Flook* 437 U.S. 584 (@587) [1978]

³⁰ *Parker v Flook* 437 U.S. 584 (@592) [1978]

³¹ *Parker v Flook* 437 U.S. 584 (@595) [1978]

(3.) *Diamond v Diehr*

The final instalment in the trilogy was *Diamond v Diehr*³² of 1981; the subject was a process for curing synthetic rubber employing a computer. The software on the computer performed a well known mathematical algorithm to determine the proper time for the rubber to cure.

A perfect cure for moulded rubber depends on several factors including the thickness of the raw material, the temperature of the moulding process and the amount of time that the raw article is allowed to remain in the press. These values can be estimated by making use of the Arrhenius equation, which was well known before. Even the application of the Arrhenius equation to the process of moulding rubber was prior known. New however were the means for measuring the temperature in the press and for using that information to open the press automatically in the exact moment when the rubber is cured properly. Prior to the invention moulding times could only be estimated roughly due to uncontrollable variables such as the decrease of temperature during opening of the press. Diehr developed a method that constantly measures the precise temperature in the closed press by using a thermocouple and feeds this information into a computer which repeatedly recalculates the curing time. When the calculated curing time is elapsed the computer generates a signal that causes the press to open automatically.

U.S. Supreme Court held this invention to be statutory subject matter of 35 U.S.C. § 101 hence patentable. Diehr's claims were not directed to a mathematical algorithm or an improved method of calculation but rather recited an improved process for moulding rubber articles by solving a practical problem related to it.³³

While the majority of United States jurists considers this decision to be a shift in view of the Supreme Court and a turn towards patentability of software³⁴, the author opines that it is perfectly in line with the rest of the 'trilogy'. The Supreme Court expressly abide by their prior arguing that a mathematical method is not subject to a patent. At the same time a process that otherwise is statutory does not become non-statutory simply because the use of a computer is incorporated. The court pointed out, that it is aware of the the Committee Reports accompanying the 1952 Act which stated that Congress intended statutory subject matter to “include anything under the sun that is made by man.”³⁵ However that did not alter the fact that laws of nature, physical phenomena and abstract ideas are excluded from this Act.³⁶ The underlying notion is that these are not made, at least not by man. A process or improvement that does not include particular machines acquired patentability if it transformed or reduced an article “to a different state or thing”.³⁷ Diehr's invention did so. The actual inventive step did not reside in the software, but in the measurement of

³² *Diamond v Diehr* 450 U.S. 175 [1981]

³³ *Diamond v Diehr* 450 U.S. 175 (@181) [1981]

³⁴ Chisum et alia, Principles of Patent Law, p. 730

³⁵ See S. Rep. No. 1979, 82d Cong., 2d Sess., 5 (1952), H.R. Rep. No. 1923, 82d Cong., Sec. 2d Sess., 6 (1952)

³⁶ *Diamond v Diehr* 450 U.S. 175 (@185) [1981]

³⁷ *Diamond v Diehr* 450 U.S. 175 (@183) [1981]

temperatures in a closed moulding press and in the process of improved rubber moulding as a whole. In other words: in the retrieval of information that will be processed by the software and the tangible application of its result. The algorithm implemented in the computer software forms a part of that invention. But the algorithm as such still would not be patentable, nor does the patent for the rubber moulding process grant rights in the algorithm as such.

While the decision demines that a computer program as part of an statutory process that changes a physical structure is clearly statutory, it still lacks of a tangible definition of the borderline to non-statutory implementations of computer programs. In particular the question arose whether the same rule applies if the computer program is implemented in a process that does not physically change matter.³⁸

b. The Freeman-Walter-Abele-Test

In all three cases of the “trilogy” the court of lower instance – the U.S. Court of Customs and Patent Appeals (CCPA) – reversed the rejection of the PTO's examiner, resp. the sustaining decision of the Board of Appeals of the PTO. The CCPA always rather tended to grant patents on software or mathematic algorithms, where that time the PTO and their Board of Patent Appeals and Interferences tended to reject them.

After *Gottschalk v Benson*³⁹ and *Parker v Flook*.⁴⁰ however the CCPA had to imply the U.S. Supreme Court's opinion that mere mathematical algorithms (even when translated to computer programs) remain non-statutory subject matter into their own adjudication. Since the CCPA struggled with that implication, it articulated its own method of examining algorithm related inventions, which became known as the “Freeman-Walter-Abele-Test”.⁴¹

(1.) In Re Freeman

The PTO's examiner and the Board of Appeals of the PTO rejected Freeman's invention of a system for typesetting alphanumeric information, especially mathematical formulas, using a computer based control system in conjunction with a conventional phototypesetter. Upon Freeman's appeal, the CCPA reversed their decisions.⁴²

The patent claim comprised a system consisting of input-, computing-, storage- and output device, which virtually is the arrangement of any data processing system. The actual invention resided in the method of arranging the stored data and processing it in a way that provide the output device with orders for the exact positioning of symbols. This was done by a computer program running on

³⁸ Hollaar, Legal Protection of Digital Information, p. 309

³⁹ *Gottschalk v Benson*, 409 U.S. 63 [1972]

⁴⁰ *Parker v Flook* 437 U.S. 584 [1978]

⁴¹ Saladi, Computer Software: Patentable Subject Matter Jurisprudence Comes Of Age, 18 JMARJCIL 113

⁴² *In Re Freeman*, 573 F.2d 1237; 197 USPQ 464 [1978]

the computing device of the system.

The stored data was arranged in a hierarchical tree structure of datasets, each of which consisted of one symbol, whether a character or an operator. The tree structure defined the exact position of each symbol by starting a new “branch” for each symbol that begins a new line, above, on or below the main line of the formula. The “local positioning algorithm” converted the (tree-) structured data into exact orders for the output device to position the symbols in accordance with their appearance, while maintaining the mathematical integrity of the expression.

The CCPA rejected a holding that patent claims had to be dissected into components, which separately must be examined for being in the prior art, and if the only novel component is outside the statutory classes of inventions, the claim needed to be rejected (the so called “point of novelty approach”). Moreover the court emphasized that they do not understand *Gottschalk v Benson*⁴³ as an exclusion of computer programs from patentability.⁴⁴

Instead it developed a “two-step analysis” to determine whether a claim is statutory subject matter in the light of *Gottschalk v Benson*:

1. “It must be determined whether the claim directly or indirectly recites an algorithm in the *Benson* sense of that term.”
2. “The claim must be further analysed to ascertain whether in its entirety wholly preempts that algorithm.”⁴⁵

The actual difficulty the court allocated in the question what an “algorithm” is in the “*Benson* sense of that term”. Two definitions were discussed. A broad definition by the Webster's New Collegiate Dictionary, stating that “an algorithm is a step-by-step procedure for solving a problem or accomplishing some end” was refused as inappropriate since almost any process can be characterized as a step-by-step procedure, while a “process” is expressed as statutory subject matter of 35 U.S.C. § 101. Preference was given to a narrow definition of algorithm as being the “procedure for solving a given type of mathematical problem”.

In analysing whether the claim recites an algorithm it did not necessarily have to be searched for algebraic formulas expressed in traditional mathematical symbols. Also prose could express a mathematical algorithm. At the same time the usage of the word “algorithm” in the claim was not necessarily referring to a mathematical algorithm, thus an algorithm “in the *Benson* sense”.

In Freeman's typesetting system the court did not find any mathematical algorithm “in the *Benson* sense”. The “local positioning algorithm” in the patent claim referred to the broad definition of algorithm as any step-by-step procedure and did not recite process steps which are themselves mathematical calculations, formulas or equations. Hence the court did not even have to perform the second step, since no “algorithm in the *Benson* sense” was recited.

The CCPA did not at all discuss or even recognise the fact that any computer

⁴³ *Gottschalk v Benson*, 409 U.S. 63 [1972]

⁴⁴ *In Re Freeman*, 573 F.2d 1237 (@1244) [1981]

⁴⁵ *In Re Freeman*, 573 F.2d 1237 (@1245) [1981]

program is a multiplicity of mathematical operations.⁴⁶ One of the first judicially approved software patents was born.

(2.) *In Re Walter*

After *Parker v Flook*⁴⁷ the CCPA had to amend their “Freeman-Test” *In re Walter*⁴⁸ where the appellant claimed a patent on a “Seismic Prospecting System”.

Seismic surveying and prospecting is done by sending seismic source waves into earth and monitoring the deflection of the signal by subsurface features. The waves are created by a mechanical apparatus which vibrate against the surface of earth. The returning signals are monitored by so called “geophones” which are set out on the surface. This method was in the prior art.

Since the returning signals have been deflected from different depth and locations, they are a jumble of different frequency components. In order to evaluate the recordings of the geophones, the frequency jumble needs to be broken down into it's components and it's individual deflected portions identified.

Walter's invention did so by converting the recordings into digital form, dividing it into segments and cross-correlating it with the original transmission signal. A computer performed several mathematical operations on it, including the “Cooley-Tukey-Algorithm”⁴⁹, which is a so called “Fast Fourier Transform”,⁵⁰ known since around 1805 when it was utilized by Carl Friedrich Gauss.

The patent claim restated the mathematical algorithms that were used in a mathematical language using symbols such as variables, numbers and operators.

The CCPA rejected an understanding of *Parker v Flook*⁵¹ that it adopts the “point of novelty approach”⁵². Instead it restated the second step of the Freeman-Test:

“Once a mathematical algorithm has been found, the claim as a whole must be further analysed. If it appears that the mathematical algorithm is implemented in a specific manner to define structural relationships between the physical elements of the claim (in apparatus claims) or to refine or limit claim steps (in process claims), the claim being otherwise statutory, the claim passes muster under 35 U.S.C. §101. If, however, the mathematical algorithm is merely presented and solved by the claimed invention, as was the case in *Benson and Flook*, and is not applied in any manner to physical elements or process steps,

⁴⁶ See above the definition of software

⁴⁷ *Parker v Flook* 437 U.S. 584 [1978]

⁴⁸ *In Re Walter*, 618 F.2d 758; 205 USPQ 397 [1980]

⁴⁹ Wikipedia “Cooley-Tukey”, http://en.wikipedia.org/wiki/Cooley-Tukey_FFT_algorithm <30. May 2005>

⁵⁰ Wikipedia “fast Fourier transform”, http://en.wikipedia.org/wiki/Fast_Fourier_transform <30. May 2005>

⁵¹ *Parker v Flook* 437 U.S. 584 [1978]

⁵² See above

no amount of post-solution activity will render the claim statutory; nor is it saved by a preamble merely reciting the field of use of the mathematical algorithm.”

One indication for a mere preemption of a mathematical algorithm – in the opinion of the court – are an end product, that is no more than a pure number.⁵³ The mere recording of such a result on, e.g. a magnetic tape, does not render the claim statutory. The fact that an blank tape is physically different from a tape containing the results is not an adequate relation between algorithm and physical elements in terms of the new “Freeman-Walter-Test”.⁵⁴ The underlying notion of course is, that the recorded information is not necessarily bound to that specific tape but could be stored on any device, including a piece of paper or even someone's mind.

Applying these rules, the CCPA came in this case to the same result as the PTO Board of Patent Appeals and Interferences:

Walter's invention was no more then an improved method of calculating. The method described an mathematical exercise, which remains a mathematical exercise even when verbally tied to the specific end use of seismic prospection. The invention did not improve the apparatus of seismic prospection but merely the method of interpreting their results. Even the possibility of substituting the multi purpose computer running a software with an electronic hardware that has only and dedicatedly been designed to perform the algorithm for the specific purpose did not render the invention statutory, as the CCPA pointed out with a reference to their own case law.⁵⁵

The even more interesting aspect of the decision is, that the CCPA for the first time addressed the fact that any computer program is a multiplicity of mathematical operations, after the PTO Board based their rejection partly thereupon.

The CCPA hold that accepting the notion that computers work mathematically would suffice to remove all computer arts inventions from the scope on 35 U.S.C. §101. The court substantiated their opinion by a couple of examples: any invention that makes use of gravity would be non-statutory because gravity “is expressible as a mathematical formula”, any invention that comprised a timed process would be non-statutory because “time is *counted* in minutes”.⁵⁶

The court ignored three facts in this *obiter dictum*: First the notion that computers work mathematically is not subject to someone's acceptance, it is a fact. Second the eventuality that gravity can be expressed as a mathematical formula does not render falling things to be something mathematical, nor is mere *counting* something mathematical. Third the notion that computer work mathematically does not exempt any computer related invention from patentability. The question what a computer program needs to perform – additionally to solely causing (mathematical) computations in the computer – is the very problem that was addressed by the Supreme Court. The “Freeman-

⁵³ *In Re Walter*, 618 F.2d 758 (@768)

⁵⁴ *In Re Walter*, 618 F.2d 758 (@770)

⁵⁵ *In Re Gelnovatch*, 602 F.2d 982; 203 USPQ 44 [1979]

⁵⁶ *In Re Walter*, 618 F.2d 758 (@769)

Walter-Test”, requesting a relation between mathematics and physical elements or procedures, seemed to be a very useful approach, while it remained unclear what the court meant by “or to refine or limit claim steps”. A presumption that computers are nothing mathematical however was neither necessary nor appropriate in that respect.

(3.) *In Re Abele*

*In Re Abele*⁵⁷ the invention was a method for image processing, particularly applied to computerized axial tomography or CAT scans.

Conventional computerised tomography was able to provide a visualized cross-section transverse to the body axis even prior to Abele's invention. However the conventional method required the examined object to be exposed to X-rays for a relative long time. The invention of the appellant was a software based method to process the image provided by the tomograph, which helped to reduce the time, the object (human body) was required to remain in the tomograph as well as to eliminate artifacts in the image by using a “ weighting function”, thus improving the quality of the image.

The method of tomography as such was not different to the prior art, but the mathematical method of computer aided processing of the image was.

The PTO Board of Appeals applied the “Freeman-Walter-Test” and, in the second step, did not find the algorithm “implemented in a manner to define structural relationships to physical elements in the apparatus claims or to refine or limit claim steps in the process claims”.⁵⁸

The patent application comprised claims that are solemnly related to the method of image processing, as well as claims that directed that same method to the use in connexion with a tomography device. In respect to the latter, the CCPA reversed the PTO Board’s decision upon Abele's appeal. The court pointed out, that the PTO Board did not apply their “Freeman-Walter-Test” in the proper way and now clarified the condition “...to refine or limit claim steps” which if given, drew an algorithm implemented invention statutory subject matter:

The claim needs to show an application of the algorithm to process steps which are themselves part of an overall process which is statutory.

The court held the overall improved process of tomography to be statutory and drew a direct compare to the improved molding process in *Diamond v Diehr*⁵⁹.

In fact there was a difference between Diehr's and Abele's inventions: Diehr created a new physical device, equipped with new physical means for measuring the temperature in the closed molding press and new physical means for controlling the molding process in accordance with the results of the computer's calculations. Whereas Abele's invention merely processed the data that has been produced by a conventional tomograph. It is to grant to the CCPA's opinion, that Abele's invention enabled users of it to use the tomograph in a different way, i.e.

⁵⁷ *In Re Abele*, 684 F.2d 902; 214 USPQ 682 [1982]

⁵⁸ *In Re Abele*, 684 F.2d 902 (@905)

⁵⁹ *Diamond v Diehr* 450 U.S. 175 [1981]

in a way that exposes the object for a shorter period of time to hazardous X-rays. *In Re Abele* certainly is one of the most difficult borderline cases, but the direct compare to *Diamond v Diehr* is very arguable since – different to *Diehr* – *Abele* did not create a new physical technology which made use of the algorithm. Notable is that the CCPA expressly deems the displaying of the results in *Abele's* invention to be statutory subject matter, which helps to consider the whole process to be statutory subject matter,⁶⁰ whereas the very same CCPA held that the physical storage of the result, e.g. on a magnetic tape, was not able to draw *Walter's* seismic prospection system statutory, *In Re Walter*.⁶¹ It is further arguable where the difference between both cases shall reside in that respect. Indeed both methods of data output are physical, but at the same time not directly related to the invented algorithm. Both are just (prior art) methods of data output, substitutable by any other mean of data output.

c. After Alappat

(1.) In Re Alappat

In the 1994 landmark case *In Re Alappat*⁶² the new United States Court Of Appeals For The Federal Circuit (Federal Circuit), which inherited the jurisdiction on patent cases from the CCPA, finally uncoupled the question of software patents from the question of algorithm patents, thus escaped the Supreme Courts authority in the 'Trilogy'. The reasoning in this decision was very arguable indeed.:

The invention was a software that provides so called „anti aliasing“ for digital oscilloscopes. An active digital output device of a computer, i.e. a screen or monitor, usually presents a raster of a certain limited number of lines and rows, usually referred to as „the resolution“. If the output of an oscilloscope - usually some kind of waveform - is made on the raster of a digital screen it can happen that the waveform appears jagged or discontinuous due to the limited number of pixels. This especially occurs if the waveform contains rapidly rising and falling portions.

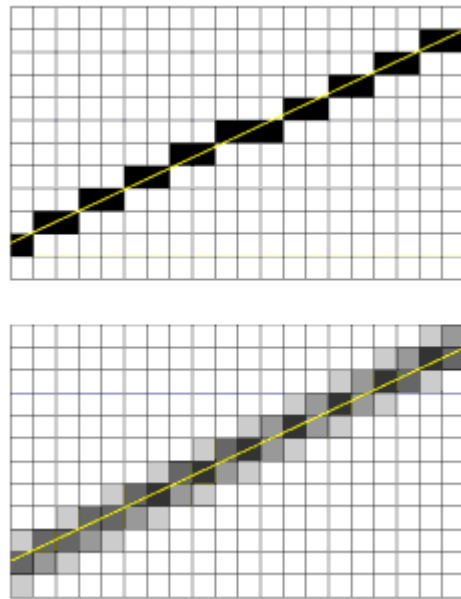
Moreover the presence of 'noise' in the input signal can cause the rasterised waveform to oscillate between two pixel rows when the magnitude of the input signal lies between the values represented by the two rows.

⁶⁰ *In Re Abele*, 684 F.2d 902 (@909)

⁶¹ *In Re Walter*, 618 F.2d 758 (@770)

⁶² *In Re Alappat*, 33 F3.d 1526; 31 USPQ2D 1545 [1994]

An „anti aliasing“ filter overcomes these effects by calculating the distance of the centre of each adjacent pixel to the waveform's actual vector through the raster. The closer the centre is to the vector the brighter this pixel is illuminated on the screen, the farther it is the less illumination is appointed to that pixel. The visual effect is a smooth, unjagged waveform as illustrated in Figure 3.⁶³ The new waveform does not represent any new information, nor is it bound to a specific output device. The output data has just been geometrically rearranged to be easier on the eye and can be directed to other forms of output devices such as a (matrix-) printer.



Anti aliasing filters are not only used to process the output of a digital oscilloscope but to soft-focus various forms of graphical computer output, e.g. the „True Type Fonts“⁶⁴ of a common word-processing software such as the one that was used to create this paper.

An extended PTO Board of Appeals sustained the rejection of the claim which comprised the calculation part (the „anti aliasing“) step by step and the use of an output device, each recited in the „means-plus-function-language“ that defines the physical apparatus related to the invention just as „means for...“. It held that the claimed steps combine to a sole „mathematical algorithm for computing pixel information“,⁶⁵ which is non-statutory in respect to the „Trilogy“. The last step, the mere display of illuminating intensity data, was not considered significant post solution activity.

35 USC § 112 P 6 provides that a patent claim may be drafted in the „means-plus-function-language“ without reciting the specific structure or material that ought to be used for the performance, but comprise the corresponding structure or material.⁶⁶

The PTO-Board held that 35 USC § 112 P 6 applies to infringement actions rather than to examinations standards⁶⁷ Hence it concluded that Alappat did not

⁶³ Georg Mischler, The Lighting Design Glossary, © by Georg Mischler. <http://www.schorsch.com/kbase/glossary/aliasing.html> <04. July 2005>

The reproduction of this graph is deemed to be in the fair use for scientific purposes.

⁶⁴ Vector orientated fonts

⁶⁵ *Alappat*, 23 USPQ2d 1340 (@1345) – reversed by *In Re Alappat*, 33 F3.d 1526; 31 USPQ2D 1545 [1994]

⁶⁶ 35 USC § 112 P 6: “An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.”

⁶⁷ *Alappat*, 23 USPQ2d 1340 (@1347) – reversed by *In Re Alappat*, 33 F3.d 1526; 31

limit his invention to a defined structure - which constituted an apparatus - but was trying to patent a process which merely preempted an algorithm.

The Federal Circuit reversed this decision. It held that the Alappat's claim construed in accordance with 35 USC § 112 P 6 is a true apparatus claim. The court questioned the applicability of the „mathematical algorithm exception“ to true apparatus claims but then denied the relevance of this question in the Alappat case. By emphasizing that the claim has to be examined as a whole and not dissected into components it refrained from the CCPA's two-parted „Freeman-Walter-Abele-Test“. ⁶⁸ Alappat's „means-plus-function“-claim when seen as a whole referred to a specific structure of semiconductor components (or their equivalents) and therefore to a machine, the Federal Circuit argued: „Although [...] the means elements [...] represent circuitry elements that perform mathematical calculations [...] the claimed invention as a whole is directed to a combination of interrelated elements which combine to form a machine for converting discrete waveform data samples into anti aliased pixel illumination intensity data to be displayed on a display means.“ ⁶⁹ This data was considered to be a useful, concrete and tangible result and not an abstract idea. „A general purpose computer becomes a special purpose computer once it is programmed [...]“. ⁷⁰ In other words the understanding of the Federal Circuit is that a general purpose computer which is programmed in a certain way to perform specific functions becomes a „new machine“. This idea of a virtual „new machine“ was sufficient to the Federal Circuit to consider a patentable application of maths to nature. Hence it was not necessary to show where the anti aliasing algorithm transformed or reduced an article to a different state or thing, as required by *Diamond v Diehr* ⁷¹

The Federal Circuit's understanding of 35 USC § 112 P6 significantly enhances the patent eligibility of inventions that implement mathematical algorithms. ⁷² But what the court apparently did not take into consideration is that the structure of circuit elements set out in the claim of Alappat does not significantly differ from the standard structure of any computer: means for input, means for (mathematical) processing, means for output. It appears a little fanciful that a computer shall transform to a different thing each time it changes the type of calculation it performs.

A general purpose computer is designed to perform any kind of calculations, including the determination of distances between pixels and vectors. The Federal Circuit failed to show why a general purpose computer that is used within this scope becomes something else if calculating a certain form of abstract output data. As a matter of fact a computer performing „anti aliasing“ is not used in a physical different way than if it performed any other calculations. The notion of the Federal Circuit is that mathematics, once carried out by a

USPQ2D 1545 [1994]

⁶⁸ Fisher, The Patent Eligibility of Computer Implemented Processes in the Wake of In Re Alappat, 32 Hous. L. Rev 517 (@532 and 553) [1995]

⁶⁹ In Re Alappat, 33 F3.d 1526 (@1544) [1994]

⁷⁰ In Re Alappat, 33 F3.d 1526 (@1545) [1994]

⁷¹ *Diamond v Diehr* 450 U.S. 175 (@183) [1981]

⁷² Fisher, The Patent Eligibility of Computer Implemented Processes in the Wake of In Re Alappat, 32 Hous. L. Rev 517 [1995]

machine, become a machine. The court stated right before its final conclusion: “In any case, a computer, like a rasteriser, is apparatus not mathematics”.⁷³ This shows exemplary how the court is ignorant of the fact that computer sciences would draw a distinction between the actual physical apparatus, i.e. the general purpose computer, and the software, i.e. the rasteriser (implementing the anti aliasing algorithm), which is abstract and may be carried out on this or any other computer.

(2.) *State Street v Signature*

Methods of doing business were traditionally not deemed to be statutory subject matter under 35 U.S.C. § 101. This so called “business method exception” had its roots in *Hotel Checking v. Lorraine*, when a method of bookkeeping designed to prevent fraud by waiters was ruled unpatentable subject matter.⁷⁴ This notion is quite plausible in any free market economy.

But if mathematics, once implemented into a software and performed by a digital processor, are no longer mathematics but apparatus, hence not subject to the Supreme courts holdings in *Gottschalk v Benson*, *Parker v Flook* and *Diamond v Diehr*, than many ways of organizing and running a businesses, e.g. calculating profitability or storing customer's details, can become statutory under 35 U.S.C. § 101 if only implemented in a computer program.

Exactly that happened in *State Street Bank v Signature Financial Group*.⁷⁵ Subject matter of this case, which was widely recognized by the press,⁷⁶ was a “Data Processing System for Hub and Spoke Financial Services Configuration”.

In essence the system is an investment structure whereby mutual funds (so called “Spokes”) pool their assets in an investment portfolio (so called “Hub”) organized as a partnership. This investment configuration provides a combination of the economies of scale in investment administration with the tax advantages of a partnership.

The claim listed “means for” performing necessary calculations related to the investment system and “means for” storage of data. All of them could be performed by multi purpose computers and none of them included any kind of technical improvement of the computers. “Hubs” and “Spokes” are financial accounts, stored on a computer system.

The court a quo, the US District Court Of Massachusetts, held the system to be non-statutory subject matter for two main reasons:

First it solemnly performed a series of mathematical functions with “no further physical transformation or reduction than inputting numbers, calculating numbers, outputting numbers and storing numbers”⁷⁷, and therefore did not pass

⁷³ *In Re Alappat*, 33 F.3d 1526 (@1545) [1994]

⁷⁴ *Hotel Checking Co. v. Lorraine Co.*, 160 F. 467 [1908]

⁷⁵ *State Street v Signature*, 149 F.3d 1368 [1996]

⁷⁶ See for example: “State Street Sets Seismic Precedent”, *The National Law Journal* (September 21, 1998); “What's Next - A Patent for the 401(k)?”, *Business Week* (October 26, 1998); “Barbed Wire on the Internet” *Forbes* (17 May 1999)

⁷⁷ *State Street v Signature*, 927 F.Supp 502 (@515) – reversed by 149 F.3d 1368 [1996]

the “Freeman-Walter-Abele-Test”.

Second it was an abstract idea of how to do business and fell under the “business methods exception”.

The Federal Circuit reversed this decision. It rebuked the application of the “Freeman-Walter-Abele-Test” to the case and in this course generally questioned its applicability to determine the presence of statutory subject matter. With a reference to *In Re Alappat*⁷⁸ it abnegated the mathematical character of the “Hub and Spokes System” and classified it as “a machine” which produces a “useful, concrete and tangible result”.⁷⁹

Moreover the court laid the business method exception “to rest”. It declared the concept obsolete since the introduction of 35 U.S.C. § 103⁸⁰, and claimed that business methods were subject to patentability since then. While the decision lacks of references to cases where business method patents have been legally granted – probably because no such existed that time – it argued that in other cases where patentability has been denied to business methods the rejections were not based on a business method exception but other reasons.

Significantly it quoted three cases in that respect, where patentability has been denied on the grounds of the mathematical algorithm exception of the “Supreme Court Trilogy”, namely *In Re Maucorps*⁸¹, *In Re Mayer*⁸² and *In Re Schrader*⁸³. Very interesting is the argumentation of denying the existence of the business exception even in its founding case *Hotel Checking v. Lorraine*⁸⁴:

The court in *Hotel Checking v. Lorraine* stated, that the (hotel booking-) “system is as old as the art of bookkeeping, i.e. charging the goods of the employer”.⁸⁵ “If at the time of (the patent) application, there had been no system of bookkeeping of any kind in restaurants, we would be confronted with the question whether a new and useful system of cash registering and account checking is such an art as is patentable under the statute”⁸⁶

From this quotation the Federal Circuit derived that in *Hotel Checking v. Lorraine* the patent had not been denied on the grounds of a business exception but rather for its lack of novelty and invention.⁸⁷

⁷⁸ *In Re Alappat*, 33 F.3d 1540 [1994]

⁷⁹ *State Street v Signature*, 149 F.3d 1368 [1996] PAGES?

⁸⁰ Which requires an invention to be “non obvious” in order to be patentable and was introduced to the Patent Act in (1952?)

⁸¹ *In Re Maucorps*, 609 F.2d 481 = 203 USPQ 812 [1979]

⁸² *In Re Mayer*, 688 F.2d 789 = 215 USPQ 193 [1982]

⁸³ *In Re Schrader*, 22 F.3d 290 = 30 USPQ2d 1455 [1994]

⁸⁴ *Hotel Checking Co. v. Lorraine Co.*, 160 F. 467 [1908]

⁸⁵ *Hotel Checking Co. v. Lorraine Co.*, 160 F. 467 (@469) [1908] quoted by *State Street v Signature*, 149 F.3d 1368 [1996] PAGES?

⁸⁶ *Hotel Checking Co. v. Lorraine Co.*, 160 F. 467 (@472) [1908] quoted by *State Street v Signature*, 149 F.3d 1368 [1996] PAGES?

⁸⁷ *State Street v Signature*, 149 F.3d 1368 [1996] PAGES?

However the words of the *Hotel Checking v. Lorraine* court can be restated to the *State Street v Signature* case: *The Hub and Spokes System is as old as the art of data processing, i.e. input data, process data, output data, store data. If at the time of (the patent) application, there had been no system of data processing of any kind in banks, we would be confronted with the question whether a new and useful system of administrating investment portfolios is such an art as is patentable under the statute.*

(3.) *The USPTO Guidelines for Computer-Related-Inventions*

In 1996 the USPTO issued new „Examination Guidelines for Computer-Related Inventions“⁸⁸, which adopted the adjudication of the Federal Circuit. Examiners were instructed to do no longer begin the examination of software related inventions by determining if the claim recites a mathematical algorithm, but by assessing the complete specification for it's practical application. Expressly they should review the practical functionality of the programmed computer as such and not of the software itself.⁸⁹

This functionality of the programmed computer as a whole needs to be statutory subject matter under 35 USC § 101. Abstract ideas, law of nature and natural phenomena remained unpatentable for being merely descriptive material. But the guideline distinguish „non-functional descriptive material“, such as music, literary work or databases, from „functional descriptive material“, such as computer programmes. While the former always remains non statutory, the latter when recorded on a computer-readable medium „becomes structurally and functionally interrelated to the medium and will be statutory in most cases“⁹⁰.

In any case the invention is statutory if it produces a physical transformation outside the computer (post computer process activities). Moreover the manipulation of data representing physical objects or activities such as the CAT-scans of *In Re Abele*⁹¹ (pre computer process activities) is deemed to be a „physical transformation“, thus statutory.⁹² The mere conveyance of the direct data output is not deemed to be such a physical transformation.⁹³ The displaying of mathematical results in the form of grey shades is mentioned as an example for non significant post-mathematical use, because there was no essential difference between the (graphical) display of shades of grey and (numeric) display of shade of grey values.⁹⁴ This example is encompassed with a reference to (the non reversed part of) *In Re Abele*⁹⁵ but is in strong contradiction to the decision of *In Re Alappat*⁹⁶.

⁸⁸ Patent and Trademark Office United States Department of Commerce, „Examination Guidelines for Computer-Related Invention“ Final Version, <http://www.uspto.gov/web/offices/pac/dapp/pdf/ciig.pdf> <8 July 2005> (USPTO Guidelines)

⁸⁹ USPTO Guidelines @ 3

⁹⁰ *Idem* @ 8

⁹¹ See above

⁹² USPTO Guidelines @ 16

⁹³ USPTO Guidelines @ 17, 21

⁹⁴ USPTO Guidelines @ 22

⁹⁵ *In Re Abele*, 684 F.2d 902

⁹⁶ *In Re Alappat*, 33 F.3d 1540

But even if a computer-related process does not fall under these so called „safe harbours“, under the new guidelines it may also become statutory by limiting the claim to a useful application within the technological arts.⁹⁷ Hence a computer program that is capable of reducing noise from a signal is not patentable as such, but acquires patentability if limited to a certain end use, e.g. audio processing.

The guidelines summarized the case law of the CCPA (resp. The Federal Circuit) as by then and consequently enabled a far sweeping issuance of software patents in the United States of America.

⁹⁷ USPTO Guidelines @ 17

4. Present situation

a. Statistic

Since then an significantly increasing number of softwarepatents have been issued.⁹⁸ Between 1976 and 2002 it were 200,012 overall. In 2002 the PTO grated 24,891 which represented 14,9 % out of all patents issued. In comparison in 1981, the year of *Diamond v Diehr*⁹⁹, it were only 1,275 (1,9%). The largest increase can be observed in the year 1997. Figure 4¹⁰⁰ shows the total numbers of utility patents issued per year in relation to the increasing number of software patents among them.

Year	Software patents	Total utility patents	Share of software patents
1976	765	70,226	1.1%
1977	884	65,269	1.4%
1978	897	66,102	1.4%
1979	795	48,854	1.6%
1980	1,080	61,819	1.7%
1981	1,275	65,771	1.9%
1982	1,402	57,888	2.4%
1983	1,443	56,860	2.5%
1984	1,939	67,200	2.9%
1985	2,453	71,661	3.4%
1986	2,657	70,860	3.7%
1987	3,530	82,952	4.3%
1988	3,495	77,924	4.5%
1989	4,974	95,537	5.2%
1990	4,704	90,364	5.2%
1991	5,347	96,513	5.5%
1992	5,862	97,444	6.0%
1993	6,756	98,342	6.9%
1994	8,031	101,676	7.9%
1995	9,000	101,419	8.9%
1996	11,359	109,645	10.4%
1997	12,262	111,983	10.9%
1998	19,355	147,519	13.1%
1999	20,385	153,486	13.3%
2000	21,065	157,595	13.4%
2001	23,406	166,158	14.1%
2002	24,891	167,438	14.9%

Figure 4: Patents issued by the PTO per year

Nowadays software patents are deemed to be as ordinary as any other kind of patents in the U.S.A. However not every software patent that has been issued by the PTO is valid.

⁹⁸ Lundberg/ Durant, Electronic and Software Patents, p.156

⁹⁹ *Diamond v Diehr* 450 U.S. 175 [1981]

¹⁰⁰ Data from Bessen / Hunt, An Empirical Look At Software Patents, Research on Innovation, Working Paper No 013-17/R, <http://www.researchoninnovation.org/swpat.pdf> <09.07.2005>

b. Newer decisions

Three cases, exemplary for a valid, a maybe valid and an invalid patent, shall be mentioned.

(1.) AT&T v Excel

In *AT&T Corp v Excel Communications Inc.*¹⁰¹ the patent was held valid straight forward. The telecommunications service provider AT&T sued its competitor Excel for infringing its patent on a „Call Message Recording for Telephone Systems“, issued by the PTO in 1996 as U.S. Patent No. 5,333,184 (the '184 patent).

A long distance phone call in the U.S.A. may be routed through the facilities of various network providers. Customers have a local exchange carrier (LEC) which usually provides the network access point in the premises of the customer and a primary interchange carrier (PIC) which is the preselected carrier for long distance calls. Switches create data records related to the call, comprising information such as the originating and terminating telephone numbers and the length of time of the call. These data are essential for the settlement of accounts between the involved telecommunication providers and the customer.

The '184 patent merely describes a method of adding new data fields to these records which identify the customer's PIC and especially contain boolean values¹⁰² (so called „flags“) to indicate if the caller's PIC is a particular one and whether the caller's and the recipient's PICs are identical. This aids long-distance carriers in providing differential billing treatments for customers depending upon whether they call a subscriber with the same or a different PIC.

The Federal Circuit sustained the validity of the '184 patent on the basis of its above illustrated case law. Although the patented method did not comprise any kind of physical transformation it was held statutory since it limited a mathematical principle, i.e. the Boolean Principle, to a specific end use. Once more the Federal Circuit labelled the requirement of a physical transformation as a „misunderstanding“ of the Supreme Court's decision *Diamond v Diehr*.¹⁰³

Hence AT&T has a monopoly on creating data records of phone calls that include the identification of the related PIC.

(2.) Amazon v Barnes & Noble (“One Click”)

One of the most infamous software patent cases was *Amazon v Barnes & Noble*, better known as the „One Click Case“. ¹⁰⁴

¹⁰¹ *AT&T v Excel*, 172 F.3d 1352 = 50 USPQ2d 1447 [1999]

¹⁰² Boolean Variable = a logical variable that either has the value „true“ or „false“

¹⁰³ *AT&T v Excel*, 172 F.3d 1352 (@1359)

¹⁰⁴ *Amazon.com v Barnes&Noble*, 73 F.2d 1228 = 53 USPTQ2d 1115 [1999] – reversed by the Federal Circuit on Februar 2nd, 2001,
<http://news.findlaw.com/hdocs/docs/amazon/amazonbn021401.pdf> <09.07.2005>

In 1999 the USPTO issued a patent labelled „Method and System for Placing a Purchase Order Via Communications Networks“ as U.S. Patent No. 5,960,411 (the '411 patent) to the online bookseller Amazon.com Inc.

Prior art systems of online retailers often make use of a so called 'shopping card' systems, where customers may add items to buy to a virtual 'shopping basket'; when they are done with choosing items, several actions are necessary in order to buy the chosen items, such as transmitting payment and shipping details. The system described in the '411 patent requires only one action by the customer, i.e. one mouse click, to place the order instantly. Indeed this is possible only because beforehand the customer subscribed to the service, disclosed necessary details and agreed upon that performing the 'one click' (or other single action) will be legally construed as an order to buy. The benefits are that customers do not need to resend sensitive information such as credit card details, that ordering is easier for them¹⁰⁵ and probable also that the customer buys faster without reconsidering it's choice. Although the claim comprised a component for „fulfillment“ of the order, it has been found by the court that this does not refer to the physical steps of packing and shipping the tangible items but to the generation of the order on the server system of the retailer.¹⁰⁶

Shortly after the the issuance of the '411 patent the U.S. District Court of Seattle granted Amazon's move for a preliminary injunction to prohibit it's competitor Barnes&Noble to use their 'Express Lane' feature on their website. 'Express Lane' also enabled the customer to buy instantly by one click.

The decision raised much tension worldwide¹⁰⁷ - probably because Amazon filed similar patent applications in other countries¹⁰⁸ - and became one of the key cases in the debate on software and business methods patents. While many companies holding software patent portfolios argue that they need them for defensive purposes, Amazon now was accused for „firing the first shot“.¹⁰⁹

In February 2001 the Federal Circuit, upon appeal by Barnes&Noble, reversed the preliminary injunction.¹¹⁰ The Federal Circuit sustained the District Court in it's holding that „Express Lane System“ infringes the '411 patent but concluded that Barnes&Noble has mounted a substantial challenge to the validity of the patent in suit, which as an error of law the District Court did not weight appropriately. Sure enough the doubts about the validity of the '411 patent were not based on the statutory subject matter issue anymore but entirely on issues regarding the novelty and non-obviousness of the method. Barnes&Nobles defence identified many references that might show that the „one-click“ method

¹⁰⁵ Amazon One Click Shopping, <http://www-cse.stanford.edu/classes/cs201/projects-99-00/software-patents/amazon.html> <09.07.2005>

¹⁰⁶ *Amazon.com v Barnes&Noble*, 73 F.2d 1228 (@1244) [1999]

¹⁰⁷ Exemplary: Thurrott, Amazon patent concerns heat up, WinITPro on March 13rd, 2000, <http://www.windowstpro.com/Article/ArticleID/19177/19177.html>; Lettice, Anti-patent protest rains cookies on Amazon.fr's parade, "The Register" on Monday 4th September 2000, http://www.theregister.co.uk/2000/09/04/antipatent_protest_rains_cookies/ <09.07.2005>

¹⁰⁸ Including but not limited to the European Union, Australia and Japan

¹⁰⁹ Stallman, Letter from RMS to Tim O'Reilly, <http://gnu.open-mirror.com/philosophy/amazon-rms-tim.html>

¹¹⁰ United States Court of Appeals for the Federal Circuit on February 14th, 2001, <http://news.findlaw.com/hdocs/docs/amazon/amazonbn021401.pdf> <09.07.2005>

was in the prior art or at least obvious to one of ordinary skill in the art at the relevant time.

The decision was just preliminary and did not conclude anything upon the validity of the '411 patent. But it shows that even in the post-Alappat United States trivial software patents might still be challengeable on the grounds of anticipation and obviousness.

The case as returned to the District Court, trials were scheduled for September 10th, 2001. To the best of the authors knowledge, no further public documentation is available so presumably there has been a mutual settlement out of court.¹¹¹

(3.) Eolas v Microsoft

A very recent and still ongoing case is *Eolas Technologies and the University of California v Microsoft Corp.*¹¹² In October 1994 the University of California filed a patent on a „distributed hypermedia method for automatically invoking external applications providing interaction and display of embedded objects within a hypermedia document“ which was granted in 1998 as U.S. Patent No 5,838,906 (the '906 patent). Later the University granted an exclusive license for the '906 patent to Eolas. In essence the patent describes a web browser that is able of displaying interactive objects embedded in a website, such as spreadsheets, databases or multimedia contents, by allocating and executing browser external application programs installed on the local computer system. Today most sophisticated websites contain such data and most web browsers are able of interactively displaying them.

In 1999 Eolas brought an infringement action against Microsoft for using this „invention“ in their web browser application Internet Explorer (IE). The U.S. District Court for the Northern District of Illinois found that the IE is infringing the '906 patent and granted Eolas a royalty of US\$ 520,562,280.¹¹³ The court rejected several defences of Microsoft and prevented them from being presented to the jury. The Federal Circuit found these rejections to be an error in law, vacated the decision in part and remanded for further proceedings on the defences, whereas the Federal court obviously strongly doubts the validity of the '906 patent when Microsoft's defences are properly considered.

The defences were mainly based on obviousness and anticipation. Microsoft presented evidence that prior to Eolas browser a third party inventor, Pei-Yuang Wei, developed the 'Viola' web browser with similar features. Wei demonstrated Version DX34 of Viola to engineers of the company Sun Microsystems on May 7th, 1993, more than one year prior to the filing of the '906 patent. Because later Wei improved Viola to Version DX37 the District Court reasoned that he abandoned, suppressed or concealed Version DX34 and therefore the disclosure to the Sun engineers did not constitute a public use in terms of 35 USC § 102. The Federal Circuit rectified that an improvement of an invention is not a

¹¹¹ Amazon.com Inc did not respond to a personal query by the author

¹¹² *Eolas v Microsoft*, 399 F.3d 1325 = 73 USPQ2d 1782 [2005]

¹¹³ *Eolas v Microsoft*, 2004 U.S. Dist. 522 (N.D. Ill., Jan. 14, 2004)

completely new invention and does not constitute an abandonment of the unimproved version.¹¹⁴

This might sound like a matter of course, but it was not for the District Court. Hence the ascertainment is very notable in respect to software patents: Many software developers like Wei might be working on a software project but did not apply for a patent, either because they did not consider their software to be statutory subject matter under 35 U.S.C. § 101 or they are of the opinion that software should not be patentable and therefore wanted to waive their opportunity to gain exclusive rights for ideological reasons¹¹⁵ or they simply could not afford a patent application. It would be inequitable to grant a patent to someone else in such cases.

Another interesting aspect of the decision regards 35 U.S.C. § 271 (f) (1) which reads

“Whoever without authority supplies or causes to be supplied in or from the United States all or a substantial portion of the components of a patented invention, where such components are uncombined in whole or in part, in such manner as to actively induce the combination of such components outside of the United States in a manner that would infringe the patent if such combination occurred within the United States, shall be liable as an infringer..”

Both courts were in agreement that a „golden master disk“, which contains the computer program's code ready for mass reproduction, constitutes a „substantial portion of the component“ in terms of this provision. The courts clarified that the scope of application is not limited to physical structures but extends to any patented invention including software. Thus if someone supplies a master disk containing a patent infringing software outside the U.S.A. that person will be liable under § 271 (f) (1). The particular relevance of this rule to software patents can be enormous, since no other legal system enabled a so far sweeping patentability of software - and least of all business methods - as the U.S.A. did, which leads us directly to the next chapter.

II. Europe

1. Introduction to the European patent system

Each European country, including the member states of the European Union, still has its own patent law. The call for a unification naturally came along with the establishment of the European Economic Community (EEC). Since the late 1960^s, after a first effort failed in 1962, a two tracked attempt was strived for:¹¹⁶

On the one hand an international Convention among ratifying countries, which were not necessarily member states of the EEC, was intended to regulate a central issuance of patents which were effective under the different national

¹¹⁴ *Eolas v Microsoft*, 399 F.3d 1325 (@1333) [2005]

¹¹⁵ This especially applies to the open source and free software movement, which provide essential technological solutions

¹¹⁶ Kraßler, Patentrecht, p. 89

patent laws. On October 7th, 1977 the European Patent Convention (EPC) was put into force by the first seven ratifying countries;¹¹⁷ since then another 24 countries¹¹⁸ joined. Additionally there are five so called „extension states“¹¹⁹ which recognise European patents but are not members of the European Patent Organisation (EPOrg). Main item of the EPC is the authority of a newly created European Patent Office (EPO) to issue European patents which are directly as effective as a national patent in each EPC member state the applicant specifies. Infringement cases have to be brought to the national courts which may declare the patent invalid only in their country, Art 138 EPC. The system was substantially influenced by the isochronic preliminary works for the intercontinental Patent Cooperation Treaty (PCT).¹²⁰

On the other hand an unitary Community Patent was - and still is – planned. The Community Patent would be autarkic from national patents and could only be issued as it could only be declared invalid with the same effect for all member states.¹²¹ An uniform patent court to be created would have central jurisdiction in matters of Community Patents and EPC-'bundle'-patents as well. Since even after decades of negotiations EU member states failed to achieve the Community Patent by a treaty, henceforth the European Council prepares its introduction by means of a directive pursuant to Art. 249 of the Treaty establishing the European Community (the „Rome Treaty“). The process is scheduled to be completed by 2010,¹²² but its success may be doubted.

2. Early considerations under national laws

The issue of patentability of computer programs arose prior to the instalment of the EPC. Provisions in the Convention that try to deal with it were developed out of the entirety of national (case-) laws. Hence to examine the genesis of Software Patents in Europe, it is expedient to have a look at some early considerations under the national laws.

a. United Kingdom

(1.) Statutes/ Patents Act

As a matter of course, the UK Patents Act of 1949, did not feature any *expressis verbis* rules for computer programs. But some cases had to be decided by the Patent Office and the Appeal Tribunal under those statutes prior to the instalment of the EPC and its adoption through the UK Patents Act of 1977.

¹¹⁷ Belgium, France, Germany, Luxembourg, the Netherlands, Switzerland and the United Kingdom

¹¹⁸ Austria, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Monaco, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and Turkey

¹¹⁹ Albania, Croatia, Macedonia, Serbia and Montenegro, and Bosnia and Herzegovina

¹²⁰ Haertel, Die geschichtliche Entwicklung des europäischen Patentrechts, margin number 42 cont.

¹²¹ Kraßler, Patentrecht, p.93

¹²² Kraßler, Patentrecht, p.99

(2.) *Slee & Harris' Application*

In 1962 Mr. Slee, Mrs. Harris and British Petroleum Co. Ltd applied for a patent claiming a method of operating data processing apparatus in a program entailing a number of operations called iterations, characterized in that one iteration was initiated before the previous iteration was completed.¹²³

The purpose of the program was to solve linear optimization problems. Sets of linear equations or inequalities, which can be descriptive of industrial processes, may have an infinite number of solutions. The purpose of an iterative regression program is to find the solution which is "optimal" in respect to a given problem, e.g. to reduce a certain variable to the lowest possible value that still meets the rules defined in the set of equations or inequalities. The Slee and Harris program employs the "Simplex"-method, which itself was not novel but developed in 1947 by George Bernard Dantzig,¹²⁴ to solve such optimization problems.

The set of equations is arranged as a first matrix (or "Simplex tableau"), which is then processed by the following steps:

1. Scan the matrix to identify a column containing an element satisfying a predetermined condition. This column is called the "pivot column" and the position of this element in the matrix is the "pivot point".
2. Perform a transforming operation called iteration on the matrix, to produce a resultant second matrix. The exact algorithm or formula doesn't need to be understood for the purposes of this paper, but it must be noted that no inventive or novel step can be found therein.
3. Provided that another pivot point can be found in the resultant second matrix, it is processed in the same way as the first matrix resulting to a third matrix. The process continues until a matrix is generated that is devoid of pivot columns. This final matrix gives the optimized solution to the problem.

These steps can also be performed without the use of a computer. However due to the large number of iterations that are to be performed, the use of a computer is functional and was already customary theretofore. The "invention" of Slee and Harris was to program the computer in a way that it initiated one iteration, while the previous one is still in progress so that a plurality of iterations can be in train simultaneously. This method results in a more economical use of the computer.

The superintending examiner objected that this computer program was not a statutory subject matter under sec. 101 (1) Patents Act of 1949. Citing a decision by the Australian High Court¹²⁵ he pointed out, that a method is only patentable if it results into a vendible end-product in the sense of "any physical phenomenon in which the effect (of the process) may be observed.". The results of Slee and Harris' program were no more than intellectual information. Even if those information might be used in the design and controlling of industrial processes, such use was "not essential or inherent in the method claimed".¹²⁶

¹²³ *Slee & Harris' Application*, 1966 R.P.C. 194 [1966]

¹²⁴ Wikipedia "Symplek algorithm," http://en.wikipedia.org/wiki/Simplex_algorithm

¹²⁵ *N.R.D.C.'s Application*, 1961 R.P.C. 134 [1961]

¹²⁶ *Slee & Harris' Application*, 1966 R.P.C. 194 (197) [1966]

However during the hearing, the applicants restated their claim and directed it to the computer itself. The restated claim described a computer the operating mode of which did not elementary differed from others but which was programmed in a way that at least two iterations are processed by the arithmetical unit 'at the same time'. The restated claim was regarded as a machine which has been temporarily modified, hence as a new machine and therefore an invention under the statutory definition. The decision did not deal with the requirements of novelty and non-obviousness, so no final judgement on the application was made.

Here almost the same understanding of a computer becoming a different thing when performing certain computations can be observed as in the CCPA's holdings since *In Re Alappat*.¹²⁷

BP, Slee and Harris also filed an application for a patent on "programming means for use in controlling data processing apparatus" in the way described above. These means may be a punched tape or cards, the punched holes representing the instructions which can be read by the computer.

The hearing officer initially stated rightfully that the 'thing' to be examined was the set of instructions, not the way they are manifested. Therefore the "means" in that applications were no more than a printed sheet, hence not a patentable subject matter. But then the applicants convinced him to proceed by arguing that these "means" were an integer which physically co-operated with a computer and controlled it in a certain way. Therefore the punched cards could be likened to a cam, shaped according to certain formulae so that, when fixed to a machine, it controlled it in a certain way.

Indeed this comparison is not evidentiary at all: The cam shaped in a certain way is in fact a new composition of matter. It differs from other cams and that very difference **as such** constitutes the invention. The cam itself causes the functional effect. But the punched cards are not different from others in their function. Their function does not go any further than representing information as a pattern of punched holes, notwithstanding what that information is. The fact that these cards where machine readable does not make a difference thereto as the following example illustrates:

Nowadays even a printed sheet of paper is machine-readable by using an optical scanner. Assumed someone equips a computer programmed for text to speech synthesis with such an optical scanner, this computer will be able to read out a book that is put on the scanners bed. The words in the book will 'instruct' the text to speech synthesizer to create certain sonic waves by using the computer hardware in a certain way. Nonetheless no one would declare a printout of Shakespeare's Hamlet to be a patentable invention. But the argumentation as aforesaid applied consequently would lead to that very result.

Slee and Harris' Application probably was the first reported decision on the issue.¹²⁸ Despite the shown inconsistencies and although the decision was only made in the Patent Office and therefore not binding authority, subsequent decisions by the Patent Appeal Tribunal referred to it.

¹²⁷ *In Re Alappat*, 33 F3.d 1526; 31 USPQ2D 1545 [1994]

¹²⁸ Beresford, Patenting Software Under the European Patent Convention, p. 6

(3.) *Badger Co Inc's Application*

*Badger's Application*¹²⁹ was heard before the Patents Appeal Tribunal. The applicant sought to patent a "method of mechanically designing and forming a visible drawing illustrating a piping system interconnecting several operating units wherein relevant information was fed into a computer and the computed linear data was finally converted into visible drawing." Today the field of art is known as computer aided design/ computer aided manufacture (CAD/CAM).

Installations such as chemical plants comprise a number of operating units, such as distillation towers, storage tanks, pumps, etc. which have to be interconnected by a piping system.

Badger's application comprised each of the following steps:

1. Drawing (manually) a plan of the installation with the units to scale positioned about a centre.
2. Measuring the plan, with references to X, Y and Z areas originating at the centre to obtain the position and shape of each unit and the location of the points intended to be interconnected by piping.
3. Tabulating this data and converting it into a coded form acceptable to the computer.
4. Entering the coded data into the computer.
5. Conditioning the computer to operate within constraining design conditions; e.g. two pipes must not intersect or pipes carrying hot liquid must be at least six feet away from pipes carrying cold fluid; some space must be kept free of pipes etc.
6. Operating the computer to compute data representing the required interconnection lines, having regard to the predetermined conditions.
7. Storing this data in a form that can be read by a plotter or printer.
8. Use a plotter or printer to produce the drawing.

The preparation and input of data to be computed (steps 1 - 4) was instantly held unpatentable. However the "process for conditioning the operation of a computer[...]" to operate in the said way was held to be statutory subject matter.¹³⁰ In other words the required physical aspect of patentable methods was now sought for in the act of programming, an approach that shall here be dispatched as *prima facie* misguided.

Alternatively the tribunal allowed the claim when revised to a form that directed to the computer arranged to operate in the said way. So the 'new machine'-approach of *Slee and Harris' Application* which was later adopted by the CCPA was prosecuted further on.

¹²⁹ *Badger's Application*, 1970 R.P.C. 36 [1970]

¹³⁰ *Badger's Application*, 1970 R.P.C. 36 (40) [1970]

(4.) *Gevers' Application*

In *Gevers' Application*¹³¹ the alleged invention was directed to a computer system that records trademarks and sorts them in such a way that lists can be produced which aid similarities and prior registration searches.

The performance of it was fairly easy and can be summarized as follows::

The trademarks (a word or succession of words) were to be entered into the computer which processed the words in accordance with certain rules involving substitution of certain letters or combinations thereof, e.g. letters (-combinations) that sound similar such as "I" and "Y" or "CI" and "SI". The original and the processed words were then sorted into lists in accordance to specific rules and these lists were printed out.

The tribunal allowed the appeal abiding by the 'new machine'-approach. A further claim directed to the "mechanographic supports", i.e. the punched cards or tapes that contain the data, was allowed on the grounds of the same reasoning as in *Slee & Harris' Application* employing the same equation of a computer program (stored on a punched card) being a "mental cam" shaped in a certain way.¹³²

That time there was no decision on software patents by a higher court or the court of last resort in the United Kingdom, the House Of Lords.

b. Austria

Returning to the *Slee & Harris* invention it has to be noted that the same invention was also patented in Austria. However in *Lineare Programmierungseinrichtung*¹³³ the Department for Revocations of the Austrian Patent Office, upon appeal by a third party, declared the patent, whether claimed on the program, or the programmed computer, or the punched cards likewise void for the lack of an inventive step. The Austrians held that a technical invention in the sense of the Austrian Patents Act could only be present if natural forces are utilized by creating an effect on things of the physical environment. Programs for controlling a computer were not susceptible to patent law because they were necessarily based on a mathematical algorithm which lacked of a technical character for being mere intellectual matter. They were only an expression of this intellectual matter and did not constitute the solution of a problem in the technical field of circuitry. The implementation of an algorithm to a computer program was in the average skill of any programmer and albeit being a creative work did not raise any problems the solution of which required the performance of an inventive step.

The decision closer examined the claimed method of simultaneously performing a plurality of iterations¹³⁴, revealing that the arithmetical unit in fact did not

¹³¹ *Gevers' Application*, 1970 R.P.C. 91 [1970]

¹³² *Gevers' Application*, 1970 R.P.C. 91 (98) [1970]

¹³³ *Lineare Programmierungseinrichtung III*, Österreichisches Patentamt - Nichtigkeitsabteilung GRUR Int. 1968, 381 [1968]

¹³⁴ see above

perform the plurality of iterations at the same time in the precise sense. It rather reorganized the order and time schedule on which single steps of the "Simplex"-algorithm are performed.¹³⁵

The Department for Revocations disagreed with an opinion that programming a computer equalled to the construction of a new circuitry: While the circuitry formed a new physical apparatus, the computer program merely handled a known apparatus without creating an effect which could not ever be predictable for a person skilled in the art and being aware of the capabilities of the machine.

c. Germany

The following three decisions by the German Federal Court of Justice Bundesgerichtshof (BGH) show a notable parallelism to the U.S.-"Supreme Court-Trilogy":

(1.) Dispositionsprogramm

The decision *Dispositionsprogramm*¹³⁶ was given upon appeal after the German Federal Patent Court Bundespatentgericht (BPatG) supported the patent office Deutsches Patentamt (DPA) in rejecting an application directed to a method of determining changes of a multiplicity of main variables and dynamic sub variables which define the main variables by using a computer. The program was intended to be used to solve problems in the field of operational disposition and organisation.

The procedure can be summarized as follows:

1. Sort the stock data in a hierarchical order, e.g. devices - sub assemblies of the devices - spare parts
2. Furnish the stock data and according dynamic data that is to be processed together with the stock data with addresses in which their relation and togetherness is made evident.
3. store stock and dynamic data separately
4. compare the entirety of dynamic data with parts of the stock data and recalculate the stock data in accordance with that dynamic data that was identified as interrelated to them
5. add any new dynamic data which emerged with step 4 to the other yet unprocessed data
6. repeat step 4 and 5 till all stock data is updated

The method is quite abstract and it's benefit to operational accountancy does not need to be understood here.

The BGH held that the method described a mathematical algorithm which did

¹³⁵ *Lineare Programmierungseinrichtung III*, Österreichisches Patentamt - Nichtigkeitsabteilung GRUR Int. 1968, 381, 382 [1968]

¹³⁶ *Dispositionsprogramm*, BGHZ 67, 22 [1976]

not necessarily need to be performed by a computer. Hence the method was a mere instruction to the human intellect. Directing such method to be performed by a computer did not alter its purely mathematical and intellectual nature.

The BGH pointed out that a computer program was not generally excluded from patentability. However the novel feature needed to be found in a "technical effect". The concept of a 'technical effect'-requirement in patent law was developed by earlier German (and other European country's) case law to draw a differentiation between the 'world of phenomena' and the 'world of mind'¹³⁷ whereas the latter is unrestricted and not susceptible to patent law. Today the definition of the term "technical effect" is one of the key issues of the European patent law, especially in respect to software patents, and at the same time one of the most controversial ones.

In *Dispositionsprogramm* the court defined, that a technical (and therefore patentable) invention must show a systematic method of directly using controllable forces of nature to achieve a causal manageable result.¹³⁸

The BGH reasoned that the claimed program was a systematic method with a causal manageable result but it lacked of a direct use of controllable forces of nature because the human intellect, which was able to perform the claimed method even without any aid of a computer, did not belong to forces of nature.

The question arose whether the linkage of an intellectual exercise to a computer does cause to have a 'technical effect' because any program when executed by a computer evokes and directly correlates to certain states in the circuitry, which are beyond doubt of technical nature. In fact this argument can be linked to the 'new machine'-approach.

The BGH held, that a program the only novel feature of which resides in the algorithm does not cause a new technical effect in the circuitry. An invention was to assess by what precisely is claimed to be inventive. Only if the 'core of the invention' was technical, was the invention technical.¹³⁹ In fact that was the very 'point of novelty'-approach the CCPA refused to employ in its reasoning.¹⁴⁰ Due to the BGH's reasoning a computer program needed to require a new, inventive assembly of the hardware or must feature a generally new manner of using the circuitry in order to have a technical effect.¹⁴¹ The underlying notion is that a multi purpose computer *ab initio* is designed to perform **any** algorithm. Thus under this approach a computer executing a 'new' programmed algorithm does not become a 'new machine' because it is still operating within the intended and conventional use of such a machine,¹⁴² unless it involves such an effect as aforesaid.

¹³⁷ e.g. in *Multiplikationstabelle*, RG GRUR 1933, 289 (290) [1933]

¹³⁸ *Dispositionsprogramm*, BGHZ 67, 22 (26)[1976]

¹³⁹ That notion is even more articulate in another decision of the same year: BGH GRUR 1978, 102

¹⁴⁰ See above: *In Re Freeman*

¹⁴¹ *Dispositionsprogramm*, BGHZ 67, 22 (29)[1976]

¹⁴² Kollé, *Technik, Datenverarbeitung und Patentrecht - Bemerkungen zur Dispositionsprogramm-Entscheidung des Bundesgerichtshofs*, GRUR 1977, 58; *Dispositionsprogramm*, BGHZ 67, 22 (31)

(2.) Straken

"Straken"¹⁴³ for someone might sound like 'a typical German word'. In fact it is a very unusual and technical term used in the field of ship and aeroplane construction. Straken are streamlines that form a family of characteristics which are descriptive of bodies such as the hull of an aeroplane or ship (see Figure 5)¹⁴⁴. The claimed invention concerned a computer program for calculating such families of streamlines by simulating the deflection of a bendable lath which is fixed at certain points and stressed with a weight at specific other points. This simulation was done by employing a novel mathematical algorithm which was disclosed in the application

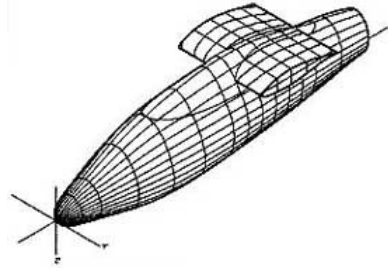


Figure 5: © 2000 by unknown

together with the corresponding listing of instructions in the programming language FORTRAN. The program did not itself create the design of the body but created a virtual model of it according to the input of the operator.

Abiding by their opinion in *Dispositionsprogramm* BPatG and BGH refused the patent due to its lack of a 'technical effect'. Likewise the U.S. supreme Court in *Parker v Flook*,¹⁴⁵ the BGH had to decide whether the identification of a technical post solution application of the program causes it to have a 'technical effect' itself. The court held that the nature of the *Straken* program was non-technical, while a technical field is only entered in the course of its post solution non-inventive application. If some invention was a technical one, it would not lose its technical nature even if the post solution application is non-technical, because the latter did not form a part of the invention. In the logic reverse a non-technical invention could not become "technical" just because an application of its product is directed to a technical field, again because the latter did not form a part of the invention.¹⁴⁶

The fact that the the prior art method of manually measuring streamlines was technical did not alter the non-technical nature of the invented program, because the program did not constitute an improvement of that technical method but substituted it with something non-technical.

(3.) Antiblockiersystem

In the 1980 decision *Antiblockiersystem*¹⁴⁷ the BGH reversed the repeal of a computer related patent by the BPatG. The applicant invented an electronically controlled anti-lock braking system (ABS) for motor vehicles.

When a car brakes, high pressured brake fluid runs through the intake valve into the brake cylinder. An ABS causes the intake valve to close and the outlet valve to open in the very moment the wheel loses adhesion. The effect is that the

¹⁴³ *Straken*, BGH GRUR 1977, 657 [1977]

¹⁴⁴ <http://studweb.studserv.uni-stuttgart.de/studweb/users/lrt/lrt31151/index.htm>, © by unknown. The reproduction of this graph is deemed to be in the fair use for scientific purposes.

¹⁴⁵ *Parker v Flook* 437 U.S. 584 [1978]

¹⁴⁶ *Straken*, BGH GRUR 1977, 657 (658) [1977]

¹⁴⁷ *Antiblockiersystem*, BGH GRUR 1980, 849 [1980]

brake pressure decreases and the wheel gains adhesion again. When the adhesion reaches a satisfying level the ABS causes both valves to close so the brake pressure is maintained. The invented ABS featured circuitry that monitors the wheels and determines the exact moments to open and close the valves electronically by executing a control algorithm. The method was more precise than prior art ABSs and was able to work properly even if the braking car is coasting on alternating surfaces, i.e. enters glaze during the brake procedure. The application was not directed to a certain circuitry but only described their function.

The BPatG opined that the functions the circuitry carried out - when seen alone - were an intellectual exercise in the *Dispositionsprogramm*-sense.¹⁴⁸ But the BGH held to clearly identify the required 'technical effect' here. The invention was intended to achieve the optimal retarding effort by directly using controllable natural forces. It made use of the natural phenomenon that in the optimal moment to maintain brake pressure, which depends on the consistence of the road surface, the circumferential speed of the monitored wheel reaches a certain acceleration value. The circuitry was programmed to detect that acceleration value from the monitoring signal and to initiate the necessary steps. The fact that the inventor did not bind his invention to a certain circuitry was irrelevant for the 'technical effect' because the very could be found in the optimisation of the retarding effort.

d. Switzerland

Swiss courts held a similar opinion on the requirement of a 'technical effect' as the (not computer related) case of that time *Nachschlagewerk*¹⁴⁹ illustrates.

Following that adjudication the patent office regularly rejected claims directed to computer programs. One reported case was *Bewehrungs-Rechenprogramm*.¹⁵⁰ Subject of the application was "a process for calculating the steel reinforcement required for concrete building blocks by using a programmable computer", whereas the used computer itself was known in the art. In other words the invention was the computer program. The Swiss patent office Amt für geistiges Eigentum rejected the application on the ground that setting up a computer program constituted a purely mental and not a technical process. The reasoning of the office was almost identical with that of the German BGH in *Dispositionsprogramm*¹⁵¹ and shall therefore not be repeated here.

e. France

The author did not become aware of any French cases of that time which deal with software patents. The potential reason for this is that due to a clear statement in the statutes there were no such cases that have been brought to court: In 1968 a new patent law was enacted in France which contained a general exclusion on patentability of computer programs.¹⁵²

¹⁴⁸ BPatG GRUR 1979, 111

¹⁴⁹ *Nachschlagewerk*, Schweizerisches Bundesgerichts GRUR Int. 1969, 141

¹⁵⁰ *Bewehrungs-Rechenprogramm*, Amt für geistiges Eigentum, IIC 1970, 149

¹⁵¹ *Dispositionsprogramm*, BGHZ 67, 22 [1976]

¹⁵² Beresford, Patenting Software Under the European Patent Convention, p. 11

3. EPO Cases

a. Statutes/ Art. 52 EPC

The scope of an European Patent is defined in Art. 52 EPC:

“Patentable inventions:

(1) European patents shall be granted for any inventions which are susceptible of industrial application, which are new and which involve an inventive step.

*(2) The following in particular shall **not** be regarded as inventions within the meaning of paragraph 1:*

*(a) discoveries, scientific theories and **mathematical methods**;*

(b) aesthetic creations;

*(c) schemes, rules and methods for performing mental acts, playing games or doing business and **programs for computers**;*

(d) presentations of information.

*(3) The provisions of paragraph 2 shall exclude patentability of the subject-matter or activities referred to in that provision only to the extent to which a European patent application or European patent relates to such subject-matter or activities **as such**.*

(4) [...]”

While at the first glance these statutes exclude computer programs from patentability, a closer inspection reveals the loophole in subsection 3.: Computer programs (amongst the other listed subject matters) are only excluded from patentability if the patent is directed to the program "as such". Its purpose is to narrow down the exclusion in a sense that they could not be read as excluding things which traditionally are suitable for protection and include true inventions merely on the ground that they involve the usage of a computer program.

Various verbalisations and formations of the list of exclusions had been discussed in the course of the drafting of the EPC, all of which tried to clarify the extend of the subject matter exclusion in the aforesaid sense.¹⁵³ Unfortunately none of them, including the chosen one, was able to give a clear answer to the question how to define a 'truly inventive' computer program which shall be excluded from the exclusion. In fact it seems that the work group preparing the convention hesitated or was unable to give a final answer and decided to leave it to the courts. Due to the fact that the EPC was designated to be interpreted by many different, autarkic jurisdictions at the same time, this decision for uncertainty put the EPC onto a slippery path right from the outset.

¹⁵³ Beresford, Patenting Software Under the European Patent Convention, p. 15

b. The Board Of Appeals

Pursuant to Art. 106 cont. EPC decisions by the EPO can be appealed to the EPO Boards Of Appeal within a period of two months. In order to ensure uniform application of the law, or if an important point of law arise, the related question can be referred to the Enlarged Board of Appeal, Art 112 EPC. This usually happens if two boards contradict each other. Indeed hitherto there is only one board with competence to 'computer implemented inventions', so no decision on the related issues has ever been given by the Enlarged Board yet.

(1.) Vicom

The first basic decision on a computer related patent by the Board of Appeal was *Vicom*.¹⁵⁴ The object of the invention was an enhanced technique of digital image processing, i.e. filtering, while the method might also be utilized for filtering of other signals that can be depicted in two dimensional arrays.

Such filtering is done by extracting a certain array around a certain pixel, processing that array with the filtering algorithm and placing it back to the image. This is repeated for each pixel in the image or part thereof which is to be filtered. *Vicom*'s invention – expressed in simple terms - was a method that extracted and processed substantially smaller arrays for each pixel than prior art methods, but repeated the processing several times. The outcome was a slightly less accurately filtered image, but substantially less demand for computing power to create it. The application also disclosed new hardware for carrying out the program. As the applicants admitted, in principle it was possible to implement the method by a suitably programmed conventional computer, although such a computer may not be optimized for it.

The Board of Appeals disagreed with the examiner's rejection of the patent as being a mathematical method holding 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."¹⁵⁵

However the Board of Appeals went further ahead in *Vicom*, holding that a novel technical feature existed in not only the hardware, but also in the method. This 'technical feature' was namely to identify in a substantial increase in processing speed compared to the prior art method and in the procedure of processing an image "seen as a whole". The latter was based on the understanding that the digitalized image was a representation of the physical image. While a new method of filtering a physical image by hardware, i.e. optical means, would be patentable in principle, no difference should be made if the use of modern technical means, i.e. a computer, is chosen for the same purpose. The Board argued that the choice of one or the other way of achieving the same result, namely a filtered image, was not of an essential nature but based on technical and economical considerations which bore no relationship to the

¹⁵⁴ *Vicom*, EPO Case# T 0208/84 [1986]. All decisions of the EPO Boards Of Appeals can be looked up under [<http://legal.european-patent-office.org/>]

¹⁵⁵ Headnote 1 of EPO Case# T 0208/84 [1986]

inventive concept as such. Decisive was what technical contribution the invention, **when considered as a whole**, makes to the known art, not the way the contribution is achieved. This approach was henceforth referred to as the “contribution test”.

In fact the EPO-Board thereby contradicted the *Straken*-holding that the substitution of a technical act by a non-technical one did not render the latter to be technical. But more remarkable is the reasoning that the “substantial increase in processing speed” was 'technical'. It must be noted that Vicom's program did not really increase the physical processing speed of the computer but decreased the computations needed to be performed. If someone performed the algorithm mentally – which in principle is possible – the same increase in processing speed would be observable. The improvement was purely mathematical and abstract of the different ways that mathematics may be performed. Consequently with the same reasoning applied even the Binomial theorem¹⁵⁶ (given that it was novel and non-obvious) might be patentable if merely translated to a computer program and directed to some end use, since that computer program would show an increase in processing speed compared to a computer program that was written without knowledge of the Binomial theorem and would have to 'multiply out' the brackets.

(2.) Koch & Sterzel

Subject matter of *Koch & Sterzel*¹⁵⁷ was a X-ray apparatus for radiological imaging, using a computer program to determine the right relation of parameters such as tube current, tube voltage and exposure time to ensure optimum exposure with sufficient protection against overloading of the X-ray tube. The data processing unit controlling the tube by carrying out the computer program initially maintained both the X-ray tube voltage and the product of tube current and exposure time constant, while decreased the tube current from the maximum permissible value until the relevant rating curve permits an exposure. Where no exposure was possible and the maximum permissible exposure time had been reached, it increased the tube voltage and decreased the tube current as a function of the secondary requirement of constant density until the relevant tube rating curve did allow an exposure. Finally it determined the most optimal exposure parameters by applying different values starting with the smallest focal spot optimum for image resolution. Moreover the program set the external high-voltage generator according to the determined values.

Upon appeal by a third party, the Board of Appeals sustained the granted patent. Although the program merely produced intellectual information, this information was the solution to a technical problem, i.e. the optimal parameters for creating a certain radiogram. This "technical effect" did not need to occur during the execution of the computer program. The only relevant fact was that it occurs at all. The Board disallowed an argumentation, that any teaching was non-technical if in its essence it states a rule that can be carried out just by the

¹⁵⁶ e.g. the known formula: $(a+b)^2 = a^2 + 2ab + b^2$

¹⁵⁷ *Koch & Sterzel*, EPO Case# T 0026/86 [1987]

human intellect.¹⁵⁸ Particularly the Board disagreed with a view that an invention which involves a mix of technical and non-technical features was to be weighed and if the greater part was non-technical the patent was to be denied.

(3.) *IBM/ Text Processing*

*IBM/ Text processing*¹⁵⁹ was a case in which the Board denied the patentability. The well known manufacturer of business machines tried to patent a "method of generating a list of expressions semantically related to an input linguistic expression" using a computer. The purpose was i.e. to create a list of synonyms to the input expression. IBM pointed out that the method was making use of two functionally separate memories, one containing the database of linguistic expressions, the other containing a presorted index thereto which enabled a faster extraction of the semantically related expressions from the first memory.

The Board of appeals concluded that the subject matter of the claim was directed to the field of linguistics and did not concern an invention within the meaning of Art. 52 EPC. Semantic relationship between expressions were not of a technical nature and could be found by performing mental acts only with no technical means involved. Indeed such a system might be patentable if it made a contribution to a field outside the range of matters excluded from patentability. But no such was present in IBM's application. Each of the technical means disclosed were conventional and especially the use of "two memories", an index and a database, was in no way inventive. In fact the two "functionally separate memories" could be different sections of one single (conventional) memory not working in an unusual way. Hence IBM's text processor failed the "contribution test"

(4.) *Sohei*

In *Sohei*¹⁶⁰ a patent related to a business method was allowed. However the reason for this allowance was that the Board meant to identify a technical contribution there.

The claim in it's amended form was directed to a "computer system for plural types of management including at least financial and inventory management." The system created an interactive image of a single transfer slip on the screen of the display, which had a format commonly used for (at least) financial and inventory management. Data that has been entered by way of this slip-image input mask was not only stored in a journalized day-book file but also in various other database files each of which was formatted in a special manner for the purposes of the different types of management, i.e. "an item master file, a commodity master file, a journalized accumulation file and an inventory file". Finally the system comprised a function to extract those datasets from the database files which are required for the respective type of management to

¹⁵⁸ Reason 3 of EPO Case# T 0026/86 [1987]

¹⁵⁹ *IBM/ Text processing*, EPO Case# T 0052/85 [1989]

¹⁶⁰ *Sohei*, EPO Case# T 0769/92 [1994]

perform.

Like in *Koch & Sterzel* the Board identified a mix of technical and non-technical features. This time the mix was not of a technical and a mathematical part but of a technical and a business administration part. Nonetheless if a technical contribution could be identified either in a technical problem to be solved or in a technical effect achieved by the solution, the mix was patentable.

The Board identified the technical contribution in the teaching to distribute the data entered through a single input screen to the different mentioned files for different purposes and to cause the computer to perform different functions on the files for different purposes, by arguing that this “would clearly require technical considerations”. Unfortunately they omitted to specify these “considerations”.

It is questionable that the Board did in a satisfying way substantiate their holding that the programming of the aforementioned features required technical considerations which were able to award the character of a technical contribution. The way of updating and processing the several database files are in the conventional use of a computer, while the overall idea of creating a plurality of databases for different purposes is subject to a mere concept of organizing and running a business. However other observers recognise the improvement of the user's convenience as being a technical contribution.¹⁶¹

(5.) IBM/ Computer Program Product

In 1997 the Board clarified that even a computer program (and not only a programmed computer) can be patented under the EPC as a *Computer program product*¹⁶². The technical facts of the case can be omitted here. The Board decided that “a computer program product is not excluded from patentability under Article 52(2) and (3) EPC if, when it is run on a computer, it produces a further technical effect which goes beyond the 'normal' physical interactions between program (software) and computer (hardware)”.

In fact any program produces a technical effect when running on a computer, i.e. it alters the electric current in the integrated circuitry. The Board reasoned that this effect is common to all programs and could therefore be no distinctive criterion. But if a running program created a further technical effect – in or outside the computer – this effect constituted an invention. A claim directed to such computer program was not directed to the program “as such”, but to the creation of the further technical effect by means of a program.

In principle this decision is welcome because where ever the borderline between patentable and non-patentable subject matter is to be drawn; the pivotal point can not reasonably be whether one and the same invention is claimed as a program or as a programmed computer.

¹⁶¹ Beresford, *Patenting Software Under the European Patent Convention*, p. 182

¹⁶² *Computer program product*, EPO Case# T 0931/95 [2000]

(6.) Pension Benefits Systems

The Board refused to vouch the claim which concerned a business method in *Pension Benefits System*¹⁶³; but the main significance is that the Board abandoned their 'contribution test' of *Vicom*¹⁶⁴ in this decision.

The subject was a method (respectively a programmed computer) for controlling a pension benefits system which, after entering and storing personal data of each employee of the subscribing employers to a database, was capable of determining such data as the average age of all employees, the periodical cost of the life insurance for all employees of a certain employer, administrative, legal, trustee and government premium yearly expenses for a certain employer, each employers monetary contribution to a master trust and the periodic benefits payable by the master trust to each enrolled employee upon death. Different to *Sohei*¹⁶⁵ the application did not disclose a certain structure of the database.

The Board held that all the features of the method claim were steps of processing and producing information having purely administrative, actuarial and/or financial character and were typical steps of business and economic methods. They did not teach any method that went beyond the general way of using data processing means, while the mere method of doing business is excluded subject matter.

The programmed computer was straight away regarded as an apparatus, a physical entity and therefore non-excluded subject matter in the sense of Art 52 EPC. The 'technical contribution' was no criterion for the subject matter question anymore. However in order to be patentable there must be involved an inventive step which needed to be solely in a technical field. The inventive step must reside in making a contribution to a non-excluded field of the art which is new and non-obvious to a person skilled in that art, without regarding any contribution to an excluded field of the art. Thus the assessment needed to be carried out from the point of view of a programmer having knowledge of the concept and structure of the improved pension benefits system; a patent was only to be granted if from this point of view any inventive steps are still to be performed in order to create the claimed invention. But merely implementing the concept and structure of the pension benefits system into a computer program formed part of the prior knowledge of the skilled person and was therefore not inventive.

The crucial difference between this new 'inventive step' approach which in fact equals to the 'point of novelty' approach, and the former 'technical contribution' approach is that the latter administered two separate comprehensive survey tests to the claim. First it was to search for anything in the overall method that was technical. If something like that was found, it was then to search – again in the overall method – for anything (else) which is new and non obvious, whereas it did not necessarily needed to be technical. The new approach first omitted the absurd statement that a computer was not technical but then in a second step gathered the two separate tests to a single test for the presence of an inventive

¹⁶³ *IBM/ Pension Benefits System*, EPO Case# T 1173/97 [1997]

¹⁶⁴ *Vicom*, EPO Case# T 0208/84 [1986]

¹⁶⁵ *Sohei*, EPO Case# T 0769/92 [1994]

step: Something in the overall method must be found which is both: technical and at the same time inventive (novel and non obvious to a person skilled in the art).

(7.) *Comvik*

In the subsequent *Comvik*¹⁶⁶ decision the Board applied and further consolidated the 'inventive step approach'. The patent related to the use of single-user multi-identity integrated circuit cards as subscriber identity module in GSM mobile units.

The “Global System for Mobile Communications” (GSM) is the most popular standard for mobile phones in the world. In Europe and Africa it holds a marked share of almost 100%. Mobile phone units in the GSM system do not have a fix subscriber identity, they are 'user neutral'. Only when a “Subscriber Identity Module” (SIM) is connected to the phone unit, i.e. an “Universal Integrated Circuit Card” (UICC) containing the SIM (therefore the such UICC are usually called SIM card) is inserted into the smart card reader that every GSM unit features, the unit gets “personalized” and can log in to the cellular network using data obtained from the SIM, i.e. the so called International Mobile Subscriber Identity (IMSI). Whenever a GSM unit is logged in to a GSM cell, a global switching system of network location register databases holds the information that this certain IMSI is registered in that certain GSM cell. Accordingly incoming calls for this IMSI are set against the corresponding cell and then against the single mobile unit located anywhere in that cell, on a worldwide basis. It should be understood that a SIM is not a mere dataset but a little computer program (a so called GSM application) providing for example means for en- and decryption and an UICC is not a mere storage device but a little computer carrying out the SIM.

Comvik's idea was to provide a SIM card which can handle at least two IMSIs. The user can selectively activate one or the other identity to be used to log into the GSM network in order to e.g. obtain differential billing for private and service calls without replacing the UICC. The applicants claimed that the capability of their SIM card to adopt different IMSIs warded a novel character to the whole interaction between SIM and network databases.

The Board did not vouch the claim. It reasoned that any invention had to be understood as a solution to a technical problem. All features of a patent claim should contribute to the solution. Assessing such a solution for patentability required the identification of the technical field of the invention, the identification of the closest prior art in that field and the identification of the technical problem to be solved. It had then to be examined whether the technical features – and only the technical features – which formed the solution, could be derived by a person skilled in the identified field in an obvious manner from the state of the art. If the invention solved several technical problems unrelated to each other, each solution had to be considered in isolation. If no technical problem can be derived from the application, no invention in the sense of Art 52

¹⁶⁶ *Comvik*, EPO Case# T 0641/00 [2002]

EPC existed.

In Comvik's application the Board identified three features: Having more than one SIM on a single UICC; registering with one particular identity to the network location registers; and providing differential billing. Each of which had to be assessed in isolation in the above mentioned way.

The technical field of the first feature was that of GSM network programming. The problem to be solved was implementing two SIMs into one UICC. However the examination of prior art revealed that the UICCs used in GSM networks were already designed to contain more than one GSM application. Since a SIM is a GSM application, the possibility of implementing more than one to SIM to a single UICC was obvious to the person skilled in the art.

The second feature was also in the field of GSM network programming. However there was no problem to be solved. It was a common feature of GSM networks that each SIM has an allocated IMSI and that once a mobile unit is logged in with a particular SIM, the network location registers will be updated automatically, i.e. setting incoming calls for that particular IMSI against that very mobile unit using the corresponding SIM.

The third feature of differential billing after all was a financial and administrative concept and was therefore not able to contribute to an inventive step.

One fact is clear from the last two decisions: Business methods patents in the sense of *State Street Bank v Signature*¹⁶⁷ remain non-allowable in Europe. But it is a crucial point whether the Board of Appeals intends to apply their new “inventive step approach” to business method related patents only, or to other cases as well. Patents like in the *Vicom* case probably would not have passed the “inventive step test” for the reason that the only novel and non-obvious step in the overall process of image processing was the underlying algorithm which – under the new approach – may not contribute to the inventive step for its lack of a technical character. Whereas the (technical) implementation of the algorithm to a computer program (or the programmed computer, or the act of programming that computer, whatsoever) is in the average knowledge of a person skilled in the art, hence obvious. The remaining steps in the overall process, i.e. digitalizing the image and printing it out, indeed were purely technical but as purely non novel.

Indeed it all depends on the definition of the word “technical”. The drafters of the European Patent Convention passed that decision to the Boards of Appeal, but they refuse to receive it.

c. Granting practise

An exact statistic on the number of software patents, and patents on computer implemented inventions respectively, that have been granted by the EPO is not possible, since there is no class or other identification which would clearly distinct them from other patents. The European anti software patents lobby has

¹⁶⁷ *State Street v Signature*, 149 F.3d 1368 [1996]

estimated a number of about 30,000.¹⁶⁸ They range from (clearly patentable) computer controlled industrial facilities to absolute trivial methods such as e.g. the use of so called “tabs” in graphical user interfaces (see Figure 6 which is taken from the actual application for European patent EP0689133. The pointers 32 and 36 indicate the “tabs”)¹⁶⁹ It should be noted that the latter is an extreme example, but unfortunately it is not an isolated one. Indeed this patent's validity in Europe is very doubtful,

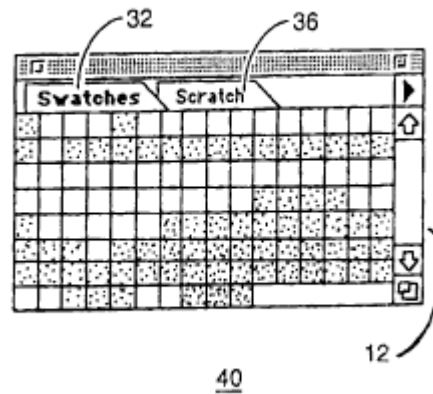


Figure 6

but the fact that it has been granted by the EPO reveals the ambiguous legal position. It is also doubtful whether the holders of patents like EP0689133 will ever bring lawsuits against infringements of their patents. In fact that would cause a lot of work for the courts since such trivial features like “tabs” are customary in modern computer applications.

4. Newer decisions under national laws

As mentioned earlier infringement suits are still subject to the national patent law of contracting states of the EPOrg. The national courts have 'the last word' regarding the validity of patents granted by the EPO. The provisions of the EPC have been adopted to the national Patent Acts. The contents of Art. 52 EPC can be found in section 1 of e.g. the UK Patents Act or the German Patents Act. So the national courts are basically interpreting the same law as the EPO Boards of Appeals does. This chapter examines whether the national courts were able to lift the fog around European software patents.

a. United Kingdom

(1.) Merrill Lynch's Application

*Merrill Lynch*¹⁷⁰ appealed to the Royal Court of Appeal after their application to patent a “data processing apparatus for making an automated market for one or more securities” was refused and the refusal sustained by the Patent Court.

The claim described a system which received transaction orders from customers, retrieved the best current bid and asked prices, qualified customers orders for execution, executed the orders and reported the trade particulars to the

¹⁶⁸ Foundation for a Free Information Infrastructure, European Software Patent Statistics, <http://swpat.ffii.org/patents/stats/index.en.html>

¹⁶⁹ European Patent EP0689133 (corresponding to US Patent #5,546,528 and Japanese Patent #JP2005025775), <http://v3.espacenet.com/textdoc?IDX=EP689133>

¹⁷⁰ *Merrill Lynch's Application*, 1988 R.P.C. 553 [1988]

customers. Moreover it monitored stock inventory and profits for the market maker. The system could be implemented to any data-processing equipment. However each of the steps the system performed was described in the “means for...”-language and the applicants argued they were claiming a machine and not a computer or business method 'as such'.

The Patent Court reasoned that Merrill Lynch's invention was a computer program and a business method, both of which were excluded subject matter, just in disguise of a computer. Something could not be patented if the only inventive step resided in the contribution of excluded subject matter alone.

The Court of Appeal sustained the decision but not the reasoning in the last sentence of the previous section. It argued that a discovery also was an excluded subject matter, while it was a well established principle that showing a way to utilize a discovery was patentable even if the only non obvious feature consisted in the discovery. This argumentation was based on a reference to *Genentech's Application*¹⁷¹, another case of the same time which concerned a patent based on the discovery of the DNA sequence of the human gene responsible for making the valuable hormone t-PA. The 'excluded subject matter issue' in the *Genentech* case was regarded to be closely related and in fact both isochronic cases have to be read in connection. However it was agreed with the Patent Court that Merrill Lynch's invention was excluded subject matter in disguise of a non excluded subject matter. In *Genentech* the court stated in respect of the *Merrill Lynch case* “it would be nonsense for the Act to forbid the patenting of a computer program, and yet permit the patenting of a floppy disc containing a computer program, or an ordinary computer when programmed with the program; it can well be said, as it seems [...], that a patent for a computer when programmed or for the disc containing the program is no more than a patent for the program as such.”¹⁷² The *Merrill Lynch* decision expressly referred to this dictum.¹⁷³ Further referring to *Vicom*.¹⁷⁴ and the 'technical contribution test' the Court of Appeal asked which contribution the invention seen as a whole made to the known art and concluded that the only contribution was a business method, hence excluded subject matter.

(2.) *Gale's Application*

In *Gale's Application*¹⁷⁵ the Court of Appeal finally discarded the Patent Appeal Tribunal's ill conceived notion of the *Slee & Harris* time that a fixed storage device such as punched cards containing a computer program was comparable to a shaped cam in a machinery.¹⁷⁶

Mr. Gale claimed to have found out a better and faster method of calculating square roots by using a new algorithm which eschewed divisions and rather

¹⁷¹ *Genentech's Application*, 1989 R.P.C. 147 on appeal 1987 R.P.C. 553

¹⁷² *Genentech's Application*, 1989 R.P.C. 147 (240)

¹⁷³ *Merrill Lynch's Application*, 1988 R.P.C. 553 (566) [1988]

¹⁷⁴ *Vicom*, EPO Case# T 0208/84 [1986], <http://legal.european-patent-office.org/dg3/biblio/t840208ep1.htm>

¹⁷⁵ *Gale's Application*, 1991 R.P.C. 305 [1991]

¹⁷⁶ See above: *Slee & Harris' Application*

employed multiplication. Why it was special was that he claimed the computer program implementing the algorithm, stored on a ROM chip. A ROM chip is a piece of circuitry which stores some data in a fixed and unalterable manner. For clarification: Mr. Gale did not invent the ROM chip, but used a common ROM chip to store his program on it.

The court ruled that following the *Merrill Lynch* holding, the program could not be patentable if put on a floppy disk and it made no difference that it was put on a ROM chip instead. No technical contribution was made because what was new was a mathematical method.

The attentive reader notices not only that the Court of Appeals was too clever to be distracted by the appearance of a ROM chip, from the fact that it is no more than a data storage device. But also that the court already left the so called 'contribution test' of the EPO. It did not ask which contribution the application made when seen as a whole, but asked whether the actual inventive step is in a non excluded field. The Court thereby implicitly contradicted its holding in *Merrill Lynch's Application*.¹⁷⁷ If Gale's invention was assessed 'as a whole' in terms of the 'contribution test', it would have been apparent that his (purely mathematical) trick causes the very same kind of “increase in processing speed” as in e.g. *Vicom*¹⁷⁸.

(3.) Fujitsu Ltd's Application

*Fujitsu Ltd's Application*¹⁷⁹ was directed to a method (and apparatus) for modelling a synthetic crystal structure for designing inorganic materials using a computer. The operator could select an atom, a lattice vector and a crystal face in each of two crystal structures displayed by the computer. The computer then converts data representing the physical layouts of the two crystal structures into data representing the physical layout of the crystal structure that would have been obtained by combining the original two structures in such a way that the two two selected atoms, the two selected lattice vectors and the two selected crystal faces were superimposed. The resulting data were then displayed to give an image of the resulting combined structure.

The Patent Court supported the rejection of the application for being directed to excluded matter. Pointing out that exclusion from patentability was a matter of substance not form, the court emphasised again that it was not enough to just frame a claim in terms of what in this paper is called “new-machine approach”, in order to obtain patent protection for a computer program. The attention was to direct not to the fact that the program was controlling the computer but to what the computer, so controlled, was doing. If all that that was being done, as a matter of substance, was the performance of activities excluded from patentability, no patent may be granted.

Fujitsu's Application was for a computer program “as such” in the courts

¹⁷⁷ *Merrill Lynch's Application*, 1988 R.P.C. 553 [1988]

¹⁷⁸ *Vicom*, EPO Case# T 0208/84 [1986], <http://legal.european-patent-office.org/dg3/biblio/t840208ep1.htm>

¹⁷⁹ *Fujitsu Ltd's Application*, 1997 RPC 608; 1997 EWCA Civ 1174 [1996]

opinion and therefore not patentable. If the computer was creating the new crystal structure it might be. However the combined structure was not a product of the computer but of the operator, who in fact was aided by the computer. The operator was determining the appropriate way of superimposing two of those crystals while the computer was merely enabling a faster portrayal of the result. Such use of a computer to display things was in their common use, so there was neither a novel way of using the computer's hardware.

b. Germany

(1.) Chinesische Schriftzeichen

In *Chinesische Schriftzeichen*¹⁸⁰ (engl.: Chinese calligraphy) the German BGH was concerned with a text processor for Chinese language.

The Chinese “alphabet” comprises about 10,000 different letters, which all even can have a plurality of meanings depending on their intonation and additional graphical characteristics. It's apparent that the input of Chinese words to a word processor by using a keyboard raises problems, i.e. equivocality of an entered string and the extensive demand for storage and computing capacity.

The invention describes a text processing system using a plurality of memories. The first memory contains phonetic and graphic characteristics for each character and is sorted by the frequency of the characters in the Chinese language. The second memory contains words (successions of at least two characters) in terms of the corresponding memory addresses of the first memory. These words are gathered into groups defined by their first character and (again) sorted by their frequency in the Chinese language. The third memory contains information on the graphical attributes a character is composed of. In a fourth memory finally all the information is gathered to output Chinese script to a display or printer. The user enters phonetic and graphic characteristics of the demanded characters or words at his keyboard. Then an associative search algorithm retrieves the memory addresses (of the first memory) corresponding to these characteristics, determines the intended Chinese word from the sorted groups in the second memory and uses this information to retrieve the required graphic attributes from the third memory to create the graphic (output) data in the fourth memory. To understand the actual functioning of the system one needs to be skilled in the Chinese language, but it appears that in essence the system organises known information about the language, i.e. phonetic and graphic characteristics and the frequency of words, to accelerate the process of inputting Chinese words to a computer.

The BGH, albeit explicitly referring to the holding of the EPO Board of Appeals, argued rather in the ways of its own case law, when it abnegated the technical character of the invention. It held that the main aspect of the invention was a classification system related to semantic markers in the Chinese language. This was a mere intellectual exercise. The technical aspects, i.e. input and output device and the organisation of the four different memories – in fact these

¹⁸⁰ *Chinesische Schriftzeichen*, BGHZ 115, 23 [1991]

can and probably will rather be four different arrays in one an one same physical memory – were only of subordinate relevance for the success of the method. Therefore they were insufficient to ward a technical character to the invention.

The BGH still assessed the technical character of claim by asking whether the 'inventive core' is technical.

(2.) *Tauchcomputer*

However, shortly after the court set aside this approach and adopted the so called 'technical contribution test' that the EPO Board of Appeals applied that time.¹⁸¹

When a scuba diver advances deeper under water the increasing water pressure also causes the air the diver breathes to gain more pressure. Increasing air pressure causes a dissolution and accumulation of gases in the body tissues and blood of the diver. When the diver ascends the opposite happens: the pressure decreases and the dissolved substances comes out of solution again. If the diver ascends too fast bubbles form in parts of the body. This phenomenon can cause sensory failure, paralysis and even death (so called decompression sickness, commonly known as “the bends”). To avoid these unpleasant consequences an emerging scuba diver has to halt in certain depths to await decompression.

Prior to the invention of the *Tauchcomputer* (engl.: diver computer) scuba divers used to plan their dives by using (printed) schedules. With the knowledge about the depth (taken from a bathometer) and the submerged time (taken from a stopwatch) the emerge time and the required decompression halts were apparent from these schedules. The divers computer automated these schedules by permanently taking the values from bathometer and stopwatch, recalculating the emerge time and decompression stops by using a new algorithm and displaying the results.

The patent granted by the EPO was declared void by the German Patent Court for the reason that the only novel feature resided in the used algorithm, which was merely a new mathematical interpretation of the known diver schedules. But the BGH reversed that decision holding that the invention was not to dissect into technical and non technical parts in order to assess the inventive step with respect to the technical parts only. Operating bathometer, chronometer, memory, processor and display means due to a certain algorithm was a technical teaching. After this conclusion was made the examination for an inventive step had to be done irrespectively of what is technical and what is not.¹⁸²

Thus the BGH was now adopting the 'technical contribution test' and yet was enlaced in some of the inconsistencies. Since the decompression effect in the body of a diver using a diver computer does not differ from the decompression effect in the body of a diver using the schedules, the invention of the diver computer necessarily did not reveal any new mathematical relationship in physics or biology but merely restated the known one. If further the use of a

¹⁸¹ *Tauchcomputer*, BGHZ 117, 144 [1992]

¹⁸² *Tauchcomputer*, BGHZ 117, 144 (150) [1992]

bathometer, chronometer, memory and display device was a technical teaching then this teaching was in the prior art: Bathometer and chronometer were used ever since to avoid decompression sickness, together with the printed schedules which are both, memory and display means. The only really novel feature in the invention was the use of a computer. It can very well be that the implementation of the computer together with the other devices to a new entity was done in a novel and non-obvious way, but the BGH did not assess the *Tauchcomputer* for that kind of authentic invention.

(3.) *Logikverifikation*

In 1999 the BGH also adopted the EPO Board's position of *Sohei* that a computer program was not a computer program “as such” in the sense of Art. 52 EPC (respectively sec. 1 of the German Patents Act) if technical considerations are required to create the program. Different to *Sohei* the required technical considerations were apparent from the court's decision in *Logikverifikation*.¹⁸³

The patented computer program was concerned with the field of design of highly integrated circuitry, particularly the logical verification of their physical layout. In the course of designing highly integrated circuitry, it is necessary to verify whether the physical layout of the circuit diagram, i.e. that what later in the actual production process will be printed onto the silicon chip, forms an exact implementation of the logic diagram, i.e. that what it ought to be in terms of the intended function of the integrated circuit. This is done by extracting a so called hierarchical layout circuit from the physical layout which basically is data that is descriptive of the physical layout. This data is then compared to the logical diagram in order to verify it's logical consistency. Due to the high complexity of modern integrated circuits, this process is very time and computing power consuming. The invented computer program, expressed in extremely simplified terms, reduces the number of connectors to be checked by 'scanning' the hierarchical layout for redundant data, i.e. parts of the circuit which are exactly equivalent to other parts, and eliminating these parts from the verification process by substituting them with so called macro units.

The BGH found that the claim was directed to a computer program. However under consideration of the whole subject of the application, it was an improvement of the process of silicon chip production.¹⁸⁴ It was not directed to a mere metal conception, but to a technical conception derived from technical considerations which are directly related to the physical entity of highly integrated circuits to produce. Only a technical expert with knowledge in the field of circuitry and not (only) in the field of informatics and programming was able to perform these considerations. This fact warded the technical character to the computer program which made it to be not a computer program 'as such' but a technical invention, hence patentable.

¹⁸³ *Logikverifikation*, BGHZ 143, 255 [1999]

¹⁸⁴ *Logikverifikation*, BGHZ 143, 255 (last page) [1999]

(4.) *Anbieten interaktiver Hilfe*

A recent German case was *Anbieten interaktiver Hilfe*¹⁸⁵ (engl.: interactive help offering). The applicants stated that market surveys discovered the phenomenon that the majority of online customers added items to a „shopping card“¹⁸⁶ but did not finalize their order. The claimed method is said to be able to determine the probability that the customer will cancel an order before dispatching it to the system by monitoring the customer's behaviour when browsing the website and comparing it with certain reference data. In case this probability was detected the system offered an interactive help to the customer to encourage the completion of the order.

Following approximately the evolution of the EPO Boards of Appeals' opinion the BGH now summarized their own one as follows: A computer program was never a technical invention just because it made use of computers. In order to constitute a technical invention it needed to solve a concrete technical problem by technical means. Whereas the term “technical” was still to be defined by the direct use of controllable forces of nature to achieve a causal manageable result. However if such a problem was solved by the program it was irrelevant that the claim was also directed to the use of a mathematical algorithm or an economical purpose.

Hence the patent was not allowed because it did not solve a concrete technical problem but one that is related to the field of sales psychology. The purpose of the invention to gather and transmit information about the customer, i.e. credit card information and a legal declaration of intend, had a technical aspect but was not part of the problem. It was directed to the customary use of a computers and the internet. The same applied to the possible effect of the invention to abate net traffic.

5. Formerly proposed directive

If the gentle reader now misses a clear line in the European adjudication, he or she does so justifiably. The holdings are shifting all the time, not only between the different jurisdictions but also within them. At the end of the day nobody clearly can say what is patentable and what is not.

The author opines that in the newer decisions a certain tendency can be observed towards a more restrictive allowance of software patents. However there is still a lot of ambiguousness and other authors conclude the exact opposite.¹⁸⁷ Among patent attorneys the question of patentability of software under the EPC is still deemed to be mainly a question of drafting skills.¹⁸⁸

To overcome the uncertainties and harmonize the patent law in Europe, the European Commission (Commission) and the Council of Ministers of the European Union (Council) initiated the legislative procedure for a directive

¹⁸⁵ *Anbieten interaktiver Hilfe*, BGH GRUR 2005, 141[2004]

¹⁸⁶ See above: *Amazon v Barnes & Noble* (“One Click”)

¹⁸⁷ Kraßler, Patentrecht, p. 160

¹⁸⁸ Beresford, Patenting Software Under the European Patent Convention, p. 1 - 249

pursuant to Art. 249 of the Treaty establishing the European Community (the „Rome Treaty“).

Basically the first draft of the directive codified the so called 'technical contribution' test.¹⁸⁹ The drafters had to face a very intensive load of criticism coming from all over Europe.¹⁹⁰ In 2003 the European Parliament presented an amended draft featuring fundamental changes.¹⁹¹ The Parliaments version did not adopt the 'technical contribution test', but rather the 'inventive step'/'point of novelty' approach. It defined a “computer implemented invention” as an invention which can be dissected to technical and non-technical features, whereas only the technical features may contribute to the inventive step.

The crucial phrases read as follows:

Article 2: Definitions

2a. “computer-implemented invention” means any invention in the sense of the European Patent Convention the performance of which involves the use of a computer, computer network or other programmable apparatus and having in its implementations one or more non-technical features which are realised wholly or partly by a computer program or computer programs, besides the technical features that any invention must contribute;

2b. “technical contribution”, also called “invention”, means a contribution to the state of the art in technical field. The technical character of the contribution is one of the four requirements for patentability. Additionally, to deserve a patent, the technical contribution has to be new, non-obvious, and susceptible of industrial application.

2c. “technical field” means an industrial application domain requiring the use of controllable forces of nature to achieve predictable results. “Technical” means “belonging to a technical field”. The use of forces of nature to control physical effects beyond the digital representation of information belongs to a technical domain. The production, handling, processing, distribution and presentation of information do not belong to a technical field, even when technical devices are employed for such purposes.

[...]

Article 3a: Fields of Technology

3a. Member states shall ensure that data processing is not considered to

¹⁸⁹ Proposal for a Directive of the European Parliament and of the Council on the patentability of computer-implemented inventions (COM/2002/0092 final - COD 2002/0047) OJ C 151 E , 25/06/2002 P. 0129 – 0131 =

http://europa.eu.int/comm/internal_market/en/indprop/comp/com02-92en.pdf

¹⁹⁰ Erdos, A Measure to Protect Computer-Implemented Inventions in Europe, The Journal of Information, Law and Technology (JILT) [http://www2.warwick.ac.uk/fac/soc/law/elj/jilt/2004_3/erdos/#a3]

¹⁹¹ Consolidated version of the amended directive “on the patentability of computer-implemented inventions” for which the European Parliament voted on 2003-09-24. <http://swpat.ffii.org/papers/eubsa-swpat0202/plen0309/resu/plenresu0309.en.pdf>

be a field of technology in the sense of patent law, and that innovations in the field of data processing are not considered to be inventions in the sense of patent law.

Commission and Council largely refused the amendments of the parliament. In 2004 they presented a version called “Political agreement on the Council’s common position”.¹⁹² However the Commission did not conceal that the fundamental changes of the parliament's version had been cancelled. The incongruity of both positions are apparent when comparing the texts. The Commission's version reads:

Article 2: Definitions

For the purposes of this Directive the following definitions shall apply:

(a) “computer-implemented invention” means any invention the performance of which involves the use of a computer, computer network or other programmable apparatus, the invention having one or more features which are realised wholly or partly by means of a computer program or computer programs;

(b) “technical contribution” means a contribution to the state of the art in a field of technology which is new and not obvious to a person skilled in the art. The technical contribution shall be assessed by consideration of the difference between the state of the art and the scope of the patent claim considered as a whole, which must comprise technical features, irrespective of whether or not these are accompanied by non-technical features.

Article 3: Computer-implemented inventions as a field of technology

- Deleted -

In the following year the Commission advanced their version in a manner which must be marked as questionable in terms of democratic principles. This paper abstains from a portrayal. Ultimately the bill was rejected by the EU-Parliament with the vast majority of 648 out of 680 votes.¹⁹³

¹⁹² Proposal for a Directive of the European Parliament and of the Council on the patentability of computer-implemented inventions - Political agreement on the Council’s common position <http://register.consilium.eu.int/pdf/en/04/st09/st09713.en04.pdf>

¹⁹³ Sherriff, EU Parliament bins software patent bill, “The Register” 6th July 2005 , http://www.theregister.co.uk/2005/07/06/eu_bins_swpat/

D. Software patents and the TRIPS-Agreement

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) is the most important attempt for substantial harmonization of patent law on a global level. Art. 27 TRIPS provides that patents shall be available for any inventions, whether products or processes, in all fields of technology. It has been argued that this provision did not allow to exclude software from patentability since they belonged to a field of technology.¹⁹⁴

However this argument is based on a circular reasoning. The very question which is answered discordant is whether software belongs to a field of technology or rather to the field of mathematics and whether software can be an invention in the sense of patent law. TRIPS did not intend to answer these questions and left it to the memberstates to do so.¹⁹⁵

Opposers of software patents also argue with TRIPS. Art. 10 of the agreement states that Computer programs shall be protected as literary works under the Berne Convention (1971), hence under copyright law. This inclusion of software to the scope of copyright had to be construed as an exclusion from patent law. This argument is supplemented with a further reference to Art. 13 TRIPS which requires memberstates to confine limitations and exceptions to copyrights to certain special cases which do not conflict with a normal exploitation of the work and do not unreasonably prejudice the legitimate interests of the rights holder.

In fact the clash of copyright and patent law already caused issues. However Art 10, 13 TRIPS can not be construed as to exclude software from patentability. Copyright and patents are not necessarily incompatible. While copyright can be used as protection for software, software patents can be used as protection for an invention that is implemented by means of software. The question remains: When is software creating an effect that constitutes an invention in the sense of patent law?

The TRIPS agreement itself does not answer this question but requires a given answer to it. The logically derived truth is: TRIPS is useless for finding the answer.

¹⁹⁴ Schiuma, TRIPS and Exclusion of Software "as such" from Patentability, IIC 31, p. 36; Rahamim, Internet and e-commerce patents (Cyberlaw @ SA II), p. 75

¹⁹⁵ Strauss, Bedeutung des TRIPS für das Patentrecht, GRUR Int. 1996, 179 (191)

E. Analysis

I. The law

Patent law served very well during the age of industrialisation. It advanced the development of new machines and improved industrial processes; it was a very well established principle that the scope of patent law was limited to the 'world of phenomena'; this could be utilized in industrial processes, whereas the 'world of mind' was not susceptible of patent law, but free. In most continental European countries this distinction was expressed as the 'technical effect requirement' of a patent.¹⁹⁶ This term does not occur in the historic case law of common law countries, but its meaning was a global common understanding of patent law. In the U.S.A. the very same notion was expressed when courts reasoned that a scientific concept or mere idea could not be the subject of a valid patent.¹⁹⁷ It was the same principle with another name: "the mental step doctrine"¹⁹⁸ The borderline was relatively easy to identify: Patentable inventions required some physical improvement, may it be a new machine or a new method to process physical objects. Unpatentable inventions in intellectual fields such as literature, mathematics or basic scientific principles usually were abstract of a certain physical structure and could be performed entirely by the human mind. Virtually all technical inventions involved mathematical considerations and were based on some kind of mathematical principle but a patent always was granted for the application of these mathematical principles to the physical environment, not for the mathematics as such.

With the invention of computers, this borderline started to blur. Computers are machines, physical entities, that perform mathematics. Something that beforehand could clearly be classified as belonging to the 'world of mind' now entered the 'world of phenomena'. A grey area had emerged.

First of all it must be thoroughly considered what a computer does in order to find the borderline in this grey area. In principle the answer is fairly easy: A computer computes. More precisely it performs mathematics and in fact any kind of mathematics. This means that a computer is not only an ingenious invention but it also means that this ingenious invention always forms part of the prior art. Hence performing a 'new' algorithm on a computer can never constitute a new way of using that computer, because the original purpose of the computer is to perform **any** conceivable algorithm. We cannot truncate this ingenious invention just because we may find that it is too ingenious and want to issue some more patents on it.

The critics of this understanding claim that it rendered an otherwise patentable invention unpatentable simply because a computer was involved¹⁹⁹ But this

¹⁹⁶ e.g. in *Multiplikationstabelle*, RG GRUR 1933, 289 (290) [1933]

¹⁹⁷ *Gottschalk v Benson*, 409 U.S. 63 [1972]

¹⁹⁸ so in prior cases, e.g. *In re Heritage*, 150 F.2d 554, 556-558, 66 USPQ 217, 219-221 [1945]; *In re Yuan*, 188 F.2d 377, 380-383, 89 USPQ 324, 326-330 [1951]

¹⁹⁹ e.g. in reason 3 of EPO Case# T 0026/86 [1987]

criticism is unsubstantiated because the according rule of thumb does not say “An invention is not subject of patent law if the computerized calculation part in it could also be carried out by the human brain”. Of course that is not right since the work of a computer theoretically always can be substituted by a human. The right rule of thumb is:

“A software invention is not subject of patent law if that what remains when the computerized calculation part is replaced by a human does not contain a teaching to utilise controllable forces of nature to achieve a causal manageable result”

These perceptions applied consequently rebut the 'new machine approach'. At least it is not thinkable that the 'new machine approach' can ever render a computer program patentable which is not patentable due to the fact that it merely performs mathematics, e.g. in the cases *In Re Alappat*²⁰⁰ or *Vicom*²⁰¹. Even given that a computer becomes a 'different machine' when programmed in a certain way, it never may become a new or non-obvious machine unless it does something which goes beyond pure mathematics.

That something must be the very invention, it must be the new teaching to utilise controllable forces [...]. And further if the software is part of the patent claim then the software must contain this teaching. In other words for a person skilled in the art the teaching must be derivable from the software. The court in the exemplary *Vicom* case, erred to identify such a teaching in a claim directing a filtering algorithm to the specific end use of image processing. The digitalized image was not a direct representative of the original physical image; it contained the same information as its original but remained data, abstract of the original. From the today's point of view this abstractness is easier to comprehend because commonly known digital cameras create a digital image without any corresponding physical original at all (Except for the motive). The filtering of the digital image data did not cause a direct physical effect. In the overall process of scanning, processing and printing out the image, the software did not teach a new way of transforming matter because it was concerned with the part of mathematically filtering only, which was abstract from possible physical transformation acts (scanning and printing). Except for this scanning and printing (which was in the prior art) there was no act of physical transformation. The algorithm would have been patentable if it e.g. taught a technically novel way of printing but the filtering did not cause the printer to be used in a novel way. The printer already was set to print any data, including data that is processed with *Vicom*'s algorithm. The counter-example is *Antiblockiersystem*²⁰². In this case the software contained an authentic invention. Sure the processing unit merely computed data as well and the electronically controlled valves already were set to work in accordance to any rule, including the invented one. But when working in accordance to the latter there was a physical effect of antilockbraking. A person skilled in the art could derive this very effect directly from algorithm in the computer program, hence the program itself was containing the inventive and patentable teaching. In *Vicom* there was

²⁰⁰ *In Re Alappat*, 33 F3.d 1526; 31 USPQ2D 1545 [1994]

²⁰¹ *Vicom*, EPO Case# T 0208/84 [1986]

²⁰² *Antiblockiersystem*, BGH GRUR 1980, 849 [1980]

no physical effect derivable from the algorithm. The product was filtered data. In fact it might be physically printed out, but it also might be physically stored to a magnetic disk or physically light exposed to a photographic paper whatsoever. Pivotal is that none of these physical acts can be derived from the algorithm.

The approach of assessing the invention “as a whole” opens a gate to claim patents on pure mathematics by merely directing it to some kind of physical post solution activity abstract from the algorithm. So an analysis of the invention into technical and non-technical features and the establishment that the technical features must be derivable from the program algorithm are necessary requirements in order to achieve the right result.

The EPO Board of Appeals recently took a step in the right direction by setting aside their 'technical contribution test' and adopting the 'inventive step' approach. However so far it has only been applied to business method patents; it has to be awaited whether they will consequently apply it to other software patents as well.

II. The change

So why is the U.S. case law so far away from this? The answer is that the CCPA and the Federal Circuit made substantial changes to the patent law. They set aside well established principles such as the 'mental step doctrine',²⁰³ the 'business method exception',²⁰⁴ and - as this paper pointed out - with the reasoning *In Re Alappat*²⁰⁵ even the 'mathematical method exception'.

These changes are substantial because they effect broad areas of society. There is an ongoing controversial discussion amongst experts in law and computer sciences on the issue of software and business method patents. A recent research paper by the Federal Reserve Bank of Philadelphia identified a large-scale (negative) impact of these changes of law on the U.S. economy.²⁰⁶ Particularly small and medium enterprises fear extinction through Softwarepatents.

Patent law is a matter of policy. Changes to the policy, in a democratic society, should be done in the general assembly, where the related questions can be publicly debated giving all relevant people the opportunity to contribute. In a court trial there are usually two parties attending their own interests only. It is not the right place to change a legal policy effecting an entire nation. Therefore only a parliament is mandated to undertake such a change. This was pointed out by U.S. Supreme Court two times in the 'Trilogy'.²⁰⁷ Apparently CCPA and Federal Circuit preferred to read over these passages in the decisions.

The fact that the proposed 'Software Patents Directive' in the E.U. failed to pass

²⁰³ *In re Prater*, 415 F.2d 1378, modified on rehearing 415 F.2d 1393 [1969]

²⁰⁴ *State Street v Signature*, 149 F.3d 1368 [1996]

²⁰⁵ *In Re Alappat*, 33 F3.d 1526; 31 USPQ2D 1545 [1994]

²⁰⁶ Bessen/ Hunt, An Empirical Look At Software Patents, Research on Innovation, Working Paper No 013-17/R

²⁰⁷ *Gottschalk v Benson*, 409 U.S. 63 (@73) [1972] and *Parker v Flook* 437 U.S. 584 (@595) [1978]

the parliament does not mean that the parliament was too inert or incompetent to decide on the issue. If the drafters of a bill aspire a positive vote in the parliament then they ought to pay some attention to the parliaments opinion when drafting the bill. That is the very object of a parliamentary democracy.

There is another rather pragmatic argument for a decision in the parliament. While a court may only extend a given statutory legal system such as the patent law to software inventions, the parliament has the opportunity to create a new one which might be more appropriate to the matter. Indeed there are arguments in our present 'information-age' that support the need for an intellectual property right in software and online business methods which goes beyond copyright. But a rigid expansion of the patent law does not give consideration to the facts of software engineering which are different to those of technical engineering. One example is the dimension of time. Software developments are much more fast moving. Granting a monopoly on a method for a period of 20 years is inappropriate in software engineering. A new intellectual property right to be created might feature a shorter duration.

The "Green Paper on Electronic Commerce in South Africa" identified that there is a need to implement a global integrated mechanism for the administration and issuing of patents to synchronise the growth, globally, of the knowledge based society.²⁰⁸ However there is no need to copy improvident concepts from other countries; particularly not if they were created without participation of their parliaments. In the E.U. it appears that the practise of past decades is not quite congruent with the majority opinion in the parliaments. The Indian Parliament recently refrained from expanding patent law to software. The U.S. Congress has never been asked.

III. Conclusion

Widening the scope of definition and the criterion in rendering a patent beyond the strict requirement of a technical contribution in the inventive step constitutes a substantial change of law. In the Republic of South Africa such a change of law should exclusively be made by the South African parliament, thoroughly paying attention to the concerns of all affected parts of society.

²⁰⁸ Green Paper on Electronic Commerce for South Africa, sec. 6.6

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