TALLINN UNIVERSITY OF TECHNOLOGY
School of Business and Governance
Department of Law

Karolis Pocevicius

INTELLECTUAL PROPERTY PROTECTION FOR SOFTWARE: COPYRIGHTING OR PATENTING? COMPARATIVE ANALYSIS OF EU AND US APPROACH

Bachelor's thesis
Programme HAJB, specialization EU and International Law

Supervisor: Pawan Kumar Dutt

Tallinn 2021

I hereby declare that I have compiled the thesis/paper (choose one) independently
and all works, important standpoints and data by other authors
have been properly referenced and the same paper
has not been previously presented for grading.
The document length is 11 814 words from the introduction to the end of conclusion.

Karolis Pocevicius ……
(signature, date)
Student code: 171525HAJB
Student e-mail address: karurelax@gmail.com

Supervisor: Pawan Kumar Dutt:
The paper conforms to requirements in force

……
(signature, date)

Chairman of the Defence Committee: / to be added only in graduation thesis /
Permitted to the defence
……
(name, signature, date)

TABLE OF CONTENTS

ABSTRACT

Presently, majority of industries, regardless of their size, cannot cope without software intervention. Computing programs help businesses and people cooperate more efficiently, saving valuable time. They can play an essential role in determining the success of any person or enterprise. Therefore, such an important subject in the world's economy needs adequate legal protection. Intellectual property rights (IPRs) provides such legal framework and this thesis will be mostly focused on researching two main tools to protect software: copyrights and patents. While copyrights are given to authors as a reward for original expression of their creative work, patents are granted for completely new technical inventions. The fact that software consists of mathematical algorithms and is not purely literary work nor tangible invention, leaves a lot of space for research.

This thesis makes main emphasis on comparing two legal frameworks of European Union (EU) and United States (US) in light of IPRs for computing programs. It aims to clarify legal status of software on both sides as well as to identify key strengths and weaknesses in those legal systems. To ensure accuracy of this research, it will be based on comparative analysis of the study of scientific resources and legal documents in both countries, as well as on court decisions in this respect.

As a result this work explains why copyrights and patents complement each other and both are necessary in order to provide full spectrum of legal protection for software. In addition, recommendations for improvement of legal framework in EU and US will be provided.

Keywords: Software patents, Software copyright, EU, US, Intellectual Property Rights

INTRODUCTION

Rapidly developing industry of informational technologies has changed life significantly over last decades. Nowadays it is hard to imagine how humanity could cope with daily tasks without the intervention of information technology. Undoubtedly, this technological leap made our life easier, the world more open and accessible. With the help of the latest developments in the field of information technology, we can easily communicate with people who are miles away, accomplish studies, maintain and develop business. It is difficult to state in one sentence how many advantages this has brought to society.

Along with developing theologies, almost every home has obtained a computer or gadget such as phones or tablets, thus, it has become an inalienable part of every sphere of our life. Without the help of the computers we cannot make a purchase on the Internet, work or even study in university, because all the information that people are using every day is stored and processed in computers.

But computing device by itself, is not capable of executing any task without commands. The computer without software is just a piece of different metal alloys and nothing more. The software is a part of workstation which vitalizes computer, makes it work and perform different tasks in order to accomplish various goals.

As the concept of computer programs became known in the 1940s and widely used only in the 1980s, humanity had to define software concept and its legal status in a relatively short time. Nevertheless, at this moment, there is enough material that can be analyzed to study actual topics in the field of law regarding computer programs.

The industry of informational technologies takes an important place in our society, as it makes a big impact on the economies of countries, and development of the world in general. It is important to have the proper legal methods and tools for protecting the rights of those who invest their time and

Despite existence of numerous conflicting interests, all of which have grounds for legal protection, this thesis is not focused on any specific side, but provides broader research on software's legal status and main tools to protect it.

The most important legal tools relevant for legal protection of software are copyright, patents and designs. For the reason that designs are mostly related only to visual but not functional part of software we exclude it from this research and focus on copyrighting and patenting of software. In a search for the best instrument of software protection corresponding research questions were raised: Which legal instrument, copyright or patent is more effective to protect software and which legal system European Union (EU) or United States (US) is more favorable to do so?

This thesis work is written by using qualitative research methods, such as empirical research based on collected data from academic literature and study of case law regarding software legal protection. It is providing comparative analysis of patent and copyright laws in EU and US jurisdictions. Using scientific approach, case law and academic literature will be analyzed throughout this paper.

The first chapter of this research defines software and explains what parts it consists of, which is needed as basis for further research. Following chapter introduces to main legal tools for software protection, explains key differences between them and why they complement each other. The third and fourth chapters are focused on giving general overview of legal framework in EU and US used to provide patent and copyright protection for computer programs. The fifth and main chapter of this thesis is mainly dedicated for comparative analysis of two legal systems EU and US in light of IPRs for software. It provides deeper analysis of main legal documents, such as European Patent Convention (EPC), Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) and others, as well as study of cases in both EU and US courts. It is aimed to clarify the legal status of the software in EU and US and to identify key differences between those legal systems. As a result, legal opinion and advice will be provided based on conducted research.

1. DEFINING SOFTWARE

Computing machines, which people use every day, such as personal computers, laptops, cellphones as well as industrial devices such as robotic arms, temperature regulating programs, food storage facilities consist of two main parts: hardware and software. Hardware is a physical part of computer and it is related to devices, such as motherboards, hard drives, processors, RAM including external hardware devices: keyboards, monitors and other physical attributes.[1] On the other hand we have software, which is a virtual part of computing machine. Software gives instructions to computer. It consists of mathematical codes, programs, algorithms, routines, other functions which controls operations of computer's hardware. It is general term to define any variety of procedure and routine that harness the potentiality of computer to produce, for example, operating system that could coordinate basic or specific computer applications for work. [2]

Software has turned into a fast-growing industry which generated more than $265 billion in 2010 and was expected to grow 6% per annum. [3] Last year it was $389.86 billion, so it has grown more than 30%. [4]

Of course, an industry with such a huge potential and turnover needs a proper legal support, legal certainty and stable legal framework which could function in accordance with everyone's needs. It is important that all parties including customers and competitors would have decent legal clarity about legal status of intellectual protection in the face of software.

[1] Bainbridge D. (1997). Software Copyright Law, 4th Ed. London, Edinburgh, Dublin: Butterworthts, p 2.
[2] Gemignani, M. C. (1979). Legal Protection for Computer Software: The View From'79. Rutgers Rutgers Journal of Computers, Technology, and the Law, 7, 269-313, 271.
[3] Global Software - World Market Software' Report published by MarketLine in 2012. Retrieved from http://www.reportlinker.com/p0188773-summary/Global-Software.html 11 May 2021.
[4] Information technology (IT) spending on enterprise software worldwide, from 2009 to 2021 (in billion U.S. dollars). Retrieved from https://www.statista.com/statistics/203428/total-enterprise-software-revenue-forecast/, 11 May 2021.

2.INTRODUCTION TO SOFTWARE PROTECTION INSRUMENTS

There are two main instruments for software protection: patents and copyrights, but they were not specifically designed for this purpose in the beginning. Each affords a different type of legal protection and are not mutually exclusive. Both of them may be obtained because creator of the code becomes the author (for purpose of copyright protection) and the inventor (for the purpose of patent protection) of the computer program.[5]

Copyright protection embraces original expression of the code, thus only "word to word" copying of the code is protected and the general essence or idea of the code is not protected. Therefore, software needs patent protection to cover idea itself which usually has core economical value.[6]

There is a stress between copywriting and patent protection for software in particular. Should the inventor or owner be awarded with monopoly rights or just a right to forbid copying? Would it be a good idea to establish a short-time monopoly right, as for example, five years, in comparison to 20 years grating available through patent. Such question have been asked for many years[7] and it can be said that we are very far from a definitive answer to this question.

For better understanding of differences between copyright and patent protection we need more detailed analysis of both in order to reveal advantages and disadvantages of those. This will be done by reviewing both legal instruments one by one and side by side.

2.1 Copyright Protection

Copyright was firstly introduced in the 15th century and it was mainly created to protect literary and artistic work, most of those were books and texts at that time. Invention of industrial printing initially created need of copyright laws. The purpose behind it was to protect original works of authors from being copied and distributed illegally.[8]

---

[5] Halt, G. B., Donch, J. C., Stiles, A. R., & Robert, F. (2014). Intellectual property in consumer electronics, software and technology startups. New York, NY: Springer, 91.
[6] *Ibid*., 91.
[7] Davidson, D. M. (1983). Protecting Computer Software: A Comprehensive Analysis. Jurimetrics Journal 23(4), 337-425, 361.
[8] Reed C., Angel J. (2003). Computer Law. 5th ed. Oxford/New York: Oxford University Press, 183-184.

There are two main requirements for object to be copyrightable and those are original expression and work should qualify as a literary or artistic work.[9] Generally, the copyright protects only original expression of particular idea, but not idea itself. Copyright law, in case of software, would protect the original source and object code, which will include certain unique elements created by user of computing language. In addition, software must be 'original' and it must be recorded in any tangible form, such as written down by hand or stored in digital storage, for example computers memory.[10]

Together with regulative function of copying, copyright protection gives to its owner the exclusive right of controlling publishing, performance, broadcasting and making of adaptations of their creation. In some cases, the author of a work may obtain certain 'moral rights', including author's non-financial interests, such as being identified with a creation and to claim about unfair treatment or misrepresentation of their works.[11]

In addition, copyright provides its owner a right to sale both original and copies of this work so author can reap a reward to cover a cost of creating the work. Another way is to assign or license copyrights, which gives a possibility to transfer exclusive rights to another party which can exploit it most profitably. In such case profits will be distributed under the terms of copyright transfer agreement.[12]

Copyright protection is applied automatically once original work is written and authorship can be proved. "Applying" for a copyright is not needed as well as to register the copyrighted work and generally the duration of a copyright is whole author's life and in addition 70 years after his death.[13]

2.2 Patent Protection

Patents emerged approximately at the same time as copyrights and have dramatically changed since they were first granted in 15th century. They are given to the authors as a document, for a technical invention and engineering solutions, to guarantee temporary monopoly over the sale and production

[9] Article 2 of the Berne Convention for the Protection of Literary and Artistic Works.
[10] Reed (2003), *supra nota 8*, 184.
[11] Bently, L., & Sherman, B. (2009). Intellectual property Law. 3rd ed. New York: Oxford University Press, 241.
[12] *Ibid*., 261-262.
[13] Halt (2014), *Supra nota* 5, 91-92.

of their inventions.[14]

A patent is also described as a twenty-year exclusive right to make, use and sell a qualifying invention in terms of monopoly. This exclusive right is considered to be a reward for inventors for their time and effort. Inventor, in return, should apply for patent about his invention in detail to the Patent office, which will publish the information about this technological knowledge to the public. [15]

Software patents are as well very powerful economic tool, because they can protect features that cannot be protected under other IP protection instruments. Patents provide core protection of the ideas of inventions such as systems, methods, processes and functions embodied in a software.[16]

The exact scope of a patentable subject matter is an important issue, because usually patents were granted for things which could be applicable industrially such as new mechanisms, chemical compounds, machines and processes which could provide useful result. Although, software is not such an industrially applicable thing solely by itself, with help of hardware software can be used in solving technical problems that has industrial meaning in most of technological fields.[17]

2.3 Copyright protection v Patent Protection

First of all, requirement of necessary registration for patent is the first thing which distinguishes copyright from patent protection. And this is understandable, because patent protection gives monopoly for its owner, so it should be examined better.[18]

The second difference between patent and copyright is a duration of granted rights: a copyright lasts whole author's life plus 70 years in the US[19] and EU[20]. Patent can protect invention to a maximum of 20 years after invertor fills the application.[21] [22]

[14] Bently, Sherman (2009), *supra nota* 11, 335.
[15] Ibid., 335
[16] Halt (2014), *supra nota* 5, 91-92.
[17] Reed (2003), *supra nota* 8, 137.
[18] Halt (2014), *supra nota* 5, 91-92.
[19] 17 U.S.C. § 302, Duration of copyright - Works.
[20] Art. 1 (1) of Directive 2011/77/EU.
[21] Art. 63 (1) of European Patent Convention.
[22] 35 U.S.C. § 154, Contents and term of patent; provisional rights.

In some regards copyright and patent complement each other: patents are protecting core, fundamental and features which are dealing with functioning of software, while a copyright protects only the original expression of how program is written and its actual data structure. But of course there are overlaps as well.[23]

The main challenge with copyright protection of software is that software is not like a literary work, but more like algorithm or mathematical formula. Software itself is made out of source code, which mean, once you have it on your computer and source code is accessed, it can be easily rewritten. The fact that copyright protects only original expression of an idea, makes this legal instrument noticeable weak against people who want to rewrite already existing computing program. [24]

According to Article 2(2) of the Berne Convention for the Protection of Literary and Artistic Works (Berne Convention), once software is written and afterwards recorded into the digital storage, copyright protection is automatically applicable in the US and EU and this is almost universally recognized worldwide[25], while applying for patent protection may be too complex, require a lot of paperwork, money and time spending.[26]

Even though, copyright is considerably weak legal instrument of software protection, person that is familiar with law and ownership can do everything that is possible to record and keep the source code safe as well as other works that will prove originality of an authorship. The need for patenting software is present because there is weakness of copyright protection. So, patent need to protect the elements of software that are not protected by copyright, such as algorithm components of software, which are mostly the core idea of the software.[27]

[23] Reed (2003), *supra nota* 8, 175.
[24] Guarda P. (2013). Looking for a feasible form of software protection: copyright or patent, is that the question? European Intellectual Property Review, 35(8), 445-454, 449.
[25] Berne Convention for Protection of Literary and Artistic Works. September 9, 1886.
[26] Guarda (2013), supra nota 24, 450.
[27] Ibid., 453.

3. LEGAL FRAMEWORK OF COPYRIGHT PROTECTION IN EU AND US

3.1 Legal framework of copyright protection in EU

In conformity with the European Commission's Green Paper of Copyright in 1989, the EU adopted a lot of measures in order to harmonise copyright laws within its states. From this, the adoption of the directve on legal protection of computer programs Council Directive of 14 May 1991 followed. Council Directive on the legal protection of computer programs had an aim to protect copyright of software, a literary works within the meaning the Berne Convention.[28]

The Directive on the legal protection of computer programs 91/250/EEC was the first European initiative for copyright law, which objected to harmonize Member States' legislation regarding the protection of software to adjust a legal framework which could provide a secure legal environment against unauthorized use of software. This document was drafted under the internal market provisions of the Treaty of Rome. [29] Present version of directive is Directive 2009/24/EC.

3.2 Legal framework of copyright protection in US

In US legal system, the foundation for statuary protection of computer programs can be found in US Constitution, which declares that Congress has a right to "promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries". Based on this, Congress has composed Copyright Act, which explains the scope and limits of the copyright protection. The copyright protection was essentially amended in 1976, but the Act did not include protection of software explicitly. [30] Nevertheless, the computer program was mentioned in Act's "moratorium" provision, section 117. In this provision it was declared that an owner of a program (a copyrighted work used together with an automatic device) is

[28] Bandey B. (1996). International copyright in Computer programm Technology. Birmingham: CLT Professional Publishing, 196-197.
[29] 91/250/EEC - The Directive on the legal protection of computer programs
[30] 17 U.S.C. §§ 101-810 (1976).

granted no greater or lesser rights under the Act than were already provided under the law."[31] The reason for this provision was to define the software until corresponding amendment could be provided and this formula was codified in the 1980 Amended to the act.[32]

[31] 17 U.S.C. § 117 (1976).
[32] DuCharme N., Kemp R., (1987). Copyright Protection for Computer Software in Great Britain and the United States: A Comparative Analysis. Santa Clara High Technology Law Journal, 3(2), 257-283, 261.

4. LEGAL FRAMEWORK OF PATENT PROTECTION IN EU AND US

4.1 Legal framework of patent protection in EU: European Patent Convention

The European Patent Convention (EPC) is a particular agreement which originates within the of Article 19 of the Convention for the Protection of Industrial Property and a regional patent treaty within the meaning of Article 45, paragraph 1, of the Patent Cooperation Treaty.[33]

The EPC presently does not have enforceable power for granting patents in all 38 countries, but the EU patent opens the possibility for those which have unitary effect and those are centrally enforceable in 26 out of 28 countries of the EU.[34]

The Convention's legal framework provides grant for European patents, having single, harmonized procedure to apply the European Patent Office (EPO).[35]

Opportunities that EPC gives to contracting countries cannot be overrated. This is one of the most important documents made so far in order to find harmonized way in EU for granting patents.

However, software or so-called computing programs and computer-implemented inventions are not regarded as inventions for the purpose of granting European Patents under the EPC[36], this exception only applies to the stage to which a European Patent relates to a computer program "as such".[37]

4.2 Legal framework of patent protection in US

[33] Preamble of the European Patent Convention
[34] Regulation (EU) No 1257/2012 of the European Parliament and of the Council implementing enhanced cooperation in the area of the creation of unitary patent protection
[35] Article 2(1) EPC
[36] Article 52(1) EPC
[37] Article 52(3) EPC

Technically first patent for software in United States was patent № 3,380,029, which was given to Martin A. Goetz in 1965.[38] However, full legal doctrine regarding patenting computer programs in the United States was formed only in 1980's as a result of a number of court cases which have developed specific criteria applicable to the patenting of computer programs. Until that time, we cannot speak about the patenting of computer programs as about adjusted legal procedure. [39] [40]

For the first time the problem of patenting computer programs was faced in 1972 (then wording computer program was not used) in case of Gottschalk v. Benson. At that time court recognized program as unsuitable for patenting due to the fact that the binary code, which was a form of expression of the program, according to the judges, was not a "process" within the meaning of the US Patent Act, but more likely a "mathematical calculation", "pure mathematics" and therefore not patentable. [41]

The legal basis for the refusal was paragraph 101 of Section 35, called Patents, which points out that "anyone who invents or open a new and useful process, machine, article or combination of substances ... may obtain a patent ...". Mentioned judgment set out judicial precedent to prohibit the patenting of computer program and this decision has been in force in the United States Until 1982, when the judgement in the case Diamond v. Diehr were established criteria for patenting software. In this case, the Court established criteria when patenting of computer programs is possible, namely, if it has proven of "concrete, useful and practical orientation" of its algorithm, or mathematical formula. With such a decision the court of United States had aim not only to allow the patenting of software for personal computers, but also not to breach already existing precedent to restrict patenting only mathematical algorithm as such.[42]Perhaps, it was made considering the pace of development of computer technology and the specific significance of the meaning of patent for the companies that conduct researches.

[38] United States Patent and Trademark Office, U.S. Patent No. 3,380,029.
[39] U.S. Supreme Court, 409 U.S. 63 (1972) Gottschalk v. Benson
[40] U.S. Supreme Court, 450 U.S. 175 (1981) Diamond v. Diehr
[41] U.S. Supreme Court, 409 U.S. 63 (1972) Gottschalk v. Benson
[42] U.S. Supreme Court, 450 U.S. 175 (1981) Diamond v. Diehr

5. COMPARISON OF E.U. AND U.S. LEGAL SYSTEMS: SOFTWARE PROTECTION

5.1 Understanding patentability of software under European Patent Convention

Probably, the most significant Article of EPC 52 (1), titled 'Patentable inventions' declares, that European patents shall be granted for any inventions, in all fields of technology, provided if they are: new, involve an inventive step and are susceptible of industrial application.[43]

Provided article states the core maxim of the general entitlement to patent protection for any kind of inventions in any technical field. If there is any limitation to the general entitlement, this is not a case of judicial judgment, but must have plain basis in the EPC.[44] This makes EPC an essential document for granting patents in the EU within contracting states and any kind of deviations must be consistent with jurisdiction laid down in EPC.

Paragraph 52 (2) states about exclusions regarding object that may not be protected under EPC and paragraph 52 (3) includes 'as such' clause. Both of those norms are dealing with requirements regarding patentable subject matter. [45] [46]

There is no clear explanation of what invention means, but article 52(2) provides a list of objects, that should not be regarded as inventions, such as: discoveries, scientific theories and mathematical methods; aesthetic creations; schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers; presentations of information.[47]

Although paragraph 3 states, that "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."[48]

[43] Article 52(1) EPC
[44] EPO board of Appeal T 154/04, OJ 2008, 46; see also G 2/12, OJ 2016, A28
[45] Article 52(2) EPC
[46] Article 52(3) EPC
[47] Article 52(2) EPC
[48] Article 52(3) EPC

The meaning of "as such" in paragraph 3, caused a lot of difficulties for applicants, attorneys, examiners, judges in dealing with such patents and the purpose behind those words and the exclusions are very far from clear.[49]

In order to obtain a patent one of the requirements is that only new or novel inventions can be granted patent protection. The invention is not considered to be new if it was known to the public before date of filling of the patent application, therefore this invention is also not patentable.[50]

Novelty also is defined in Article 54 of EPC the as "not form[ing] a part of the state of the art."[51], and "state of the art" is clearly defined in Article 54(2) of European Patent Convention:

"The state of the art shall be held to comprise everything made available to the public by means of a written or oral description, by use, or in any other way, before the date of filing of the European patent application."[52]

The Requirement of inventive step, also known as "non-obviousness", generally examines if the invention can be considered to be obvious from the point of view of an individual having common skill or knowledge in the art. Common skill does not mean expert in area should be involved.[53] The requirement of Inventive step is provided under the European Patent Convention Article 56.[54]

So called the "problem-and-solution approach" was established by EPO in order to evaluate if an invention includes an inventive step. It consists of three basic parts: Defining the closest prior art and main differences between the new invention and related closest prior art; Identifying the technical effect brought by the distinctions of new invention together with identifying the objective technical problem. Examination of matter if claimed is to be given technical issue should not be obvious for the skilled individual in the point of view to of the state of the art generally.[55]

---

[49] Pila, J. (2005). Article 52(2) of the Convention on the Grant of European Patents: What did the framers intend? A study of the Travaux Preparatoires. IIC-International Review of Intellectual Property and Competition Law, 36(7), 755–787, 785.
[50] Bainbridge, D. I. (2008), Intellectual Property, 7th ed. Pearson Longman: Essex, 400.
[51] Article 54(1) EPC
[52] Article 54(2) EPC
[53] Abraham, S. E. (2009). Software patents in the United States: A balanced approach. Computer Law & Security Review, 25(6), 554-562, 555.
[54] Article 56 EPC
[55] Beatty, J. (2011). The European patent office 'Raising the Bar' initiative. World Patent Information, 33(4), 355-359, 356.

The condition of industrial applicability is related to the concept that the invention should be possible to be used for practical aims, which means not being purely theoretic. Any individual should be capable to produce the product, if the invention is a product. If invention is a process, it should be possible to perform this process in practice as well.[56] The meaning of 'industrial' must be understood in its broadest sense[57], which means continuous, independent performance for financial benefit.[58] As well this term should be interpreted in its wide sense including any practical activity of "technical character".[59]

Decision of T870/04 held the fact that a product is made in practical way it does not mean, that requirements of article 57 of EPC are fulfilled, there should be also some profitable use for which product can be applied.[60]

5.1.1 Summary of the structure of the European Patent System

Patentable inventions are defined in the European Patent Convention. The Board of Appeal and Enlarged Board of Appeal duty is to interpret this. The definition of the rights that are given by European patents to decide for contracting states, subject to specific requirements of the European Patent Convention. Practically, the contracting states adopted provisions which corresponds to the definition of violation in the Community Patent Convention. The mechanism to create the monopoly right is the interaction between a patent specification with claims and the law of infringement of member states. Though, the contents of the specification and the form of the claims is described in the European Patent Convention. The implementing regulations and enforcement is to be regulated by the national courts using national procedures.[61]

[56] Sterckx, S., Cockbain, J. (2010). The patentability of computer programs in europe: An improved interpretation of articles 52(2) and (3) of the European Patent Convention. Journal of World Intellectual Property, 13(3), 366-402, 367.
[57] WIPO, Intellectual Property Handbook: Policy, Law and Use (2nd ed, WIPO Publication 2004), 19.
[58] EPO Board of Appeal T 0144/83 (Appetite suppressant) of 27.3.1986.
[59] Sterckx, S., Cockbain, J. (2010), *supra nota* 56, 368.
[60] EPO Board of Appeal T 0870/04 (BDP1 Phosphatase/MAX-PLANCK) of 11.5.2005.
[61] Ullrich, H. (2002). Patent Protection in Europe: Integrating Europe into the Community or the Community into Europe? European Law Journal, 8(4), 433-491, 436.

From this follows, that claim drafting for securing grant of a patent needs to be regarded to the requirements of the European Patent Convention. Claim drafting to create a corresponding monopoly has to be regarded to the law of infringement of the contracting state.

5.1.2 Is software patentable under European Patent Convention?

In 1998, the European Commission raised up the question whether there was a necessity to conform patent legislation specifically for 'computer programs and software related inventions'[62] many investigations were made to study the use of patenting software. Altogether, these studies did not have any remarkable outcome. It can be explained by the fact that the "software patents" conception has many uncertain delimitations, but as well these patents are very different.[63] In such fields as control engineering, computer aided design or computer aided manufacturing, operating system functions and programming aids to text processing and spellchecking software patens are granted often these days.[64]

5.1.3 Abstract definition of software: Software "as such" and "technical" software

The list of subject-matter "as such" is not considered an invention under European Patent Convention and "programs for computers" are included. Lawyers have been trying to resolve the enigma of how to draw a line to make a proper distinction between computer programs and "computer programs as such". [65]

The EPO Boards of appeal state the questionable conclusion that subject matter has to make a technical assistance in order to be protected by patent. From this follows, that software "as such" should be opposite of "technical" software. Although, EPC does not endorse this interpretation, because contracting states are aimed at an unspecified – limiting exegesis excluding software from patentability.[66]

---

[62] European Commission. (1997). Promoting Innovation Through Patents: Green Paper on the Community Patent and the Patent System in Europe. Commission of the European Communities, 17.
[63] Bakels, R., & Hugenholtz, P. B. (2002). The patentability of computer programs. Amsterdam: IViR, 20.
[64] Arezzo, E. G., & Ghidini, G. (Eds.). (2011). Biotechnology and Software Patent Law: A Comparative Review of New Developments. Cheltenham, UK: Edward Elgar Publishing Ltd, 134.
[65] Chiappetta, V. (1998). Patentability of computer software instruction as an article of manufacture: Software as such as the right stuff. John Marshall Journal of Computer and Information Law 17. 89-183, 154.
[66] Pila, J. (2010). The requirement for an invention in patent law. Oxford: Oxford University Press, 10.

The clause "in all fields of technology" was added to Art. 52(1) EPC later and this statement was literally copied from a provision in the TRIPS Agreement[67], which is focused on limitation of discrimination in any technological field. The explanatory text for the EPC affirms that the new formulation of art. 52(1) EPC now clearly states that inventions in the technical field are under patent protection.[68]

While there is no certain opinion on technology requirement, a different question arouses whether a technology requirement is inessential. Whether "technology" is "the only usefully restricting criteria with respect to various intellectual attainments of human being for which patent protection is neither provided nor appropriate"?[69]

Actually, this is German tradition to grant patents solely for those inventions which can solve a technical problem with technical means providing technical result.[70] Possibly the German *Reichsgerich* thought of the difference between the mind and matter made by Descrattes.[71] The idea that "programs for computers" is combined in Art. 52(2c) with "schemes, rules and methods for performing mental acts" shows that European Patent Convention is related to this principle as well.

The question whether "technology" is a proper test can only be reviewed after certain definition of "technology" in patent law. On the one hand, it is one of those conceptions which refers to: "I know it when I see it"[72], but in reality, it is not simple as that. As case law has shown the conception of "technology" in patent law does not obligatorily meet common parlance, but is rather used in a teleological manner, with the preconceived desire to allow or prohibit certain subject matter.[73] For the non-professional as well as for software engineers, all software is technical, so the EPO backs down from general parlance if it makes a difference between technical and non-technical software and its position is explained in T 1173/97[74] and T 0935/97–IBM[75] cases decisions of EPO Board of

[67] Art. 27(1) TRIPS
[68] Proposal for the revision of the EPC (MR/2/00) of Administrative Council of the European Patent Organization
[69] German Federal Supreme Court 22 June 1976, case X ZB 23/74, GRUR 1977, 99
[70] Dhenne, M. (2018). The Assessment of the Technicality of Computer-Implemented Inventions in Europe. European Intellectual Property Review 5, 295-300, 296.
[71] Descartes, R., & Cress, D. A. (1998). Discourse on method. Hackett Publishing.
[72] U.S. Supreme Court, 378 U.S. 22 (1964) Jacobellis v. Ohio
[73] Dhenne (2018) *supra nota* 70, 295.
[74] EPO Board of Appeal T 1173/97 (Computer program product/IBM) of 1.7.1998
[75] EPO Board of Appeal T 0935/97 (Computer program product II/IBM) of 4.2.1999

Appeal.

Another difficulty is the concept that that the legal technology conception cannot be 'static', so patent law has to develop further. The EPO interpreted this concept from German tradition also[76], but EPO, not like Germans, never risked to determine the technology term clearly. Rejected European Directive proposal followed the EPO way and applied a technology requirement without definition of "technology" too.[77]

Thus, it appears that neither the legislator nor the judiciary could resolve the problem with explanation or clearing up existing rules. As soon as „as such" is considered synonymous with „non-technical" the path is closed to innovative interpretation that might finish the years of uncertain boundaries of software patentability, because existing rules begin from essential misconceptions that interfere a satisfactory solution.[78]

5.2 Decisions of the Board of Appeal at the EPO

Decisions made by the Board of Appeal at the EPO has convincing character, because there is no obligation to follow them. However, within the courts of EPC signatory states, there is a trend to follow them as much as possible in EU. [79] This means that EPC still remain to be the main legislative document for its signatories, but as it has no clearness decisions of the Boards of Appeal at the EPO may come to the rescue.

The decisions of the Boards of Appeal at the EPO are respectfully treated and usually they are expected to be followed in the domestic courts. **[80]**

[76] Dhenne, M. (2020). Technical Character in European Patent Law. Social Science Research Network Journal, 2-47, 9.
[77] European Commission. (2002). Proposal for a Directive of the European Parliament and of the Council on the Patentability of Computer-implemented Inventions. Office for Official Publications of the European Communities. procedure number 2002/0047
[78] Guarda (2013), *supra nota* 24, 449.
[79] Abid, J. G. (2004). Software patents on both sides of the Atlantic. John Marshall Journal of Computer and Information Law 23, 815-845, 832.
[80] *Ibid*, 832.

Over time, there was a considerable change in how the Boards of Appeal at the EPO settle applications for patenting software inventions. VICOM/Computer-related invention[81] was regarded as the leading case at the EPO on software inventions. This case deems to be proper one by the Court of Appeal and was followed in a number of cases. Such approach led Court of appeal to some difficulties, as they must, except in some bounded and exclusive conditions, follow its previous decisions. [82]

5.2.1 Case law development on software patents at the EPO

VICOM/Computer-related invention was a watershed decision which strongly influenced case law in EPC signatory states. Boards of Appeal calmly and almost unnoticeably moved away from Vicom case, which previously was regarded as authority in number of cases before the Boards of Appeal at the EPO. This was made in a line of decisions where Vicom case was not even mentioned.[83]

The main claim in the Vicom case was for 'a method of digitally processing images in the form of a two-dimensional array by an operator matrix 'characterized in that the method includes repeated cycles of sequentially scanning the entire data array with a small generating kernel operator matrix… according to conventional error minimization techniques. And second claim was to an apparat to carry out the method described in the first claim. It was feasible to perform the method and apparat using a properly programmed computer, but EPO's examination division rejected the application basically because it was referred to a mathematical method or computer program as such. [84]

Court of Appeal held that mathematical method as such is an abstract conception and does not produce any technical result. From another side mathematical method may be used in the technical processes which is carried on a physical object by technical way, it cannot be considered as mathematical method as such, it is a technical method.[85]

From this follows that if claim is regarded to technical process that is implemented with a help of a computer program, then the claim cannot be referred only to a computer program as such. It will be

[81] EPO Board of appeal T 0208/84 (Computer-related invention) of 15.7.1986
[82] Bainbridge, D. (2007). Court of Appeal parts company with the EPO on software patents. Computer Law & Security Review, 23(2), 199-204, 200.
[83] *Ibid*, 201.
[84] EPO Board of Appeal T 0208/84 (Computer-related invention) of 15.7.1986
[85] Bainbridge, D. I. (1997). Software copyright law (3rd ed), London, UK: Butterworths, 14-15.

the application of the program for identifying algorithm of steps in the process and it is the process for which protection was claimed. In this case, the subject matter of the creation was the practical use of a computer program, the real technical effect which resulted from the functioning of the programmed computer but not computing program itself.[86]

The move away from Vicom at the EPO together with change in the application of Art 52(2) and (3) for software inventions was not a surprising change. It was more likely a gradual change in range of different decisions without direct disapproval of Vicom by the Boards of Appeal at the EPO.
First case to mention is PBS Partnership/ Controlling pensions' benefits system.[87] In this case there was a claim to a device to produce a non-technical performance (identifying pension benefits) was found to be not excluded under Article 52(2) on the basis that the device was a tangible object and thereby had a technical nature. Nevertheless, the Board considered the issue of lack of inventive step. Court held, that the step from the prior art to the invention, included creation in a non-technical field of practice, such as calculation of pension benefits. [88]

It is European patent law position, that inventive step must lie in a technical field. This approach to technical content has been tried to be implemented with the draft of EU Directive on the Patentability of Computer-Related Inventions.[89]

The second case is HITACHI/Auction method[90], where supposed invention was a method of managing online auctions. The Board of Appeal has refused the application for a patent, because it did not involve an inventive step. However, the Board of Appeal stated that a method using technical ways, as well as the apparatus itself, was an invention, the subject-matter of the application was the circumvention of a technical issue more than a solution of the problem by technical means. [91] The Board also stated that the question if an invention has a technical character can be supposed from the

[86] Bainbridge, (2007), *supra nota* 82, 201.
[87] EPO board of appeal T 0931/95 (Controlling pension benefits system) of 8.9.2000
[88] Bainbridge, (2007), *supra nota* 82, 200.
[89] Ballardini, R. M. (2008). Software patents in Europe: the technical requirement dilemma. Journal of Intellectual Property Law & Practice, 3(9), 563-575, 565.
[90] EPO board of appeal T 0258/03 (Auction method/HITACHI) of 21.4.2004
[91] EPO board of appeal T 0258/03 (Auction method/HITACHI) of 21.4.2004

physical characteristics of an apparatus, the nature of an activity or to be referred on a non-technical activity by use of technical means. [92]

Most likely the most significant of lined above cases aspect is the fact that if technical contribution goes within one or other object which are excluded from the meaning of invention as such, applying for patentability is not excluded. However, this is conflicting with actual case law at the Court of Appeal, as it was seen later. In Duns Licensing Associates/Estimating sales activity case, where the use of mathematical and statistical methods to evaluate data about sales activity was a method of business research as such was presented. It cannot be said that business method performed by computing machine can be patentable, but there is still a requirement for a technical problem to be solved by a technical means. **[93]**

5.3 Understanding patentability of software in US

5.3.1 Case Law Trilogy

In the United States patent emerged on the basis of case laws that broadened the understanding of invention including computer programs. United States software patent was shaped within patentability trilogy, series of case law, which set a model of software patent applicability.[94]

First case to mention in this trilogy is Gottschalk v. Benson, where the Supreme Court stated that "abstract intellectual concepts" are not patentable if they are usual tools of scientific and technological work. In despite of denying granting patent of this algorithmic program, the Court pointed that decision did not restrict software patentability, but rather restricted patentability of computer programs, which essential element is usual algorithm. [95]

In second case, Parker v. Flook, the Supreme Court lined out that invention which is resulted from

[92] EPO board of appeal T 0854/90 (Card Reader) of 19.3.1992
[93] EPO Board of Appeal T 0154/04 (Estimating sales activity/DUNS LICENSING ASSOCIATES) of 15.11.2006
[94] Keating, W. J. (1967). The Supreme Court Intreprets the Patent Statute: A Trilogy of Cases and Their Effect Today. Dickinson Law Review 72, 244-270, 244.
[95] U.S. Supreme Court Gottschalk v. Benson, 409 U.S. 63 (1972)

'prior art' only for using mathematical algorithm is patent-eligible if performance is novel and non-obvious.[96]

And the final case, Diamond v. Diehr[97] Supreme Court ruled that an invention of physical process performed by a software can be patented.

Based on those decisions of Supreme Court, the patentability of software was formed in the United States and because of this fact it had a historical advantage over EU in technological economic development. United States was the very first country to grant software patents.

5.3.2 Conflicting Case Laws

Despite historical advantages that United States had in ability to patent software, in 2008, the Supreme Court ruled decision that almost nullified the software patentability with a narrow precedent – In re Bilski case.[98]

In 1997, the Bilski filed patent application on the methods of risk insurance in the energy trade. The US Patent Office refused to grant a patent for an invention of Bilski ruling that these methods of doing business are not connected to a specific machine or and do not include the transformation of material objects, and are only abstract ideas, not giving a useful, concrete and tangible result.

Bilski appealed on the decision of the Patent Office to the Court of Appeals of the Federal District of the United States, which confirmed the decision of the Patent Office, but based on more narrow interpretation of patentability standards. In this case was used the so called 'machine-or-transformation' test. Then Bilski appealed the Court of Appeal's decision to the US Supreme Court, which unexpectedly accepted his petition.

Finally, Supreme Court ruled rejection of the machine-or-transformation test as the sole test of process patent eligibility based on an interpretation of the language of 35 U.S.C. Article 101[99]

[96] U.S. Supreme Court Parker v. Flook, 437 U.S. 584 (1978)
[97] U.S. Supreme Court Diamond v. Diehr, 450 U.S. 175 (1981)
[98] In re Bernard L. Bilski and Rand A. Warsaw, [2007] US Ct. of Appeals for the Federal Circuit
[99] U.S. Supreme Court Bilski v. Kappos, 561 U.S. 593, 601 (2010)

The Supreme Court nullified previous patentability test and introduced a new test, which stated, that process can be patentable if '(1) it is related to a particular machine or apparatus, or (2) it transforms a specific object into a different state or object'.[100]

The Court did not mention whether a "machine apparatus" could be interpreted as a usual computer, in such case making most of the software not patentable and conflicting with previous case laws.

5.3.3 Post-Alice USA patentability era

In Alice Corp. v. CLS Bank Int, Alice Corporation, the defendant, was granted patent for its software related inventions concerning computer system which could close financial transactions by avoiding a settlement risk. Those patent claims, which were granted by United States Patents and Trademarks Office (USPTO) included, first of all, a method for exchanging financial obligations, secondly computer system, and finally computer-readable medium (CRM) which contained source code for performance of mentioned method of obligation exchange. [101]

CLS Bank declared judgment action incorrect, seeking non-infringement, invalidity and unenforceability of the patents. The district court decided, that patents obtained by Alice Corporation are invalid.[102]

Then defendant appealed in the Federal Circuit which canceled the district court decision and found that the patent claims were not related to an abstract idea, therefore were patentable subject matter. [103]

Therefore, CLS Bank appealed for en banc hearing, form which resulted that Federal Circuit reversed its decision and ruled that patents obtained by Alice corporation were really ineligible for patentability subject matter.[104]

This decision of Supreme Court in Alice Corp. v. CLS Bank Int has made a significant impact on the patent eligibility of computer-implemented inventions under 35 USC article 101. In this case, the Court ruled that patent claims related to mitigating settlement risk in financial transactions a software

[100] U.S. Supreme Court Gottschalk v. Benson, 409 U.S. 63 (1972)
[101] U.S. Supreme Court Alice Corp. v. CLS Bank International, 573 U.S. 134 (2014)
[102] 768 F.Supp.2d 221, 252 (D.D.C. 2011)
[103] 717 F.3d 1269 (Fed. Cir. 2013)
[104] *Ibid.*

was unsuitable to obtain patent protection.[105] Resulting from this decision, Court has introduced new patentability test consisting of two parts:

1. Are the claims directed to a patent ineligible concept (e.g., abstract idea); and

2. If so, do the claims amount to significantly more than the patent ineligible concept itself?[106]

After decision, the United States Patent and Trademark Office (USPTO) released several guidelines to help Examiners in their examination of patent applications under Alice. Last update was published on May 6th, 2016.[107]

The May 2016 subject matter eligibility release is providing information to the examining corps on best practices for formulating a subject matter eligibility rejection and evaluating the applicant's response. This memorandum includes instructions how examiners should formulate a subject matter eligibility rejection under Article 101 of 35 USC and how examiners should evaluate an applicant response to such rejection.[108]

Companies which are specifically related to software writing and employ people for such work are doing well and their application patents are treated as before, but Alice's case has made the business model of patent trolls more complicated, specifically it provided a useful tool for early elimination of abstract software patents. [109]

5.4 Conflicting common approaches to patentability

As functional elements of an invention were extended and in addition to the fact that software contains both literal and functional elements, protecting of software under patent law may be regarded as adequate protection of software as well. Though concerning patentability of software article 27 of TRIPS Agreement lacks clearness, and there is still no clear answer whether software is patentable

[105] U.S. Supreme Court Alice Corp. v. CLS Bank International, 573 U.S. 134 (2014), 2352–53
[106] *Ibid*, 2355
[107] Sadr, R., & Zolotova, E. J. (2017). Fractality of Patentability under the New Subject Matter Eligibility Scheme. Northeastern University Law Journal 9, 425-453, 434
[108] Ibid.,427.
[109] Ibid., 451.

subject matter or not. It states, that patents shall be granted: "… for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application."[110]

This unclear definition raises lot of confusing assumptions, because it does not namely include or exclude software from the scope of patentability. Nevertheless, it is broadly common that if it does not prevent software form patentability, and given extensive definition of patentable subject-matter[111], TRIPS also stand as international document providing protection for computer programs under patent law.[112]

However, the fact that TRIPS agreement does not namely include software as patentable subject matter, leaves the decision whether to include patentability of computer under responsibility of individual signatories and in such circumstances the achievement of unified legal standards of patentability of computer programs is almost impossible, as many countries disagree with possible software patentability. [113]

As result, discretion given by TRIPS agreement to its signatories gives them the right to decide on patentability of software themselves in accordance with they own economic, legal and political concerns. In addition, this discretion generated a number of conflicting legal provisions, which govern patents of software, thus obstructing cross-border trade, as well as innovation and fair rights balancing.[114]

5.5 Comparing US and E.U. Regulatory regimes regarding patentability of computer-related inventions

[110] Fusco, S. (2016). TRIPS Non-Discrimination Principle: Are Alice and Bilski Really the End of NPEs. Texas Intellectual Property Law Journal 24, 131-161, 134.
[111] Kaya, T. (2007). A comparative analysis of the patentability of computer software under the TRIPs agreement: The US, The EU, and Turkey. *Ankara Law Review*. 4(1) 43-81, 58.
[112] Toeniskoetter, S. B. (2005). Protection of software intellectual property in Europe: an alternative sui generis approach. Intellectual Property Law Bulletin., 10, 65-83, 67
[113] Kaya (2007), *supra nota 111*, 46.
[114] *Ibid*., 46.

Regulatory regime is one of the key elements of legislation, because it is the way of how legislation is enforced. Both U.S. and EU positions differs from each other, because of its attitude towards IP right protection, different historical and cultural development.

5.5.1 US approach

The US has shown the most liberal approach to software among all leading countries. Objection to deliver patents lays down even in Constitution, which obliges Congress to: "… promote the Progress of Science and Arts, by securing for limited times to authors and inventors the exclusive rights to their writing and discoveries."[115] In addition, there are no exceptions mentioned to subject matter to be patentable, but Alice settled key exclusions for patents: laws of nature, natural phenomena and abstract ideas.[116]

Article 101 Title 35 of US Code provides relevant categorization of inventions as patentable subject matter, namely:

"Whoever discovers any new and useful process, machine or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title."[117]

There is also novelty, and non-obviousness requirements which are stated in Article 102 and 103 as follows. The invention is granted for a 20-year limited period of time after filling the application.[118] Text of Article 101 does not provide directly possibility of patenting software but because of its very wide terms it would gave possibility of raising case laws which favored patentability of computer programs.[119]

As example, Article 101 was interpreted in the Diamond v Chakraborty case, stating "anything under the sun that is made by man". [120] In this case Supreme Court Had to examine, whether an apparat that utilized computer software for molding rubber into precise products was patentable subject matter, and recognized it as eligible for patentability this was perhaps first case inspiring movement of

[115] US Constitution art.1 s.8.
[116] Hattenbach, B. W., & Kautz, R. M. (2018). Concrete Thoughts About Abstract Ideas: Why a Nebulous Exception to Patentability Should Not Swallow Computer Software. Santa Clara Law Review, 58, 261-295, 263.
[117] 35 U.S. Code § 101 - Inventions patentable.
[118] 35 U.S. Code § 154 - Contents and term of patent; provisional rights.
[119] 35 U.S. Code § 101 - Inventions patentable.
[120] U.S. Supreme Court Diamond v. Diehr, 447 U.S. 303 (1980)

software patentability .[121] Latter case State Street Bank & Trust Co v Signature Financial Group Inc, court ruled that only invention that produces "a useful, concrete and tangible result" can be patented[122].

State Street Bank & Trust Co v Signature Financial Group Inc was regarding data processing system for managing and recording information and data flows, using computer program. The court had a statement:

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

This crucial patentability test was applied in the AT&T v Excel Communications case, which was related to a software-implemented method of long-distance call recording. From this case follows that court has recognized that invention is covered by 101 of USC 35, regardless if is it related to machine or a process [123]

5.5.2 EU approach

In comparison with US, the EU position regarding patentability of software is more restricted and narrower, at least theoretically. Primary legislation for Patent protection provided in European Patent Convention is in some extend very similar to what is provided by Article 101 of USC 35. Article 52 (1)[124] namely claims, that "European patents shall be granted for any inventions which are susceptible of industrial application, which are new and which involve an inventive step". Same requirements for novelty, inventive step and industrial applicability requirements lays down in Articles 54, 56, and 57 of the EPC respectively.[125]

Under Article 52(2) of the European Patent Convention, which states about non-inventions,[126] as well as under national legislation most of the signatories, by setting out the types of inventions for which

[121] Naser, M. A. (2008). Computer software: copyrights v. patents. Loyola Law and Technology Annual 8, 37-44, 39.
[122] State Street Bank & Trust Co. v. Signature Financial Group, 149 F.3d 1368 (Fed. Cir. 1998).
[123] At&T Corp. v. Excel Communications, Inc., 172 F.3d 1352 (Fed. Cir. 1999).
[124] Article 52(1) EPC
[125] Articles 54, 56,57 EPC
[126] 52(2) and (3) EPC

patent protection cannot be granted, those provide nugatory determination of patentable subject-matter. Namely, Article 52(2), specifically rules out software as inventions for granting European patents, while on the other hand American legislation does not precisely exclude software from equal treatment.[127]

Despite this nugatory aspect excluding software as inventions, article 52(3) of European Patent Convention essentially limits that strict exclusion of software from being patented. This setting, mostly known because of its "as such" exclusion, actually confuses patentable subject-matter under the EPC but at the same time leaving doors open for software patentability if those produce further technical effect.[128]

Future for patent assertation processes in EU is going to be change a lot soon with introduction of such up-coming legal elements as unitary patent (UP) and unified patent court (UPC). [129] Together with that, current days, there is a lot of talks regarding Patent Assertation Entities (PAE) establishments in EU. In general, PAE, are companies, which main goal is to enforce patents but they do not utilize them. [130] Referred as non-practicing enterprises aiming to monetize patents, their business models are mostly based on buying patents and using them against practitioners.[131] PAE use patents as a tool to receiving awards for a low-value settlement against license infringers, but on another hand, they help inventors to receive financial benefits for their innovative patents.[132] It is believed, that originating from US, PAEs bear the responsibility for increased numbers of patent court litigations, but on another hand, they have potency to increase market liquidity and improve situation of investing in research and development.[133]

[127] Bainbridge (2007), supra nota 82, 200.
[128] Kaya (2007), supra nota 111, 47.
[129] Alberti, J. (2017). New developments in the EU system of judicial protection: the creation of the Unified Patent Court and its future relations with the CJEU. Maastricht Journal of European and Comparative Law, 24(1), 6-24, 7.
[130] Thumm, N. (2018). The good, the bad and the ugly–the future of patent assertion entities in Europe. Technology Analysis & Strategic Management, 30(9), 1046-1056, 1049.
[131] Schwartz, D. L., & Kesan, J. P. (2014). Analyzing the role of non-practicing entities in the patent system. Cornell Law Review 99 (2): 425–456, 427.
[132] Gabison, G. A. (2016). Spotting software innovation in patent assertion entity world. Hastings Science and Technology Law Journal, 8(1), 97-136, 118.
[133] Lemus, J., and E. Temnyalov. (2017). Patent Privateering, Litigation, and R&D Incentives. The RAND Journal of Economics 48 (4): 1004–1026, 1007.

5.5 General copyright protection

Obtaining and maintaining copyright for software is extremely easy comparing to patent and is given for almost unlimited time frame. As well Computer-related inventions has been commonly identified all over the world qualifying as literary works which gave it the most beneficial form of IP protection[134], where patentability has not to be proved[135].

TRIPS agreement of 1994 recognized internationally software as clearly demanding copyright protection. Article 10 of this agreement, promotes extension of protection of copyright to software, declaring that "Computer programs, whether in source or object code, shall be protected as literary works under the Berne Convention (1971)". As most countries of the world, involving all EU Member States and US, are signatories to TRIPS agreement, software is both internationally and domestically granted with copyright protection automatically with no need for application. [136]

5.5.1 Definition of computer programs

First thing to mention is that Directive on the legal protection of computer programs of EU does not provide definition of software itself. Initially drafters assumed that definition would be outdated soon, because of fast technological changes. But the main reason of this decision was that any definition would by itself be limiting. Despite the absence of a definition in the Directive itself, the Directive Proposal stated, that 'given the present state of the art, the word "program" should be taken to encompass the expression in any form, language, notation or code, of a set of instructions the purpose of which is to cause a computer to execute a particular task or function.'[137]

Also, the recitals to the Directive state that the definition "computer program" shall include programs in any form, including those which are incorporated into hardware, such as firmware. It also includes design work of creation preparation if this later can lead into creating computer program.[138]

[134] U.S. Supreme Court Atlantic Works v Brady, 107 U.S. 192 (1883)
[135] U.S. Supreme Court Parker v Flook, 437 U. S. 584, 593 (1978)
[136] TRIPS: Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh
[137] Derclaye E. (2000). Software copyright protection: can Europe learn from American case law? Part 1. European Intellectual Property Review, 22(1), 1-47, 5.
[138] *Ibid*., 5.

In contrast, the definition in the US, lies in section 101 of the 1976 Copyright Act, which states, that "computer program" is a set of statements or instructions to be used directly or indirectly in a computer.

Thus, the main first difference between EU and US law is that EU does not provide explicit definition of "program" and definition is not binding.

In addition, the Proposal to directive provides legal basis for protection only of "instructions", while section 101 touches "statements" (referred to source code) and "instructions" (referred to object code). But, definition in Europe says "instructions expressed in any code"; this means that object and source codes are involved. Therefore, both formulations talk about the same concept, so there is no difference between European and US law.[139]

Furthermore, additionally to "statements" and "instructions" in US there are adverbs referred to them "directly or indirectly", where "directly" is related to "instructions" and "indirectly" to statements and so court has stated in Apple v. Franklin "indirectly" is related to source code.[140] Those adverbs explain the interaction between language and machine. Source code is one which software developer uses to instruct the computer, but source code cannot be red by computer, therefore it needs to be translated to language which could be readable by machine – object code. But TRIPS agreement states the same, that both source code and object code are protected, so definition should not raise problems in the future.[141]

In EU "the expression of a set of instructions…" is mentioned in Directive's proposal, whereas section 101 of the Copyright Act notes "instructions" solely. But such is formulation is not making big difference between both legislators, as both laws have adopted idea/expression principle, so in US law, "instructions" must mean "expression of instructions" because ideas are not protected US copyright law. To conclude both legislators have different formulations, though the term "instructions" can be understood as expression of an idea.[142]

[139] *Ibid.*, 6.
[140] Apple Computer, Inc. v. Franklin Computer Corp., 714 F.2d 1240 (3d Cir. 1983).
[141] Derclaye (2000), *supra* nota 136, p 6.
[142] *Ibid.*, 6.

To conclude, in both US and EU the definition of software is formulated differently, but has the same legal meaning, which is pretty broad. This may cause several issues on legal basis, such as lack uniformity between court's interpretations in different member states and difficulties to reach uniformity between EU and US programs. Recital 14 speaks what is not protected in relation to software: i.e. logic, algorithms and programming languages, when in they may be assumed as included in the general exclusion of section 102 (b).[143]

5.5.2 Protectable elements of software

There are two types of program elements to be distinguished: literal and non-literal. Literal elements are consisting of source and object code, while non-literal part refers to software's structure of software. EU Directive is very explicit about protecting elements. The first article of Directive states that computer programs, should be protected by copyright, as literary works within the meaning of the Berne Convention. For the purposes of this Directive, the term 'computer programs` shall include their preparatory design material, so flow charts and all elements designed to a software falls in the scope of protection and Recital 10 implicitly covers UIs, sub-software, routines. [144]

The US Copyright act does not have any statements about protectable elements of software. So, courts have to rely on section 102 (b) only, which states about not protected elements, using deduction method. In comparison the Directive seems to be more complete than US copyright act regarding copyrightable elements, but US laws have more complete exclusions list, which excludes every kind of "idea or process". But Member States legislation may be interpreted broadly and cover all the exceptions stated in the Copyright Act. [145]

There were questions raised in CJEU whether such thing as programming language is copyrightable in SAS Institute Inc. v. World Programming Ltd and court held that even programming language and the format of data files in order to use certain functions as such, in this case create interface of

[143] *Ibid*.,14.
[144] Derclaye (2000), *Ibid*.,7.
[145] Derclaye (2000), *Ibid*.,9.

computer program, is not copyrightable by law, language can protect, if its authors own intellectual creation. [146]

5.5.3 Copyright ownership dilemma

As it was mentioned before, copyrights belong to its author once it's finished and fixed into a tangible from such as paper or hard drive, but thing gets more difficult if creator is coding software while being employed in another company. So called work-made-for hire-type provision applies when user is creating software while executing duties or following instructions given by their employer and such work should belong to creator's employer.[147]

5.6 Scarcity of International Harmonization

Necessity of more unified and internationally accepted legal harmonization of IP rights were established with introduction of such documents as Berne or Paris conventions, and most recently by the Agreement on Trade-Related Aspects of Intellectual Property Rights, Including Trade in Counterfeit Goods[148], so called TRIPS agreement. Those indicatives show how weakly harmonized is IP rights overall and how we can improve the situation in harmonization of those rights.

The main reason of importance is territorial nature of IP law and everyday increasing cross-border trade environment are environment, which are conflicting. Countries should agree in point of view of creation of more harmonized international jurisdiction and legal framework for computer-related developments. Because of non-geographical nature of online inventions, such as software, internationally harmonized legal system of IP protection is vital. In this respect even European

[146] C-406/10, SAS Institute Inc. v. World Programming Ltd, (May 2, 2012).
[147] Trimble, M. (2020). Quarter century of international copyright on software. Texas International Law Journal, 55(3), 349-372, 358.
[148] EPO Boards of Appeal, T424/03, Clipboard formats I/MICROSOFT of 23 February 2006

Parliament has stated, that harmonized, clear and effective legal protection of software is core key to maintain and promote investment in this area.[149]

[149] 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 */

CONCLUSION

Based on the findings made during research it was found that there are two main legal instruments for the protection of computer programs: copyrighting and patenting software. First tool, copyright is aimed to protect original expression of software, as creative work. Therefore, copyright protects only the way software is made, but not software itself. Consequently, computer-educated people, who can get to the algorithm or the source code, on which the whole principle of the program is based, to give certain tasks to the computer, can slightly change code or algorithm and use it as their work. For this reason, copyright can be considered as relatively weak legal tool that protects only exact codes of creator but not essential functionally of software. Even so, copyrights are given to author once creation is recorded in any form such as handwritten or on computer's drive and are almost universally recognized worldwide.

On another hand, there is alternative tool - patent, which alike copyright, was not specifically designed to protect software, but was amended by legislators to fulfil this function. Patents were designed to protect inventions in any field of technology by giving its author property rights over creation for specific period of time. Necessity of patent registration makes its protection harder to acquire, but given monopoly rights to its author compensates time and finances spent during application process.

In this study, it was difficult to compare these two IPRs as competitors in order to identify a more preferred way to protect the program, since they are both unique and substantially complement each other. Patents are protecting fundamental idea that lies under software and features that are made for software to function, while copyrights protect actual structure and original expression of computing program. Because of the fact that software consists of pure mathematics, it's hard to specify for simple inhabitant if software can be classified as creative work or invention. To look into this matter more precisely, analysis of the main documents that determine the legal status of programs in EU and US jurisdictions was conducted.

Patentability of invention is being defined in EU within EPC and patents can be granted in any field of technology, if it meets requirements of novelty, involve an inventive step and are susceptible of industrial application. Nevertheless, it does not classify software as invention if it is claimed as such. It was found through T 208/84 "VICOM" case that subject-matter can be patented regardless the fact,

if technical process is conducted by hardware or software, because technological and economic factors can influence choice whether process is performed using special circuits or software. It was held that subject cannot be excluded from patentability only because software is engaged in invention.

In addition, approach that was followed by the EPO shows that software can be patented if it includes at least one feature that can be regarded as having a technical character under Article 52 of the EPC. Meaning of what is 'technical' is not explained within the EPC, but case law in EPO Boards of Appeal presented more clarity in this matter. Namely, if software running on computing machine produces technical result that goes beyond computer's normal behavior, patentability of such claim will not be excluded and T 1173/97 IBM and T 935/97 IBM cases confirmed this practice.

In the US, patentability is determined within US code and their legislators have historical advantage over giving first patents for software. It was notable during this research, that legal practices held in US regarding patent protection differs notably in regards of eligibility range and how rulings are made. Section 101 of Title 35 of the US Code defines 'eligible subject matter' as "any new and useful, process, machine, manufacture, or composition of matter, or any new and useful improvement thereof" which has much broader scope as compared to EPC. Case trilogy of US courts has defined quite clear limits for software patentability. First of all, Gottschalk v. Benson case determined, that algorithms by themselves are abstract concepts and therefore unpatentable. In following case Parker v. Flook, court ruled that even if phenomena of nature or mathematical formula might be well known, it does not exclude subject from patentability if it is inventive application. And in final Diamond v. Diehr case it was decided by court that software may be patented if algorithms used in program can produce a tangible and transformative result. Those cases were used as main guidance until Supreme Court in Alice vs. CLS Bank issued what might be the most consequential decision after Diamond v. Diehr case, that taking activity that people have been performing for years, in this matter keeping funds in escrow before transfer is finished, and then "doing it through a computer" does not make action invention new and eligible for patentability. Later courts used Alice v. CLS Bank ruling to invalidate a relatively large amount upcoming patent. These often were patent applications for highest value products and services including Cloud Computing and Big Data and other new technologies, which posed a challenge for many innovative cooperation's departments.

Similarities that EU and US patenting systems possesses are requirement of inventions to be novel, which means that such subject-matter was not known before as well as it should include inventive step, meaning that creation should not be obvious for skilled person in that field of technology. There is a difference that software "as such" is completely excluded from patentability under EPC, while US legislators leave more space for interpretations by not defining it US code 'Patens' section, and leaving right to determine it primarily for US courts. Nevertheless, case law practices of both legislations have shown, that device, tied to a machine is required in order invention to be patentable. Therefore, software by itself is excluded from patentability in both legislations.

During this research it was found, that as compared to patent protection, copyrightability of software is more internationally recognized and this can be confirmed with existence of numerous international agreements such as Berne Convention, TRIPS agreement as well as WIPO copyright treaty, which main aims are to harmonize copyright treatment practices worldwide.

Particularly, in EU legislators implemented a lot of measures in order to unify copyright treatment within its member states and Directive on the legal protection of computer programs, most recent version of which is Directive 2009/24EC is the most significant document in this area.

On another hand, in US, Copyright law is governed by federal statute, more precisely by the Copyright Act of 1976. It was discovered, that computer programs are treated as literary works under definition described in the 17 U.S.C. § 101 and therefore copyrightable. Unlike US, EU does not provide concrete definition of "software" in Directive. Nevertheless, during research it was found, that even definition of software lays differently, it has pretty similar board meaning in both sides. Scope of copyrightable elements was determined as more complete in EU Directive as compared to US Copyright Act, but US laws had more complete exclusions list. After research, no significant differences were identified between both legislations, despite few small details, which cannot be treated as important arguments for identifying which of jurisdictions is more favorable for software copyrightability. Consequently, it may be concluded that establishment of EU Directive in some sense had aim to harmonize members states laws in accordance with position of US legislation regarding IPRs for software.

Current EU's direction towards establishment of UP and UPC can be game-changing players in perspective of future patent activities, making EU more attractive for investors. In addition, recent

activity of PAEs in EU, originating from US shows, that intellectual property climate becomes more even and harmonized on both sides of Atlantic Ocean.

LIST OF REFERENCES

Scientific books:

1. Arezzo, E. G., & Ghidini, G. (Eds.). (2011). Biotechnology and Software Patent Law: A Comparative Review of New Developments. Cheltenham, UK: Edward Elgar Publishing Ltd.
2. Bainbridge, D. I. (1997). Software copyright law (3rd ed), London, UK: Butterworths
3. Bainbridge, D. I. (2008), Intellectual Property, 7th ed. Pearson Longman: Essex.
4. Bakels, R., & Hugenholtz, P. B. (2002). The patentability of computer programs. Amsterdam: IViR.
5. Bandey B. (1996). International copyright in Computer program Technology. Birmingham: CLT Professional Publishing.
6. Bently, L., & Sherman, B. (2009). Intellectual property Law. 3rd ed. New York: Oxford University Press.
7. Descartes, R., & Cress, D. A. (1998). Discourse on method. Hackett Publishing.
8. Halt, G. B., Donch, J. C., Stiles, A. R., & Robert, F. (2014). Intellectual property in consumer electronics, software and technology startups. New York, NY: Springer.
9. Pila, J. (2010). The requirement for an invention in patent law. Oxford: Oxford University Press.
10. Reed C., Angel J. (2003). Computer Law. 5th ed. Oxford/New York: Oxford University Press.

Scientific articles:

1. Abid, J. G. (2004). Software patents on both sides of the Atlantic. John Marshall Journal of Computer and Information Law 23, 815-845.
2. Abraham, S. E. (2009). Software patents in the United States: A balanced approach. Computer Law & Security Review, 25(6), 554-562, 555.
3. Alberti, J. (2017). New developments in the EU system of judicial protection: the creation of the Unified Patent Court and its future relations with the CJEU. Maastricht Journal of European and Comparative Law, 24(1), 6-24.
4. Ballardini, R. M. (2008). Software patents in Europe: the technical requirement dilemma. Journal of Intellectual Property Law & Practice, 3(9), 563-575.
5. Beatty, J. (2011). The European patent office 'Raising the Bar' initiative. World Patent Information, 33(4), 355-359, 356.
6. Chiappetta, V. (1998). Patentability of computer software instruction as an article of manufacture: Software as such as the right stuff. John Marshall Journal of Computer and Information Law 17. 89-183.
7. Davidson, D. M. (1983). Protecting Computer Software: A Comprehensive Analysis. Jurimetrics Journal 23(4), 337-425.

8. Dhenne, M. (2018). The Assessment of the Technicality of Computer-Implemented Inventions in Europe. European Intellectual Property Review 5, 295-300.
9. DuCharme N., Kemp R., (1987). Copyright Protection for Computer Software in Great Britain and the United States: A Comparative Analysis. Santa Clara High Technology Law Journal, 3(2), 257-283.
10. Fusco, S. (2016). TRIPS Non-Discrimination Principle: Are Alice and Bilski Really the End of NPEs. Texas Intellectual Property Law Journal 24, 131-161.
11. Gabison, G. A. (2016). Spotting software innovation in patent assertion entity world. Hastings Science and Technology Law Journal, 8(1), 97-136.
12. Guarda P. (2013). Looking for a feasible form of software protection: copyright or patent, is that the question? European Intellectual Property Review, 35(8), 445-454, 449.
13. Hattenbach, B. W., & Kautz, R. M. (2018). Concrete Thoughts About Abstract Ideas: Why a Nebulous Exception to Patentability Should Not Swallow Computer Software. Santa Clara Law Review, 58, 261-295.
14. Kaya, T. (2007). A comparative analysis of the patentability of computer software under the TRIPs agreement: The US, The EU, and Turkey. Ankara Law Review. 4(1) 43-81.
15. Keating, W. J. (1967). The Supreme Court Intreprets the Patent Statute: A Trilogy of Cases and Their Effect Today. Dickinson Law Review 72, 244-270.
16. Lemus, J., and E. Temnyalov. (2017). Patent Privateering, Litigation, and R&D Incentives. The RAND Journal of Economics 48 (4): 1004–1026.
17. Naser, M. A. (2008). Computer software: copyrights v. patents. Loyola Law and Technology Annual 8, 37-44.
18. Pila, J. (2005). Article 52(2) of the Convention on the Grant of European Patents: What did the framers intend? A study of the Travaux Preparatoires. IIC-International Review of Intellectual Property and Competition Law, 36(7), 755–787.
19. Sadr, R., & Zolotova, E. J. (2017). Fractality of Patentability under the New Subject Matter Eligibility Scheme. Northeastern University Law Journal 9, 425-453.
20. Schwartz, D. L., & Kesan, J. P. (2014). Analyzing the role of non-practicing entities in the patent system. Cornell Law Review 99 (2): 425–456.
21. Sterckx, S., Cockbain, J. (2010). The patentability of computer programs in europe: An improved interpretation of articles 52(2) and (3) of the European Patent Convention. Journal of World Intellectual Property, 13(3), 366-402.
22. Thumm, N. (2018). The good, the bad and the ugly–the future of patent assertion entities in Europe. Technology Analysis & Strategic Management, 30(9), 1046-1056.
23. Toeniskoetter, S. B. (2005). Protection of software intellectual property in Europe: an alternative sui generis approach. Intellectual Property Law Bulletin., 10, 65-83.
24. Ullrich, H. (2002). Patent Protection in Europe: Integrating Europe into the Community or the Community into Europe? European Law Journal, 8(4), 433-491.

EU and international legislation:

1. Administrative Council of the European Patent Organization, Basic proposal for the revision of the European Patent Convention. Document MR/2/00. München, 13 October, 2000.
2. Berne Convention for Protection of Literary and Artistic Works. September 9, 1886.
3. E.P.O., Case Law of the Boards of Appeal, 6th edt, 2010.
4. European Commission. (1997). Promoting Innovation Through Patents: Green Paper on the Community Patent and the Patent System in Europe.
5. European Commission. (2002). Proposal for a Directive of the European Parliament and of the Council on the Patentability of Computer-implemented Inventions. Office for Official Publications of the European Communities. procedure number 2002/0047.
6. European Patent Convention, October 1973, Munich, Germany.
7. 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.
8. TRIPS: Agreement on Trade-Related Aspects of Intellectual Property Rights, April 15, 1994, Marrakesh.

Other countries' legislation:

1. Code of Laws of the United States of America.

EU Case law:

1. EPO Board of Appeal T 0144/83 (Appetite suppressant) of 27.3.1986.
2. EPO Board of Appeal T 0154/04 (Estimating sales activity/DUNS LICENSING ASSOCIATES) of 15.11.2006.
3. EPO Board of Appeal T 0154/04 (Estimating sales activity/DUNS LICENSING ASSOCIATES) of 15.11.2006.
4. EPO Board of Appeal T 0208/84 (Computer-related invention) of 15.7.1986.
5. EPO Board of Appeal T 0424/03 (Clipboard formats I/MICROSOFT) of 23 February 2006.
6. EPO board of appeal T 0854/90 (Card Reader) of 19.3.1992.
7. EPO Board of Appeal T 0870/04 (BDP1 Phosphatase/MAX-PLANCK) of 11.5.2005.
8. EPO board of appeal T 0931/95 (Controlling pension benefits system) of 8.9.2000.

US Case law:

1. 717 F.3d 1269 (Fed. Cir. 2013)
2. 768 F.Supp.2d 221, 252 (D.D.C. 2011)
3. Apple Computer, Inc. v. Franklin Computer Corp., 714 F.2d 1240 (3d Cir. 1983).
4. AT&T Corp. v. Excel Communications, Inc., 172 F.3d 1352 (Fed. Cir. 1999).
5. Johnson v. Transportation Agency, Santa Clara City., 480 U.S. 616, 107 S. Ct. 1442, 94 L. Ed. 2d 615 (1987).
6. State Street Bank & Trust Co. v. Signature Financial Group, 149 F.3d 1368 (Fed. Cir. 1998).
7. U.S. Supreme Court Bilski v. Kappos, 561 U.S. 593, 601 (2010)
8. U.S. Supreme Court Alice Corp. v. CLS Bank International, 573 U.S. 134 (2014)
9. U.S. Supreme Court Atlantic Works v Brady, 107 U.S. 192 (1883)
10. U.S. Supreme Court Diamond v. Diehr, 450 U.S. 175 (1981)
11. U.S. Supreme Court Gottschalk v. Benson, 409 U.S. 63 (1972)
12. U.S. Supreme Court Parker v. Flook, 437 U.S. 584 (1978)
13. U.S. Supreme Court Jacobellis v. Ohio, 378 U.S. 22 (1964)

eMaterials:

1. Global Software - World Market Software' Report published by MarketLine in 2012. Retrieved from http://www.reportlinker.com/p0188773-summary/Global-Software.html 11 May 2021.
2. Information technology (IT) spending on enterprise software worldwide, from 2009 to 2021 (in billion U.S. dollars). Retrieved from https://www.statista.com/statistics/203428/total-enterprise-software-revenue-forecast/, 11 May 2021.
3. World Intellectual Property Organization. (2004). WIPO intellectual property handbook. Retrieved from: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_489.pdf, 11 May 2021.

APPENDICIES

Appendix 1. Non-exclusive licence

Non-exclusive licence for reproduction and for granting public access to the graduation thesis[1]

I ___Karolis Pocevicius_____(author's name)

1.Give Tallinn University of Technology a permission (non-exclusive licence) to use free of charge my creation

Software intellectual protection: copyrighting or patenting? Comparative analysis of EU and US approach,
(title of the graduation thesis)

supervised by Pawan Kumar Dutt
(supervisor's name)

1.1. to reproduce with the purpose of keeping and publishing electronically, including for the purpose of supplementing the digital collection of TalTech library until the copyright expires;

1.2. to make available to the public through the web environment of Tallinn University of Technology, including through the digital collection of TalTech library until the copyright expires.

2. I am aware that the author also retains the rights provided in Section 1.

3. I confirm that by granting the non-exclusive licence no infringement is committed to the third persons' intellectual property rights or to the rights arising from the personal data protection act and other legislation.

[1] *The non-exclusive licence is not valid during the access restriction period with the exception of the right of the university to reproduce the graduation thesis only for the purposes of preservation.*