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Intellectual property rights on software: Patentability of computer programs

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INTRODUCTION

Intellectual property has always represented one of the most discussed topics when it comes to protecting someone's work in all fields, including industrial, scientific, literary and artistic areas.

Creations of the mind are the object of intellectual property rights, which aim at protecting works and consequently their authors, who can benefit from their exploitation and get rewarded.

Progress can be defined as the most important purpose of intellectual property rights. As a matter of fact, innovation and cultural development are strongly supported, development and investments are encouraged, in order to boost economic growth and improve quality of life. Moreover, works protected under the umbrella of intellectual property have created new jobs and have had an important role in the creation and development of new industries, for instance information technology.

Two categories can be identified in the field of intellectual property: Industrial property and copyright. The former refers to trademarks (distinctive signs), patents for inventions, industrial designs and geographical indications, while the latter protects literary and artistic works and covers the whole world related to performances, broadcasting and the Internet.

The most important organization that establishes rules in order to provide some regulation to these rights is WIPO (World Intellectual Property Organization), established in 1970. WIPO is a specialized agency of the United Nations which aims at protecting intellectual property in order to achieve progress and cultural and social development around the world.

This organization has promoted international cooperation through several agreements to which many countries in the world have adhered and which represent an important part of the law related to intellectual property.

Among all the works protected by intellectual property rights, software or computer programs have always represented a difficult and interesting topic.

In fact, computer programs represent the center of the new era that is information technology, along with the digital age we are currently living.

The issue with computer programs has always been focused on the best way to protect them, and whether it was necessary to consider them as literary work, invention or as secret information which cannot be disclosed, given the unique nature of software itself. Computer programs have become more and more important, especially in the last twenty years. In Europe, the number of patent applications in the area of computer technology has increased considerably in the last ten years, from 8000 applications in 2009 to 11000 applications in 2018, highlighting the importance of the sector.

This work will focus on the topic of patentability of computer programs in all his aspects, with a comparative analysis between Europe and the USA.

The first part will focus on the main characteristics of copyright protection and patent protection, providing some important features of both intellectual property rights and highlighting the most relevant characteristics of the European and U.S. systems.

A brief description of software will follow, in order to introduce the topic and its history and understand the importance it has acquired in the field of information technology.

The work develops with an analysis of the double protection of software, i.e. copyright and patent, by providing specific references to the European and U.S. law, along with case law examples. The development of software protection through the years will be explained in detail.

The last part will focus on the current situation in Europe and in the USA to have a deeper and overall view of the issue, leaving the topic open for future and further decisions and improvements.

CHAPTER 1

COPYRIGHT AND PATENT PROTECTION: AN INSIGHT

SUMMARY: 1.1 Copyright: a definition – 1.1.1 Berne Convention and scope of protection – 1.1.2 Requirements for protection – 1.1.3 Moral and economic rights – 1.1.4 Terms of protection – 1.2 Patent: a definition – 1.2.1 European Patent Convention and Paris Convention – 1.2.2 US Patent law – 1.2.3 Requirements for protection

1.1 Copyright: a definition

Among intellectual property rights, copyright, also known in civil law countries as authors' rights, is a right which protects creative and artistic work. The creator is granted several exclusive rights, both moral and economic, over the creative work and its usage. Copyright protects original works such as books and other literary works, movies, paintings, sculptures, but also computer programs, databases and advertisements.¹ Moreover, the oral form is also protected, in the form of lectures or speeches.

An important characteristic of this intellectual property right is that it protects only the creative work, and not the physical embodiment of the work itself. As a matter of fact, what is actually protected is the intangible work, that is the expression, and not the mere ideas, procedures or concepts.

In order to clarify this concept, it is helpful to identify three main elements of creative works: the external form, that is the form of the work in its original version, the internal form, that is the form of expression, and the content, that is the idea or concept expressed through the form. Copyright protects only the form, both external and internal, while the content is excluded from protection.

¹ WIPO, Copyright, www.wipo.int/copyright/en/

The expression, that is the form, must be new and original.²

Moreover, the right owner of the expression can be different from the owner of the physical container of the work.³

Another distinction that must be made concerns the copyright system in common law countries and civil law or *droit d'auteur* countries.

In common law countries, that is in the English-speaking states (UK and USA), the focus is on the economic value of the work, while in the *droit d'auteur* countries, that is in continental Europe, the relationship between the author and his work is very important. As a matter of fact, moral rights are the distinguishing features of this system. Nonetheless, the difference between the two systems is becoming less and less important.

Two main objectives can be identified when it comes to copyright protection: The first concerns the author, the second concerns the society. As a matter of fact, the creator must be rewarded for his skills and labour when creating an original and artistic work. This intellectual property right prevents others from using the work without the author's permission.

As far as the second objective is concerned, the original work is considered as a benefit and an improvement for the public, by stimulating further creations of works and creations, reaching both cultural and economic development. In fact, culture is improved, as well as the economic side of the topic, boosting investments in artistic creations.

Finally, it is necessary to clarify who is considered to be the author of a work protected by copyright.

The author is the creator of the work, and he is considered the physical person who created the work in the *droit d'auteur* system.

In common law countries the author can also be a legal person or a company, vested with economic rights. The author and the right holder are not necessarily the same person, based on who owns the economic rights on the creation.

² L. TREVISAN, G. CUONZO, *Proprietà industriale, intellettuale e IT*, Milano, Wolters Kluwer Italia, 2013, 470.

³ WIPO, *Understanding Copyright and Related Rights*, 2016, 7.
www.wipo.int/edocs/pubdocs/en/wipo_pub_909_2016.pdf

In case of more than one creator, the status of co-author is conferred only if there is an actual contribution to the originality of the work.

1.1.1 Berne Convention and scope of protection

Copyright is governed by several international treaties that represent the rules applied to this intellectual property right.

The most important agreement is the Berne Convention for the Protection of Literary and Artistic Works, first adopted on the 9th of September 1886 in Berne, Switzerland.

The number of total contracting parties is 177,⁴ that is the majority of countries in the world. This number shows the importance given to copyright and to protected works, providing authors with legal means over protection of their creations.

The main basis of the Berne Convention refers to three basic principles, that represent the foundation of the agreement. The first one is referred to as national treatment principle, according to which the same level of protection must be given to a creative work originating in a contracting state in every other state that is part of the Berne Convention.⁵

The second principle is referred to as automatic protection, that is no registration is required, even if countries are allowed to do it. This principle refers to the characteristic of copyright itself of being an unregistered right, meaning that protection is an automatic consequence of the act of creation of an original work, without asking for formalities. Nonetheless, some countries have decided to maintain a national registration system, so that authors can voluntarily register their creative works, in order

⁴ WIPO, Contracting parties – Berne Convention
www.wipo.int/treaties/en/ShowResults.jsp?treaty_id=15

⁵ WIPO, Summary of the Berne Convention for the Protection of Literary and Artistic Works (1886). The national treatment principle is fundamental among the member states of the World Trade Organization. Along with the most-favored-nation principle, the national treatment ensures that WTO members not part of the Berne Convention get the same level of protection when it comes to intellectual property rights and that advantages granted to a member state also apply to all other members, under the rules of the TRIPS agreement (Trade-Related Aspects of Intellectual Property Rights).
www.wipo.int/treaties/en/ip/berne/summary_berne.html#_ftn1

to get a concrete proof of their right. National registration can represent a positive resource in case of infringement, as it can provide valuable documents about the works, and it is also a source which is available to the public to testify creativity and culture.⁶ Finally, the third principle is the independence of protection, meaning that the protection of a work exists whether it is protected in the country of origin or not. In other words, «protection is independent of the existence of protection in the country of origin of the work».⁷

Going deeper into the analysis of the Berne Convention, some articles appear important to clarify the whole topic.

Article 1 defines that the contracting states form a single Union, in the sense that the Convention is an international agreement that represents a step ahead from the bilateral agreements existing before 1886.

As stated in this article, the main aim of the treaty is «the protection of the rights of authors in their literary and artistic works».⁸

When it comes to define what kinds of works can be protected by copyright, there is not any exhaustive list of works, even if article 2 of the Berne Convention provides a wide list of examples, including books, cinematographic works, photographic works, pieces of art, musical compositions and «every production in the literary, scientific and artistic domain, whatever may be the mode or form of its expression»,⁹ including oral form. Moreover, article 2 refers also to the so-called derivative works, which include «translations, adaptations, arrangements of music and other alterations of a literary or artistic work».¹⁰

Derivative works must be protected as original works, without harming the copyright of the existing works.

⁶ WIPO, Copyright Registration and Documentation Systems www.wipo.int/copyright/en/activities/copyright_registration/

⁷ WIPO, supra note 5.

⁸ Berne Convention for the Protection of Literary and Artistic Works, article 1, at www.wipo.int/treaties/en/text.jsp?file_id=283698#P83_10372

⁹ Supra note 8, article 2, clause 1.

¹⁰ Supra note 8, article 2, clause 3.

Besides, what article 2 also wants to express is that a work is protected by copyright despite its purpose, which could be for instance commercial or educational.

A very important topic is related to the content of article 5, regarding the country of origin. Article 5, clauses 2 and 3, explain the territoriality principle, according to which copyright protection is granted for a certain state under national legislation and is applied in that member state only. As a consequence, rules and exceptions to this right differ from country to country, possibly causing problems.¹¹

A solution to this disparity is regional harmonization, for example the directives applied in all the European Union countries. Another solution is represented by the minimum standards of protection that are recognized under the Berne Convention, such as the right to translate (as explained before) or the right to make reproductions.¹²

Besides, in case of infringement of copyright, national law is applied.

Considering the exceptions to the copyright system, a relevant tool is the so called three-step test, defined in article 9, clause 2 of the Berne Convention.

The three-step test is indeed a clause which establishes the three conditions concerning the exclusive right of reproduction of the work. The test establishes three conditions under which national laws can adopt exceptions and limitations to copyright.¹³

The first condition refers to special cases in which exceptions can apply. The second condition approves the reproduction, «provided that such reproduction does not conflict with a normal exploitation of the work»,¹⁴ so that unfair use of the work is forbidden. The last condition aims at protecting the interests of the author guaranteed by law.

As well as the Berne Convention, exceptions and limitations are also present in an exhaustive list in article 5 of the European Union «Directive 2001/29/EC on the

¹¹ EUROPEAN PARLIAMENT, EU copyright reform: Revisiting the principle of territoriality, September 2015

www.europarl.europa.eu/RegData/etudes/BRIE/2015/568348/EPRS_BRI%282015%29568348_EN.pdf

¹² WIPO, *supra* note 7.

¹³ R.M. HERMANN, *IP Experts Focus On 3-Step Test In Copyright, Discuss Way Forward*, (December 2011), Intellectual property watch, www.ip-watch.org/2011/12/21/ip-experts-focus-on-3-step-test-in-copyright-debate-way-forward/

¹⁴ *Supra* note 8, article 9, clause 2.

harmonization of certain aspects of copyright and related rights in the information society».¹⁵ These limitations include educational scopes, scientific and research purposes, review, parody and pastiche. Exceptions are connected to freedom of expression and for educational purposes considered useful for society.

Along with the Berne Convention, the other agreement on the topic is the Universal Copyright Convention (UCC) adopted in Geneva in 1952.

UNESCO developed the UCC as an alternative to the Berne Convention for those countries that did not want to adhere to it. The main aim of the UCC is copyright protection to all countries in the world.¹⁶ The UCC is becoming less important since all the members are also part of the TRIPS agreement, but its importance is considerable since the USA adhered to the Berne Convention through the UCC itself.¹⁷

To sum up, the Berne Convention represents the main agreement on copyright protection, defining its main scope. The owner has the exclusive right of reproduction of the work, including derivative works, communication to the public and distributions. Exceptions and limitations are permitted under fair use of the work, always protecting the author's legitimate interests.

1.1.2 Requirements for protection

As said before, copyright exists from the moment of creation of a work. Several kinds of works can be protected, from literary to scientific ones. However, in order to be copyrighted, a work must meet some requirements that are specific for this intellectual property right.

¹⁵ EUROPEAN UNION, Directive 2001/29/EC on the harmonization of certain aspects of copyright and related rights in the information society
eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2001:167:0010:0019:EN:PDF

¹⁶ Universal Copyright Convention, portal.unesco.org/en/ev.php-URL_ID=15381&URL_DO=DO_TOPIC&URL_SECTION=201.html

¹⁷ TREVISAN, CUONZO, *supra* note 2, at 468.

First of all, a work must be creative, new and it must be an autonomous expression of an idea. The commitment of the author used to produce the work must be creative and strictly personal and the expression must be individual.

Originality is the main requirement for a work to be protected by copyright. This characteristic of a work is considered in two different ways, depending on the country's system.

In civil law countries, originality refers to the expression of the author's personality and in particular to the way concepts are expressed and turned into creative works. In this system the focus is placed more on the moral – or human – rights between the work and the author rather than only on the labour or the economic side of the creation.

In common law countries instead, originality is seen in skills and labour used to make a work. In some countries this characteristic is referred to as “sweat of the brow” doctrine, which considers the labour behind the work.

Originality involves and is therefore strictly connected to creativity. A work can be creative despite the fact of being simple and not very elaborate. The idea can be the same for several works, but it is the creative expression that makes the difference between a work and another. It must be a personal representation of reality and not a simple description, because it would lack the necessary creativity.¹⁸

The requirement of creativity is conceived in a different way depending on the system. As a matter of fact, in civil law countries the connection between originality and creativity is considerably strong, since a work must indeed be the result of a certain level of creativity and therefore represents a new form of expression of an idea. In other words, the concept of creativity also includes novelty as characteristic of creations.

On the other hand, common law countries show a more pragmatic view since a creation can be protected by copyright when it is not a simple copy of a pre-existing work and when skills and labour represent the effort necessary to actually make the work.

In this system, creativity is not required because it implies the existence of a deeper connection between the author and his work, which is not conceived in common law countries. Nonetheless, the distance between the two systems is reducing and the difference is getting smaller and smaller. For instance, the U.S. judicial practice has

¹⁸ TREVISAN, CUONZO, *supra* note 2, at 471-472.

stated that a minimum level of creativity is required – even though the level is extremely low – and has also rejected the “sweat of the brow” doctrine.¹⁹

1.1.3 Moral and economic rights

Copyright confers two kinds of rights: Moral and economic rights.

Moral rights, which have more importance in continental Europe, aim at protecting the intimate relation between the author and its work. Through moral rights, authors can take specific actions in order to protect their creations and to prevent mutilation or false attribution of the work. As opposed to economic rights, moral rights cannot be assigned to others, but they can be waived in some countries, such as in the UK or in some states of the USA. On the other hand, in the majority of European countries – i.e. civil law countries – moral rights are inalienable.

Among moral rights, we can distinguish two main rights: the right of paternity and the right of integrity. The former, also known as right of attribution, is an individual right, that recognizes the authorship of a specific creation, even if all the economic rights have been sold.²⁰ This right also allows the author to remain anonymous.

The right of integrity refers to opposition to any kind of distortion of a work that can harm the author’s reputation. Violation of integrity can happen even if the economic rights were sold before.²¹

Along with paternity and integrity, divulgation is another moral right. It refers to the will of the author to publish a work and his legitimate right to oppose to release or disclosure. This moral right is retained also after the death of the author.

¹⁹ Feist Publications, Inc. v. Rural Tel. Service Co., 499 U.S. 340 (1991), 345, at casetext.com/case/feist-publications-inc-v-rural-telephone-service-company-inc

²⁰ For instance, the author of a book that sold all his economic rights to the publisher will always be the author of that book, thanks to paternity right.

²¹ WIPO, *supra* note 3, at 14. It appears important to clarify that formal adaptation is not considered a violation of integrity, for instance when a publisher owns the economic rights, he cannot modify the work if it appears to be a distortion.

Supra note 8, article 6bis, clause 1, of the Berne Convention, stating «Independently of the author's economic rights, and even after the transfer of the said rights, the author shall have the right to claim authorship of the work and to object to any distortion, mutilation or other modification of, or other derogatory action in relation to, the said work, which would be prejudicial to his honor or reputation».

The last moral right that can be mentioned is retraction. Through retraction, the author is allowed to stop the publication of his work despite any former licence agreement. This moral right is recognised only in some countries, such as France.²²

As far as economic rights are concerned, they can be waived, assigned and used by someone else through a licence. They are granted by the Berne Convention.

The owners of economic rights are allowed to gain financial reward from the exploitation of the work by others, always respecting the moral rights behind it, legal rights and public interests.

Right owners can give or deny authorization in relation to specific acts that can be made by others on their work.

The main economic right is the right of reproduction. Right owners have total control on the use of their work, in this case regarding copies of the work made without consent.

Indeed, the right of reproduction concerns the act of making a copy of a work or of a substantial portion of it.

Strictly connected to reproduction is the right of distribution, referring to the allowed distribution of copies of a work in order to release it to the public. The principle of exhaustion establishes that, when a copy is sold or when ownership is transferred, for example once a book is sold, the right owner has no control on that specific copy anymore. In other words, this principle – also called “first sale doctrine”, establishes that the right to control copies of a work “exhausts” on its first sale, provided that the sale was made by the copyright owner or at least with his consent.²³

Distribution includes rental and lending rights which appear to be very common. A possible consequence is the loss of revenues for right owners due to use or sale of illegal copies.

Another economic right, which is included only in some copyright laws, is the right to control importation of copies of a copyrighted work. This right appears to be strictly correlated to the territoriality principle, since it would be more difficult to get control

²² WIPO, *supra* note 3, at 14.

²³ WIPO, International Exhaustion and Parallel Importation.
www.wipo.int/sme/en/ip_business/export/international_exhaustion.htm

over the right owner's economic interests when copies are outside the territory where the work has protection.²⁴

The author of an artistic work is granted the resale right, so that he can receive a part of the price at which the work is resold. Resale right exists for authors of graphic and plastic works of art, because otherwise they would not take advantage of further exploitation of their works like other authors do.

In the list of economic rights, adaptation and translation rights must be mentioned. They involve a transformation of a work (for instance a book turned into a movie) and the change of the language different from the original one.

Just like the original work, translations and adaptations have copyright protection and their publication needs the authorization of multiple right owners, specifically the owner of the copyright of the original work on one side, and the owner of the copyright of the adaptation.

Finally, among the economic rights, the right of communication to the public is very important, as it concerns public projections or performances, broadcasting and public disclosure of creations.

Public performances happen in front of an audience and they include projections of movies, representations of plays and concerts. The right owner must give authorization to all these kinds of performances as exploitation of the work.

The public display right allows right owners to show publicly a copy of a protected work by any means.²⁵

Broadcasting right concerns transmission of sounds and images through communication means, including radio, television or satellite. This right is strongly connected to sport, since «television and media organizations pay huge sums of money for the exclusive right to broadcast top sporting events live».²⁶

This aspect is strictly linked to the U.S. doctrine of fair use, which is codified in Title 17 of the U.S. Code – related to copyright – in section 107. The doctrine states that «the fair use of a copyrighted work for purposes such as criticism, comment, news reporting,

²⁴ WIPO, *supra* note 3, at 10-11.

²⁵ WIPO, *supra* note 3, at 12-13.

²⁶ WIPO, *Broadcasting & Media Rights in Sport*, www.wipo.int/ip-sport/en/broadcasting.html

teaching (including multiple copies for classroom use), scholarship, or research, is not an infringement of copyright»,²⁷ providing exceptions to the use of such works.

Nowadays copyright is not only applicable to radio and television, but it also considers the Internet and the whole online world. As a matter of fact, websites with original content and mobile apps are protected by copyright.²⁸

In order to provide some regulations for the digital age, in April 2019 the EU issued two Directives belonging to the topic: The Directive on copyright and related rights in the Digital Single Market and the Directive on online transmissions, television and radio programs.

The purposes of these directives are focused on the development of industries in the Digital Single Market, i.e. the EU market in which online activities are regulated by rules such as fair competition and data protection. As a consequence, the development of the digital economy, along with networks and services, have the guarantee of being protected.²⁹

Moreover, an important purpose of the directives is «to create favourable conditions for cross-border distribution of television and radio programmes online»³⁰ and to increase the quality of platforms, along with the improvement of digitalisation.

Finally, the new directives involve rules on the content displayed on social networks in order to favour authors and performers.

After the explanation of all the rights that copyright can confer, it is also important to briefly explain its exceptions, that is the cases in which the consent of the author or the right owner is not necessary to exploit the work.

The main purpose of exceptions is to support public interests or to favor users' rights in some specific cases.

²⁷ US CODE, Title 17, section 107. Limitations on exclusive rights: Fair use
www.uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title17-section107&num=0&edition=prelim

²⁸ WIPO, Copyright in the Digital World
www.wipo.int/ip-outreach/en/ipday/2016/ip_digital.html

²⁹ EUROPEAN COMMISSION, *Shaping the Digital Single Market*, ec.europa.eu/digital-single-market/en/policies/shaping-digital-single-market

³⁰ EUROPEAN COMMISSION, *Modernisation of the EU copyright rules*, ec.europa.eu/digital-single-market/en/modernisation-eu-copyright-rules

Limitations are allowed in two cases: free use and non-voluntary licences.

Regarding free use of reproduction, it is allowed when the user can exploit the work without the author's permission and without harming his rights, for example when quoting a source for teaching and academic purposes, provided that the quotation is consistent with fair practice.³¹ Furthermore, free use is linked to the three-step test mentioned before, since the clause specifies the cases in which permission is not required.

Besides, the concept of fair use is also considered when talking about exceptions. In this case, exploitation of the work is allowed without permission considering the nature of the use and its specific purpose.

With non-voluntary licences, the user can exploit the work without the author's permission by paying a compensation for it. Governments sometimes take advantage of this exception for reasons of public policy. In other cases, important public interests are reasons to exploit protected works without the author's permission.³²

1.1.4 Terms of protection

As mentioned before, copyright does not need registration since the protection starts from the moment of creation of a work, if the requirements are met.

The duration of the protection is variable depending on the legislation, but in general it is established as a period of time after the author's death. In this way the author's heirs can economically exploit the work and benefit from it.

The Berne Convention sets the term of protection in article 7, clause 1,³³ stating that the duration of the protection lasts until at least 50 years after the author's death.

³¹ Supra note 8, article 10, clause 1. «It shall be permissible to make quotations from a work which has already been lawfully made available to the public, provided that their making is compatible with fair practice, and their extent does not exceed that justified by the purpose, including quotations from newspaper articles and periodicals in the form of press summaries».

³² WIPO, supra note 3, at 16-17.

³³ Supra note 8, article 7, clause 1. «The term of protection granted by this Convention shall be the life of the author and fifty years after his death»

Article 7 also states some exceptions, for instance concerning cinematographic works or in case of anonymous or pseudonymous works, where it is not possible to identify an author and base the years of duration on his life.³⁴

In addition to the term set by the Berne Convention, in European Union countries directive 2006/116/EC establishes that the duration of copyright is 70 years after the author's death,³⁵ which appears longer than the one set by the Berne Convention.

In case of joint authorship, «the term shall be calculated from the death of the last surviving author».³⁶

Once the term of protection has expired, the work enters the public domain and consequently can be used without the consent of the right owner.³⁷

1.2 Patent: a definition

Patents are part of intellectual property rights and they are specifically granted for inventions with particular characteristics and requirements.

Inventions can be both products or processes which solve technical problems and consequently represent a solution. Moreover, inventions are patented for reasons of public interests, to improve knowledge and encourage innovation.

Inventions as products can be used in every field of technology. They can be utensils, mechanical devices or machines. Inventions as processes are techniques or methods for the production of goods or the realisation of services.³⁸

A patent is a sort of contract signed by the inventor with society. The applicant files for a patent when he wants to prevent others from using his invention in the country where the patent is granted.

³⁴ Supra note 8, article 7, clauses 2-3.

³⁵ EUROPEAN UNION, DIRECTIVE 2006/116/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 December 2006 on the term of protection of copyright and certain related rights, article 1, clause 1, «The rights of an author of a literary or artistic work within the meaning of article 2 of the Berne Convention shall run for the life of the author and for 70 years after his death, irrespective of the date when the work is lawfully made available to the public», eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32006L0116&from=EN#d1e266-12-1

³⁶ European Parliament and Council, supra note 31, article 1, clause 2.

³⁷ WIPO, supra note 3, at 19.

³⁸ TREVISAN, CUONZO, supra note 2, at 266.

The most important aspect is that a patent grants a negative right, since through it the applicant does not have the right to exploit the invention, but he gets the right of excluding others from using it.

Once an invention is patented, no one else can exploit it. In exchange for this protection from others, the applicant must disclose all the information about the invention, so that it is available and accessible to the public.³⁹

Patent is different from all other intellectual property rights. First, it is a negative right. Second, public interests and the spread of knowledge appear to be more important than the right itself, since disclosure is mandatory when filing an application.

It is possible to sell the right, transfer it or licence it to others so that they pay royalties to the owner in exchange for the use of the invention. If an invention is used without permission, an infringement happens, and national courts will then make decisions in infringement proceedings, following the principles established by law.

Concerning the terms of protection, patent protection has a shorter life with respect to other intellectual property rights. It is indeed 20 years from the date of filing, that is the date in which the owner filed for application in one of the set-up offices. The term of patent rights is indeed shorter, given the importance of the invention itself. Since it solves a technical problem, it appears to be more important with respect to public interests.

When it comes to the date of filing, it is very important because the rule followed to grant a patent is “first to file”. As a matter of fact, the right is assigned on the first to file the application, so that two inventors could have the same invention, but it would turn out to be just a matter of good timing.

The process to obtain a patent is very long. The first step is to prepare the application in order to file it. Going into details, when it comes to European patents, the draft of the application must contain the summary, which briefly defines the invention and its purposes, the description, which provides details about the invention and the field of

³⁹ WIPO, Frequently Asked Questions: Patents, www.wipo.int/patents/en/faq_patents.html

application, sketches and illustration, useful for the complete comprehension of the work, and finally revindications, which contain all the characteristics of the invention.⁴⁰ In this way, all the features of the invention are explained. The following step is to check whether it meets the requirements for the application, which will be explained later in detail.

Once the application is filed, it could take up to five years to obtain the patent. From the date of publication of the application, a provisional protection is conferred to the invention. In the meantime, the patent office will proceed to the examination of the application in all its parts. If it has a positive outcome, the patent is granted. The patent Register will provide all the information regarding fees, status and the patent number. Finally, the patent is published on the Official Gazette to make it public.⁴¹

Regarding the routes for application, three main possibilities can be identified.

The first route is the national patent office, which grants protection only in the specific territory of that country. In order to extend it, applications must be filed in every other desired country.

The second route is through the regional office. Most patents are regional and currently there are five regional patent offices in operation, including the European Patent Office (EPO).⁴² Regional patents have a relevant advantage, that is only one application is needed. The downside is that regional patents are a bundle of national patents and consequently do not have a unitary effect.

Finally, the last route is the international one, which is equally a bundle of national patents. It is possible to file an application under the Patent Cooperation Treaty (PCT) in up to 152 countries in the world. While it appears to be very expensive, the advantage of the international route is that the applicant can wait up to 30 months to decide whether to proceed and in which countries he wants protection, so that a considerable number of months is gained.⁴³

⁴⁰ TREVISAN, CUONZO, *supra* note 2, at 288-291.

⁴¹ WIPO Intellectual property handbook, Second edition, 2004, 27.
www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf

⁴² Under the European Patent Convention.

⁴³ WIPO, *Protecting your Inventions Abroad: Frequently Asked Questions About the Patent Cooperation Treaty (PCT)*, www.wipo.int/pct/en/faqs/faqs.html

To sum up, patents are granted for inventions that solve a technical problem and are useful for society. The protection is granted for 20 years but the application process appears very long, and the best possible route must be chosen among the three possibilities mentioned before.

1.2.1 European Patent Convention and Paris Convention

As written above, one of the routes to apply for patent protection is the regional way. When it comes to Europe, the regional route is under the European Patent Convention (EPC), which is the most important agreement concerning patent protection.

The EPC was signed in Munich in 1973 and then modified in 2000. At present the number of contracting parties is 38, including not only all the members of the European Union but also other countries in Europe, such as Switzerland and Turkey.⁴⁴

The contracting parties of the EPC are member states of the European Patent Organisation, which is an intergovernmental organisation born in 1977, composed of two main bodies, the European Patent Office (EPO), that is the executive body, and the Administrative Council, whose task is supervision.

The main purpose of the EPO is the examination and review of applications for European patents, which can be granted in up to 44 countries.⁴⁵

The advantage of the European patent is that there is only one application, which makes the whole procedure much easier and faster.

The downside is that the European patent is not unitary and, therefore, does not have a unitary effect. It is indeed a bundle of national patents, despite being an attempt to reach harmonization in Europe.

Besides, once the European patent is granted, it must be validated in the countries designated in the original application. In addition, in case of infringement it is necessary to go before national courts and therefore cope with all the different proceeding regulations, not to mention the different decisions of courts about legal controversies.

⁴⁴ EPO, Member states of the European Patent Organisation, www.epo.org/about-us/foundation/member-states.html

⁴⁵ EPO, Governance, www.epo.org/about-us/governance.html

Before going deeper into the European Patent Convention, a relevant description must be made on the so-called Unitary Patent.⁴⁶

The Unitary Patent is a project about a patent with unitary effect for EU member states that was first proposed in 2012. The “Unitary Patent package” was meant to introduce a new form of patent, that is a patent with unitary effect extended to 26 EU countries (Spain and Croatia excluded). Moreover, it is composed of two regulations and an agreement that aimed at creating the Unified Patent Court, that is a court with competence in both Unitary and European patents, in order to avoid all the difficulties given by the form itself of being a bundle of patents.⁴⁷

The regulation has been in force since 2013, but since it represents a compromise, it will apply only with the ratification of 13 EU member states. In order for it to apply, three countries with the highest number of European patents must ratify, that is France, Germany and the United Kingdom).

The Unitary Patent System was expected to start in 2019 but given Brexit and the position of the countries on the subject, it is not clear whether it will apply at all.⁴⁸

Going back to the EPC, it is also known as Convention on the Grant of European Patents. The EPC represents a solution to several problems concerning patents in Europe, including the requirements of applying in every single country instead of having a unique procedure, and the necessity of translating the text of patents in different languages. As a matter of fact, EPC brought harmonization to the system by solving these two issues.

The preamble and the first articles define the Organisation, its bodies, the contracting states and the offices.

⁴⁶ EPO, Unitary Patent & Unified Patent Court, www.epo.org/law-practice/unitary.html

⁴⁷ EPO, Unitary Patent Guide

www.epo.org/law-practice/legal-texts/html/upg/e/uppg_a_v.html

⁴⁸ EPO, *When will the Unitary Patent system start?* www.epo.org/law-practice/unitary/unitary-patent/start.html

Dr G. STUTTARD, *The Unitary Patent in Europe*, (May 2019), Lexology www.lexology.com/library/detail.aspx?g=9a26864a-f239-4bbb-8c0e-f129d9fd57dd

Since the EPC solved one of the main problems in the patent system, it is relevant to mention article 14, which regards the official languages of the EPO, which are English, French and German.⁴⁹

The European Patent Organization works with a budget that comes from the renewal fees that must be paid by the contracting states along with other resources, as stated in article 37 of the Convention.

Part II of the Convention is about the most important part of patent law, which regards the specific characteristics of inventions. Articles 52 to 57 describe the requirements for patent protection, which will be dealt with in details in the next paragraphs.

Article 58 defines the applicant that can be any natural or legal person.

When it comes to the term of protection, it is defined in article 63 as «20 years from the date of filing of the application».⁵⁰

As stated in article 64, and as mentioned before, when a European patent is granted, the rights conferred by it are the same as if it was a national patent of one of the contracting states.

Concerning the application before the EPO, the required steps are described in articles 90 to 105 of the Convention. The first step is the filing of the application. The details of the invention are not immediately disclosed but for a period of time up to 18 months they remain secret.

Then, the EPO writes the search report, which includes all the information about prior art and similar inventions in order to evaluate novelty.

The following steps are the publication of the search report and of the application, along with the examination of the application itself. The application is examined on request to check whether it meets the basic requirements.

After that, the application can either be granted or refused and, in case it is granted, validation in all the designated countries must follow.

⁴⁹ European Patent Convention, article 14, clause 1, at [documents.epo.org/projects/babylon/eponet.nsf/0/5837DA4C63F75B90C12583CC00503FA3/\\$File/EPC_16th_edition_2016_en.pdf](https://documents.epo.org/projects/babylon/eponet.nsf/0/5837DA4C63F75B90C12583CC00503FA3/$File/EPC_16th_edition_2016_en.pdf)

⁵⁰ EPC, supra note 49, article 63, clause 1.

Within nine months of the publication of the patent, opposition can be made by third parties before the European Patent Office. The opposition is examined by the Opposition Division, which has the task of checking if the requirements are met.⁵¹

All the following invalidity or infringement procedures will happen before national courts.

To sum up, the European Patent Convention takes into consideration all the aspects related to the European patent, giving rules to all the contracting parties.

The Paris Convention for the Protection of Industrial Property was signed in 1883, today it counts 177 contracting parties,⁵² and it is administered by WIPO (World Intellectual Property Organization).

It is one of the oldest agreements on industrial property and it includes all intellectual property rights, such as trademarks, patents and industrial designs.

The Convention establishes a Union whose main aim is «the protection of industrial property»,⁵³ which is ensured in the country of origin of the invention and in all the countries belonging to the Union.

When it comes to the regulations, they are divided into three main categories: national treatment, right of priority and common rules.

National treatment refers to articles 2 and 3, which state that the same protection given to its own nationals must be granted by each contracting state of the Union to the nationals of other member states. This provision aims at ensuring equality among all the countries that are part of the Union, along with «nationals of countries outside the Union who are domiciled or who have real and effective industrial or commercial establishments in the territory of one of the countries of the Union».⁵⁴

As far as the second category is concerned, the right of priority gives a relevant advantage to the member states of the Union. Regarding patents, trademarks and industrial designs, when an application is filed in one of the member states, the member

⁵¹ TREVISAN, CUONZO, *supra* note 2, at 304-310.

⁵² WIPO, Paris Convention contracting parties
www.wipo.int/treaties/en/ShowResults.jsp?lang=en&treaty_id=2

⁵³ Paris Convention for the Protection of Industrial Property, article 1, clause 1
www.wipo.int/treaties/en/text.jsp?file_id=288514

⁵⁴ Paris Convention, *supra* note 53, article 3.

state can also apply in all the other contracting countries, within a period of time of six to twelve months. The main advantage is that applicants have priority over others, since the following applications will show the same date of filing of the first one. Consequently, the applicant has a considerable amount of time to decide in which countries he would like to apply and any event happening in the meantime would not affect the application in all his aspects.⁵⁵

The third category refers to common rules that all member states are required to follow. These rules are specific for every intellectual property right, but in this case the focus will be only on patents. The first provision is independence, since patents granted in member states do not have any connection among them. They are independent in case of a patent for the same invention, whether it is granted in a member of the Union or not. A patent can be granted for an invention in one country, but it could be refused in another. As a general rule, there is no influence among patents and procedures connected to them.⁵⁶

Another rule concerning patent regards the inventor, who has the right of being mentioned as such in his patent.

The remaining provisions about patents concern importation of patented goods and compulsory licences. In these cases, countries take legislative measures independently from one another and only if specific conditions are respected.

In addition, all member states must respect rules and provisions about the indication of the source of goods and its identity. Moreover, protection against unfair competition must be ensured by every country of the Union.⁵⁷

1.2.2 US Patent law

As a comparison with the European system, the US patent system will be briefly described.

⁵⁵ Paris Convention, supra note 53, article 4.

⁵⁶ WIPO, supra note 41, at 243-247.

⁵⁷ WIPO, Summary of the Paris Convention for the Protection of Industrial Property www.wipo.int/treaties/en/ip/paris/summary_paris.html

First of all, in the USA the agency in charge of granting patents is the United States Patent and Trademark Office (USPTO). In fact, USPTO performs all the functions related to patents, including granting them, disclosing information to the public and keeping the register of all the national and foreign patents.

Like in Europe, patent is a negative right, so that it excludes others from economically exploiting the invention. As stated in the U.S. Code, «except as otherwise provided in this title, whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States, or imports into the United States any patented invention during the term of the patent therefor, infringes the patent».⁵⁸

Three kinds of patents are considered by the U.S. legislation: Utility patents, design patents and plant patents. Utility patents are granted for inventions of machines, processes or products, design patents are granted for new and original designs, and lastly, plant patents are granted for inventions of new variety of plants.⁵⁹

When it comes to the law, the first Patent Act was established in 1790,⁶⁰ even earlier than the Paris Convention. It was defined as “An Act to promote the progress of useful Arts” and it established the subject matter as «any useful art, manufacture, engine, machine, or device, or any improvement thereon not before known or used»,⁶¹ defining invention and specifying the requirements for protection. The term of protection was 14 years at the time.

It is evident that during the years the Patent Act was modified. The most important revision led to the U.S. Patent Act of 1952, codified in Title 35 of the United States Code, patent section.⁶² The Title regards intellectual property rights and it was influenced by the Patent Cooperation Treaty and the TRIPS agreement.

⁵⁸ USPTO, United States Code Title 35, section 271, (a), Infringement of patent
www.uspto.gov/web/offices/pac/mpep/consolidated_laws.pdf

⁵⁹ USPTO, General information concerning patents, UNITED STATES PATENT AND TRADEMARK OFFICE, (October 2015), www.uspto.gov/patents-getting-started/general-information-concerning-patents

⁶⁰ S. W. HALPERN, *Fundamentals of United States intellectual property law*, Kluwer Law International, 1999, 182.

⁶¹ Patent Act of 1790, Ch. 7, 1 Stat. 109-112, April 10, 1790, The First United States Patent Statute, chapter VII, section 1
web.archive.org/web/20110722040111/http://www.ipmall.info/hosted_resources/lipa/patents/Patent_Act_of_1790.pdf

⁶² USPTO, supra note 58, USC 35 – Patents.

The first part of Title 35 regards the United States Patent and Trademark Office, defining the legal procedure before the Office, fees and functions.⁶³

The second part defines the requirements for patentability, which will be described in the next paragraph, and the application procedure. As far as the application procedure is concerned, it must contain three mandatory documents: a specification, a drawing and a declaration.⁶⁴ These documents must include a description of the technical background of the invention, relevant details and all the information about the inventor. Once the application is filed, it must be examined by the Office, which investigates over the state of the art, prior art and makes both a technical and legal examination.

The application can be refused but in case it is accepted, it will be published within a period of time of 18 months. The term of protection is 20 years from the date of filing of the application.⁶⁵

Finally, the third part of Title 35 concerns patents and the protection of rights. It includes provisions about infringement, ownership and related interests.

Part four and five of Title 35 are related to other international agreements and how they are implemented in the national legislation.

An important modification of the Patent Act happened in 2011, known as the Leahy-Smith America Invents Act (AIA), a federal law introduced by President Obama.

Through this act, the system is now based on the principle of the “first - inventor - to - file”,⁶⁶ while before it was characterized by the principle of the “first - to - invent”.

The American approach is getting closer to the European regime, which has always been characterized by the “first to file” rule in case of patent application. As mentioned before, priority is based on the date of filing of the application. In the case of USA,

⁶³ *A Brief History of the Patent Law of the United States*, (May 2014), at ladas.com/a-brief-history-of-the-patent-law-of-the-united-states-2/#end

⁶⁴ *Supra* note 58, section 111, a, (2), Application.

⁶⁵ Agenzia ICE, Ministero dello sviluppo economico, *Guida pratica alla Proprietà Intellettuale negli USA*, 9-10, www.assolombarda.it/servizi/internazionalizzazione/documenti/la-proprietà-intellettuale-negli-usa

⁶⁶ USPTO, *supra* note 58, Section 100 (note). «The first inventor to file provisions of the Leahy-Smith America Invents Act (AIA) apply to any application for patent, and to any patent issuing thereon...».

priority exists only for patents whose application is filed in the U.S. territory, and not abroad.⁶⁷

AIA also brought modifications as regard as the so-called prior art, which defines all the information disclosed to the public that are relevant to define novelty and originality of an invention. As a matter of fact, the Act considers as prior art innovations that are disclosed both on a written and oral basis. In addition, the usage and sale of an invention before the filing of the application is part of the prior art, if they happened both in the USA or abroad.⁶⁸

In conclusion, the US patent law has a long history and has developed a system that is typical of common law countries, even though it is approaching the European system. The use of patents in the USA appears to be very strong, since it is one of the biggest markets in the world.

Despite this, USA is the country that files the most applications in the European patent system, as represented by its percentage of 25% on total applications.⁶⁹

1.2.3 Requirements for protection

As far as European patents are concerned, the European Patent Convention establishes some requirements, that are the specific characteristics for an invention to be patentable.

Invention of any field of technology can be patented provided that they are «new, involve an inventive step and are susceptible of industrial application».⁷⁰

As stated in article 52 of the EPC, one of the requirements is novelty. The invention must be new at the date of filing, meaning that it does not have to be part of the state of the

⁶⁷ P. M. JANICKE, *Overview of the New Patent Law of the United States*, Texas intellectual property law journal, 2013, volume 21, 82.

⁶⁸ M. GARDENAL, A. MARIANI, *La nuova normativa statunitense in materia di brevetti*, (March 2013), Il Sole 24 Ore www.diritto24.ilsole24ore.com/avvocatoAffari/mercatoImpresa/2013/03/la-nuova-normativa-statunitense-in-materia-di-brevetti.php?uid=ABjOrjC&refresh_ce=1

⁶⁹ EPO, European companies and inventors file more patent applications in 2018, (March 2019), www.epo.org/news-issues/news/2019/20190312.html

⁷⁰ EPC, supra note 49, article 52, clause 1.

art. Therefore, information about the invention must be kept secret until the date of filing of the application. In many cases, people that have knowledge about the invention are bound by the so-called “non-disclosure agreement” about confidentiality.

It appears obvious that if some information were to be published before, then the requirement of novelty would not be met.⁷¹ An invention is not considered new, whether it was disclosed in written or oral form.

The second condition regards the inventive step, which is not easy to interpret.

An invention is inventive if the solution it provides is not obvious to an ordinary skilled person. In other words, it does not have to be part of the prior art or be so simple that a person with ordinary skills could easily understand or think of. Hence, it must be original and creative and must represent something different but also something that goes a step further from everything existing before, that is a non-obvious solution to a technical problem.

Given these two first requirements, it is easy to understand that an invention must have very specific characteristics. Anything that is connected to a routine work cannot be patented, as well as anything that is in contrast with public order or morality, such as human cloning. Moreover, inventions related to therapeutic methods used in hospitals or surgery cannot be patented, since they represent useful solutions for society and enter the sphere of ethical issues.⁷²

The last requirement concerns industrial application of the invention, meaning that it must concretely be made and produced in series or used in industrial activities.

This condition is strictly related to utility, since a patented invention must be useful and produced in any kind of industry, whether we are talking about a process or a product.⁷³

Apart from inventions that are in contrast with public order and morality, there are other exceptions that are listed in article 52 of the EPC.

Discoveries, scientific theories, mathematical methods as well as business methods and computer programs as such are excluded from patentability. Plant and animal species are excluded, too. Computer programs are more and more discussed when it comes to the possibility of being patented and yet they still represent an exclusion.

⁷¹ EPC, supra note 49, article 54.

⁷² EPC, supra note 49, article 53.

⁷³ WIPO, supra note 41, at 18.

On the other hand, when it comes to the biotechnology sector, inventions are protected by patents under the Directive 98/44/EC, also known as the 'Biotech Directive'. Patents protection in the biotechnology sector appears very important given the structure of the industry itself. As a matter of fact, it is characterized by a strong reliance on research and development, which is a department with considerably high costs. Moreover, the risk of imitation by others is extremely high and therefore a strong protection is needed. Besides, this industry is characterized by recently-established SMEs which are not known in the market and have not released products yet. For these reasons the number of patents in the biotechnology sector is higher than the average.⁷⁴

When it comes to the US patent law, requirements are described in the second part of Title 35.⁷⁵ Indeed, section 101 states that patentable inventions must be new and useful, which appear to be basic conditions.

The first requirement is novelty, which requires that the invention is new and not known by the public. It must not be published in written form, whether it happened in the USA or in a foreign country, and it must not have been patented before.

Besides, an inventor can lose his right to patent, for instance if he abandons the invention or if the invention was mentioned in another patent.⁷⁶

Another requirement defines the non-obvious subject matter. As a matter of fact, the invention must not be part of the prior art and the subject matter must not be obvious to a person with ordinary skills.⁷⁷ The invention must indeed be new, useful or operative, and non-obvious.

In order to be patented, an invention cannot be an abstract idea or refer to physical phenomena, and this aspect appears similar to European law.

As far as the inventive step is concerned, in the European patent law it is represented by article 52 of the EPC, while in the U.S. patent law it is described in the 35 US Code sections 102 and 103. When analyzing the articles, it appears that the EPO has a stricter

⁷⁴ E. BURRONE, *Patents at the Core: the Biotech Business*, WIPO www.wipo.int/sme/en/documents/patents_biotech_fulltext.html

⁷⁵ JUSTIA, Patentability Requirements www.justia.com/intellectual-property/patents/patentability-requirements/

⁷⁶ USPTO, supra note 58, section 102, Conditions for patentability; novelty and loss of right to patent.

⁷⁷ USPTO, supra note 58, section 103, Conditions for patentability; non-obvious subject matter.

view on the requirement, since the interpretation of article 52 involves the introduction of two extra requirements: The solution to a problem and the technical character of the problem itself. In fact, if a problem is not solved by the invention, the inventive step requirement is not satisfied. In the same way the problem must be technical, so that economic or social problems are excluded from the requirement.

Besides, the solution cannot appear obvious to a person skilled in the art, increasing the required level in order to be patent eligible.

From this brief analysis it appears that the U.S. patent law has a lower degree of novelty and non-obviousness when it comes to the requirements of an invention, showing the differences between the two systems.⁷⁸

Another difference that can be underlined between the U.S. law and the European law regards the patentable subject matters.

As a matter of fact, while article 52 CBE establishes the elements that are excluded from patent protection, section 101 provides a list of objects categories that can be patentable, including processes, machine and manufacture.⁷⁹

A relevant requirement is described in the 35 US Code section 112, which concerns the disclosure of the invention,⁸⁰ and in particular the specification, which was already mentioned before. The specification must include the best way to use the invention in order to disclose all the aspects related to it, avoiding the risk of monopoly. This characteristic is referred to as the best mode requirement, which is not present in the European patent law.⁸¹

In conclusion, requirements for patent protection appear similar in some respects in the European and the U.S. system, provided that in the European approach the requirement of inventive step is considered in a stricter way than in the American system, since it must solve a technical problem in a non-obvious way.

⁷⁸ Differences between US and European patents, Inventive step
www.iusmentis.com/patents/uspto-epodiff/

⁷⁹ Supra note 58, section 101 Inventions patentable. «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».

⁸⁰ J. RANTANEN, *Patent Law's Disclosure Requirement*, Loyola University Chicago Law Journal, 2013, volume 45, article 3, 371-373.

⁸¹ Supra note 78, Best mode requirement.

CHAPTER 2

COPYRIGHT PROTECTION OF SOFTWARE

SUMMARY: 2.1 Software: a definition – 2.2 Background – 2.3 The choice of copyright protection – 2.3.1 Pros and cons – 2.4 Copyright protection in the EU and in the USA

2.1 Software: a definition

In the last forty years, software has become more and more important along with the development of technology.

Software, also called computer program, is an organized set of instructions or symbols that can make devices perform specific tasks.⁸² Software programs run on computers and they are opposed to hardware, which is the physical component of a computer.

Software is included in and it represents the main component of the so-called computer-implemented inventions (CIIs), that are inventions that involve the use of a computer.⁸³

Computer programs are present in every field of technology, since they are able to control any kind of device.

Software is composed of three parts: Source code, object code and the abstract component. The source code is written in program languages and it is comprehensible for human beings, in particular to expert computer programmers. The object code can only be used by computers as it is written in binary form to give instructions to electronic devices.⁸⁴ The last component is abstract and it refers to the function of software which, given its utilitarian purpose, is also the most difficult part to protect.

⁸² Software definition, at searchmicroservices.techtarget.com/definition/software

WIPO, software definition «computer program' means a set of instructions capable, when incorporated in a machine-readable medium, of causing a machine having information-processing capabilities to indicate, perform or achieve a particular function, task or result». www.wipo.int/edocs/mdocs/copyright/en/wipo_ip_cm_07/wipo_ip_cm_07_www_82573.doc.

⁸³ EPO, Index for Computer-Implemented Inventions, www.epo.org/law-practice/legal-texts/html/guidelines/e/j.htm

⁸⁴ TREVISAN, CUONZO, *supra* note 2, at 484.

First of all, the abstract functional part could not be included in copyright, since this intellectual property right protects only the expression and not the idea behind it. Second, patents only protect technical solutions to a problem and not abstract parts that are not concrete and visible.

Another particular characteristic of computer programs concerns the technological progress that is strictly linked to them.

New software is created with a small innovative step, since it is the result of previous computer programs. As a matter of fact, portions of codes are reused in order to create new software, underlying the dynamic of the creation, which also appears connected to interoperability, that is the connection of an independently created software with other programs.

To better understand the particular nature of software, it is necessary to explain the events that led to its invention.

The concept of software goes back to the 19th century, when the French merchant Joseph Marie Jacquard applied the already existing mechanical calculator – which could not be programmed – to a sewing machine, creating a mechanical loom called “the Jacquard Loom”.

The machine was based on the use of pasteboard cards with punched holes that were able to automatically control the movements of the loom. As a matter of fact, these cards represent the ancestors of the boards and the software that today are used to give instructions to a computer.⁸⁵

Meanwhile in England, the mathematician Charles Babbage created the first real computer in history, the so-called Difference Engine. The aim of this engine machine was the production of mathematical tables used to solve equations.

The inventor soon understood that these new kinds of machines needed a completely new language, different from the one used by human beings, which involved numbers, letters and other symbols. As a consequence, he developed the idea of the so-called “Analytical Engine”, with components that remind the ones of a modern computer and which could be programmed. This machine was never built but it represents the first

⁸⁵ C. DI COCCO, E. PELINO, A. M. RICCI, *Il diritto d'autore nella società dell'information technology: software, database, multimedia*, Bologna, Gedit Edizioni, 2005, volume II, 368.

idea of a computer in history, since it could be used in different fields and for various purposes.⁸⁶

In the 1930s, the English mathematician Alan Turing developed the first modern theory of software. He was in charge of the decoding of the German Enigma machines during World War II for the British Department of Communications.

It is relevant to say that he proposed the Turing Test, which is one of the most important contributions to the theory of computing, and he developed the idea of the so-called “Turing Machine”, which used symbols to solve any mathematical calculation, which remained only a concept.⁸⁷

At the beginning of the 1940s, the first attempt was made to build the “Analytical Engine” proposed by Babbage a century before.

The United States, with the IBM collaboration, created the ASCC (Automatic Sequence Controlled Calculator), then called MARK I, which was the first universal calculator.⁸⁸

After 1940 the computer industry started to develop, and the first electronic computers were born.

In the US the ENIAC (Electronic Numerator, Integrator, Analyzer and Computer) was developed by the University of Pennsylvania as a project for the US Army to solve ballistics problems. The machine was programmable, it involved the use of stored memory and electronic components and it could perform several functions, but in order to do so, there was the need for trained technicians to manually operate on the machine. The phase of programming was therefore very complicated.⁸⁹

The first prototype of the modern calculator was the EDVAC (Electronic Discrete Variable Computer), developed by the mathematician John Von Neumann who explained the architecture of the computer as formed of five components: input and output, memory, and a control unit and arithmetical unit.⁹⁰

⁸⁶ G. PHILIPSON, *A Short History of Software*, 2004, 2-3.

⁸⁷ PHILIPSON, *supra* note 86, at 4.

⁸⁸ DI COCCO, PELINO, RICCI, *supra* note 85, at 369.

⁸⁹ *Ibidem*.

⁹⁰ The development of the modern electronic computer was possible thanks to the paper of J. VON NEUMANN, *First draft of a report on the EDVAC*, 1945, which included the basic principles of hardware that are still used today and which are referred to as the “Von Neumann architecture”.

With Von Neumann the concept of program was born as a set of instructions which are electric pulses that run inside the calculator and which can be modified without the need of operating on cables.

After World War II, the first digital and programmable computer was produced on an industrial scale. The so-called UNIVAC I had general purpose business use and it was released in 1951, later bought by the US government in order to process all the data related to the census of the population.

In the history of the computer, three generations can be distinguished: The first generation, which included UNIVAC I, was characterized by the use of valves technology, the second one focused on the use of transistors in the circuits and it was the generation of the 7070 system of Siemens, while the third generation started from the beginning of the 1960s and was represented by system 360 by IBM which introduced integrated circuits also known as chips.⁹¹

Until the 1970s the industry was mainly based on hardware and it strongly developed also thanks to the production of the first microprocessor by Intel in 1971. On the other hand, the software industry had not yet developed in the way it is known today.

The computer industry was characterized by the entry of companies from all over the world which represented, and some still represent today, the biggest firms in the field, for instance General Electric, Siemens, Olivetti and Fujitsu.

Software and hardware were still sold as a unique apparatus until 1969, when the US Antitrust forbid the IBM to perform this commercial practice since it harmed the freedom of competition. The software industry was born.

Consequently, software became an economic and legal good as it is known today and the uncontested protagonist of the IT revolution. In fact, through the years hardware has become less expensive as it required fewer investments, while the industry has focused on the development of computer programs, which represent the distinctive element within the marketplace.⁹²

⁹¹ DI COCCO, PELINO, RICCI, *supra* note 85, at 370.

⁹² DI COCCO, PELINO, RICCI, *supra* note 85, at 373.

In the 1980s the computer started to become more than a mere apparatus used by governments and universities. As a matter of fact, computers were smaller and smaller and adaptable to use in offices, such as banks, and by professionals.⁹³

Thanks to the development of microprocessors and consequent microcomputers, the concept of home computer entered the everyday vocabulary and it would soon be present in every home, thanks to the reduction of prices and dimensions of the apparatus itself, and the increase in the ease of usage of programs.⁹⁴

The industry started to develop, and new companies were born. One of the most successful examples is Apple, whose first products represented a proper revolution in the sector, along with the introduction of the first floppy disk and the launch of Macintosh, the first PC without the need of a programming language.

IBM entered the market and soon after that another company made its entrance: in 1992 Microsoft launched its first operating system Windows 3.11, which involved the use of a graphical user interface (GUI).⁹⁵ The GUI was able to directly connect the user to the program without the need to know the exact commands of the software, which made computers more difficult to be used earlier in time.

The new system, introduced for the first time by Macintosh and Windows, was characterized by windows, desktop icons and menus that could be controlled by the user by means of a mouse. All these features that are taken for granted today represented a true revolution at that time.

As a direct consequence, the software-hardware dichotomy became stronger and stronger since the two components of the apparatus were two different elements with

⁹³ CONTU, *The Final Report of the National Commission on New Technological Uses of Copyrighted Works*, 1978, ch. 3, stating that «The first commercial computers, built shortly after World War II, were based largely on vacuum tubes and were so expensive that only the government or the largest corporations could even consider owning them. To function, the typical early computer required an environment in which temperature and humidity were carefully monitored. It was controlled by programs created by its manufacturer and users exclusively for that particular computer. Subsequent generations of computers have been characterized by dramatic reductions in the size, energy requirements, and price for a given amount of computational power».

⁹⁴ CONTU, *supra* note 93, at ch. 3, «Computers have become less cumbersome and expensive, so that individuals can and do own computers in their homes and offices with more power than the first commercial computers, while at the same time, programs have become less and less frequently written to comply with the requirements imposed by a single-purpose machine».

⁹⁵ PHILIPSON, *supra* note 86, at 16-17.

different characteristics. Two industries corresponded to these two elements, even though they remained complementary. In fact, when a computer program is developed, it is necessary to know the characteristics of the hardware, that is the machine on which the software will run.

The arrival of the Internet completely changed the industry and the way computers were considered by users. At the beginning, i.e. in the 1990s, the Internet was used by governments, universities and companies. Later, it spread broadly along with the development of e-business, which was able to create a brand-new economy.

The software industry, along with computers and the Internet, has brought changes in the economy by increasing employment, investments and by boosting productivity and competition in many sectors. At the same time, the software industry itself changed and turned into production of on-line services, completely separated from the hardware part of the industry.⁹⁶

This is how software has developed in the current digital age, characterized by smart devices such as tablets and smartphones, along with applications, creating a relevant economic development in the field of Information and Communication Technology (ICT).⁹⁷

One aspect can be underlined when it comes to the development of the software industry. It is unquestionably very strong, but it is also harmed by software piracy which involves illegal distribution and copying.⁹⁸

In conclusion, in today's information society software has an important economic role, as it represents a driving force for innovation, development and investments.⁹⁹

⁹⁶ A. I. WASSERMAN, *How the Internet transformed the software industry*, 2011, 12.

⁹⁷ TechTerms - The Tech Terms Computer Dictionary, ICT definition, «ICT refers to technologies that provide access to information through telecommunications. It is similar to Information Technology (IT) but focuses primarily on communication technologies. This includes the Internet, wireless networks, cell phones, and other communication mediums», at techterms.com/definition/ict

⁹⁸ DI COCCO, PELINO, RICCI, *supra* note 85, at 373.

⁹⁹ EUROPEAN UNION, DIRECTIVE 2009/24/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 on the legal protection of computer programs, recital 3, stating that «Computer programs are playing an increasingly important role in a broad range of industries and computer program technology can accordingly be considered as being of fundamental importance for the Community's industrial development», at eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:111:0016:0022:EN:PDF

2.2 Background

When it comes to the protection of software under intellectual property rights, it started to develop during the 1970s, first conceived as a *sui generis* system, given the particular characteristics of the work itself, later only as copyright.

Today, software is protected by copyright as original and creative work, if it differs from previous programs and provided that it is expressed in a personal and autonomous way. Ideas and principles that are the basis of computer programs are excluded from protection, as a general rule of copyright.¹⁰⁰

The development of the so-called package software, the entrance of independent software vendors and the separation between software and hardware led to the need of protection for computer programs.

The diffusion of the Internet and the development of the software industry allowed more and more companies to enter the market. As a direct consequence, the massive use of the Internet has opened new channels through which it is becoming easier and easier to simply copy software and reach a high-level distribution.

For these reasons, the protection of software in the area of intellectual property right has developed as a double protection.

First, computer programs fall under the protection of copyright as a creative work. Second, protection is also provided by patents, granted to avoid the unauthorized use of software.¹⁰¹

Software and hardware used to be considered a single unit and everything that was behind software was protected only by trade secret.

Trade secret was not strong enough to protect computer programs in their growing industry. Therefore, software was first introduced in the USA in section 101 of the Copyright Act in the list of works protected by copyright, thanks to the incentive of CONTU (National Commission on New Technological Uses of Copyrighted Works).¹⁰²

¹⁰⁰ TREVISAN, CUONZO, *supra* note 2, at 484.

¹⁰¹ E. AREZZO, *Tutela brevettuale e autoriale dei programmi per elaboratore. Profili e critica di una dicotomia normativa*, Milano, Giuffrè Editore, 2012, 5-9.

¹⁰² AREZZO, *supra* note 101, at 28.

The issue moved then to Europe, where at the end of 1980s the European Commission was already in favour of copyright protection. But it was only in 1991 that, with Directive 91/250/CEE, computer programs entered the list of works considered creations and consequently protected by copyright.

At the time, it was not possible to modify the copyrightable subject matters in the Berne Convention. Nonetheless, it was internationally recognised in the TRIPs agreement, article 10,¹⁰³ and later also in the WIPO Copyright Treaty, representing the beginning of harmonization.

2.3 The choice of copyright protection

The choice of protection fell under the area of copyright for several reasons.

First of all, copyright had the advantage of immediate protection, that is no formality was needed since, as written before, it exists from the moment of creation.

Copyright was chosen in order to foster the new industry that was just about to start his development.

On the other hand, protection granted by patents could have been another possibility, but for many reasons the opposition was strong. Patents require a very long process and a lot of formalities are needed.¹⁰⁴ As a consequence, it would have taken a very long time to gain protection. Moreover, the general worry was that, through patents, software algorithms and mathematical principles would have become private, so that society could not benefit from their knowledge and related inventions would have suffered from it.¹⁰⁵

S. GRAHAM, D. C. MOWERY, *Intellectual Property Protection in the Software Industry*, (January 2015), U.C. Berkeley.

¹⁰³ WTO, TRIPs agreement, article 10, clause 1, stating «Computer programs, whether in source or object code, shall be protected as literary works under the Berne Convention (1971)». www.wto.org/english/docs_e/legal_e/27-trips_04_e.htm

¹⁰⁴ WIPO, Copyright Protection of Computer Software www.wipo.int/copyright/en/activities/software.html

¹⁰⁵ AREZZO, *supra* note 101, at 31.

In addition, a great obstacle to patentability of software was represented by the European Patent Convention that excluded computer programs from patentable subject matters.

Lastly, software has a sequential character and it is naturally not original enough to meet the requirements for patentability mentioned in the first chapter of this work.

It is often true that computer programs do not always have the required inventive step, and neither do they always have technical character. The concern was that, due to all these reasons, patent protection would have discouraged investments in the industry, and it was not the moment to take such a high risk.

Despite the intense opposition, strong pressure was put on copyright especially in the USA. As a consequence, this opinion had such a strong influence in Europe that copyright legislation was adopted to protect computer programs. The main reason was that Europe aimed at protecting the growing market and wanted to promote small and medium enterprises in the territory. Difficulties in the patent application process and most of all the necessary fees would represent a barrier to the development of the software industry.¹⁰⁶

As far as USA are concerned, it is important to talk about the first case of an American court that confirmed the choice of copyright protection.

Apple Computer, Inc. v. Franklin Computer Corp. lawsuit took place in 1983, when Franklin Computer Corp. was accused of copying software developed and used by Apple Computer, Inc. In this way these programs could also be used on computer branded by Franklin. The question asked to the court was whether there had been copyright infringement or not.

Franklin had actually copied Apple's software, codes and strings included.

The court of appeal stated that both a program existing only as object code and the same program as source code (and so understandable by human beings) were actually

¹⁰⁶ AREZZO, *supra* note 101, at 35-36.

protected by copyright, giving birth to the first case in history where software was declared to fall under copyrightable subject matter.¹⁰⁷

2.3.1 Pros and cons

When it comes to software, it is necessary to explain the particular nature of the work. Computer programs are protected by copyright through a *fictio iuris* (a legal fiction)¹⁰⁸ that compares software to literary works, protecting both the source code and the object code. Moreover, protection is extended to all the preparatory works that express principles and ideas that are the basis of software, without protecting the ideas as such.¹⁰⁹

Based on this first characteristic, a lot of criticism is made on the fact that software cannot be compared to literary works, simply because it has a strictly utility character and is not creative as all other copyrighted works.

As the majority of critiques claim, despite the text component of software, its codes are not understandable by most consumers, who are not interested in the codes themselves and will not buy the product depending on them.¹¹⁰

In order to be protected, computer programs must be functional, original and must provide something new with respect to previous software.

The most important aspect of this criticism is the fact that software is not comparable to creative works, or in general to works that are included in the list of protection by copyright. Software has some written elements understandable by men, but they are only aimed at producing a result and only represent a means for computers to make tasks. In addition, computer programs do not produce the so-called “artistic enjoyment” that creative works naturally have, since it lacks the artistic component.¹¹¹

¹⁰⁷ R. HASSET, *Impact of Apple vs. Franklin Decision*, at internetlegal.com/impact-of-apple-vs-franklin-decision/

¹⁰⁸ E. AREZZO, *Il dibattito sull'opera utile par excellence: il software*, AIDA, Milano, Giuffrè Editore, 2016, 313.

¹⁰⁹ Mere ideas are excluded from copyright protection, see page 3.

¹¹⁰ WIPO Magazine, IP and Software, (December 2008).
www.wipo.int/wipo_magazine/en/2008/06/article_0006.html

¹¹¹ AREZZO, *supra* note 101, at 39-40.

Software has another important feature, that is its behaviour, namely all the actions that a computer can make through the instructions of the program. It is indeed the behaviour that is important for the user and it represents what is actually bought by the end consumer, since text has no value to the user.

It is important to underline that text and behaviour are completely independent, meaning that two programs can have different texts but same behaviour and vice versa. This is an aspect that makes software different from other works protected by copyright.¹¹²

This critique received a valuable answer, based on the fact that copyright itself protects works that do not have artistic value, such as scientific works, or that are provided with a utilitarian purpose, for instance design or architectural projects.

Moreover, these kinds of works have the same characteristic of software, that is the independency between text and actual realization of the work, so that it appears right to include computer programs in the list of copyrighted works.¹¹³

As a confirmation to this criticism, it appears indeed true that computer programs do not bring any pleasure to the user, which does happen instead in case of scientific or literary works.

To conclude the first part of criticism to copyright protection, software is considered like an industrial product, rather than a creative work. Consequently, the aim of computer programs would only be financial reward rather than gain of artistic value.

Therefore, the function of software would be its utility and protection would focus on multiple expression of ideas, rather than on a unique expression (which is indeed a characteristic of copyright).

Besides, a direct consequence would be the creation of a sort of monopoly held by software companies, given two main reasons: The requirement of originality would only refer to a work that is not copied, lacking all other characteristics, and the fact that disclosure is not needed (which is mandatory in case of patent protection), causing lack of knowledge and culture for society.

¹¹² P. SAMUELSON, R. DAVIS, M.D. KAPOR, J.H. REICHMAN, *A manifesto concerning the legal protection of computer programs*, 1994, 2317-2318.

¹¹³ AREZZO, *supra* note 101, at 41-42.

Lastly, copyright does not require formalities that characterize the long process for application in case of patents, and this represents another advantage for the growing market, not to mention the term of protection, which would last 70 years after the death of the author, which compared to the term of patent seems rather excessive.¹¹⁴

Further criticism on the topic is based on the idea-expression dichotomy, as the opposition between content and expression.

As stated above, copyright protects the expression and not the mere idea or content, which is actually let free from any judgement and so from any protection.

The main aim of this separation between idea and expression is based on freedom of expression and development of art and scientific knowledge.

In the case of software, it is almost impossible to separate the idea from the expression, since the latter is only a sequence of instructions necessary to get a result.

The choices made by the programmer are not driven by artistic value but are only based on functionality, lacking the requirement of originality.¹¹⁵

Concerning the end consumer and so the user of computer programs, the lack of disclosure of information present in copyright represents a disadvantage for him.

As a matter of fact, reverse engineering, that is the process through which it is possible to decode the source code starting from the object code, is allowed only in limited cases and with permission of the right owner, in order to gain access to specific information that are necessary to make another independent program work.

The end consumer is not allowed to know this information, since he can only study the program during its normal functions (for instance during loading).

Moreover, information gained through decompilation can only be used with the purpose of interoperability and it cannot be disclosed or sold, and so it appears protected by trade secret.

The paradox is that the most important information of software should instead be public and accessible by consumers.

¹¹⁴ L. SCHIUMA, *Il software tra brevetto e diritto d'autore*, Riv. Dir. Civ., 6, 2007, 685-686.

¹¹⁵ AREZZO, *supra* note 101, at 46-48.

The protection applied to software appears stronger with respect to any other work, combining copyright and trade secret¹¹⁶, with no possibility of disclosure of information.¹¹⁷

A further issue concerns derivative works, such as adaptation or translation.

In the case of software, the programmer has the exclusive right to translate, adapt and modify his computer program. These exclusive rights must be adapted to the nature of software itself. For instance, when it comes to translation it would not mean in another language, but in another programming language.

The use of derivative works for purposes that are not private needs the permission of the author of the original work.

When it comes to computer programs, the line between creation of a derivative work and counterfeiting is thin. It is believed that, in case of software, a derivative work is counterfeit if there is not any permission from the author of the original work, even if normally permission is not requested in case of private use, but only in case of financial exploitation.

As a consequence, copyright protection of software would become even stronger, possibly harming technological and cultural development by making the creation of derivative works even more difficult.

In addition, it is believed that comparing the source codes of two programs is not enough to distinguish plagiarism from a creative derivative work.

This criterion is not applicable to software, as it does not take into account the improvement in terms of technical performance or intellectual effort.

Moreover, copyright protects also preparatory documents, subroutines and flowcharts, meaning that confirmation of plagiarism is even more difficult.

If the derivative work is autonomous in all his parts, the programmer had no access to the source code of the original work and, despite having the same functions, there is not any violation of copyright with respect to the original work.¹¹⁸

¹¹⁶ G. B. HALT, Jr., J. C. DONCH, Jr., R. FESNAK, A. R. STILES, *Intellectual Property in Consumer Electronics, Software and Technology Startups*, New York, Springer, 2014, 97.

¹¹⁷ AREZZO, *supra* note 101, at 59.

¹¹⁸ AREZZO, *supra* note 101, at 81-86.

Strictly connected to this aspect of the topic, a brief description must be made on the so-called free software and open source.

Free software slightly differs from open source, which is a more recent definition. The two terms express the same concept but from different points of view.

The former was born in the 1980s and it is a software that respects freedoms of users, meaning that they can use, copy, study, distribute and improve computer programs. In case of free software, four main freedoms are ensured, which are based on ethical concepts. It is important to underline that the program is always protected by copyright and by means of a licence, which must comply with ethics to be called free. Users are allowed to modify a computer program before selling copies of its improvement. Free software means that it can be modified while it remains in the market.¹¹⁹

Open source was born in the 1990s and it refers to free software licence with access to the source code and which complies with ten criteria. The term was created to avoid misunderstandings with the word “free”, which was previously meant as zero cost with respect to software. Open source allows users to modify computer programs and create derivative works by means of a licence, ensuring integrity and forbidding discrimination.¹²⁰

2.4 Copyright protection in the EU and in the USA

Copyright protection for software starts from international law with the TRIPS agreement, which was the first act to include the protection of computer programs.

Article 10 indeed protects computer programs «as literary works under the Berne Convention»¹²¹, providing rules that govern their intellectual property protection.

As written above, the Berne Convention provides details and requirements about copyrightable subject matters. Article 2 of the Convention does not specify software,

¹¹⁹ Cos'è il Software Libero? www.gnu.org/philosophy/free-sw.html#f1

The Free Software Foundation, www.fsf.org/about/

¹²⁰ The Open Source Definition, opensource.org/osd

¹²¹ WTO, *supra* note 103.

since the Convention was issued in 1886 and computer programs were invented a century later.

It is necessary to remind that article 2 does not provide an exhaustive list of works and, despite this, computer programs are protected and must meet the requirements like any other copyrightable work.

At international level, another agreement which must be mentioned is the WIPO Copyright Treaty, signed in 1996 by the countries of WIPO¹²² as a special agreement under the Berne Convention.¹²³

The WCT covers the protection of works in the field of information technology and it includes computer programs and compilations of data, that are databases. Moreover, it grants specific rights¹²⁴ to authors that complete the ones already present in the Berne Convention.

A brief mention goes to article 4 of the WCT, which states that computer programs are protected as literary works «whatever may be the mode or form of their expression».¹²⁵ Therefore, apart from the ideas that are not protected, computer programs are part of the copyrightable works in any form, meaning that it could be any kind of expression, both source code and object code. In this way the scope of protection is defined.

Starting from the international scale, we can now move to the regional level.

As far as the European Union is concerned, copyright protection was at first regulated by Directive 91/250/CEE, which created a uniform law in the territory.¹²⁶

The main purpose of the directive was to make all national laws uniform in order to avoid disparities, to make the common market of the EU work, since technologies were beginning to gain relevant importance also in the economic field.

¹²² WIPO, 102 contracting parties.

www.wipo.int/treaties/en/ShowResults.jsp?lang=en&treaty_id=16

¹²³ WIPO, Summary of the WIPO Copyright Treaty (WCT) (1996)
www.wipo.int/treaties/en/ip/wct/summary_wct.html

¹²⁴ Right of distribution, right of rental and right of communication to the public.

¹²⁵ WIPO Copyright Treaty (WCT), article 4, Computer programs
www.wipo.int/treaties/en/text.jsp?file_id=295166#P56_5626

¹²⁶ EUROPEAN UNION, Council Directive 91/250/EEC of 14 May 1991 on the legal protection of computer programs, eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:31991L0250&from=IT

Article 1¹²⁷ of the directive states that computer programs must be protected by copyright as stated in the Berne Convention. A very important part of the first article is the reference to all parts of software, which also include the whole preparatory design material. This aspect represented an exception with respect to all other international agreements, given the specification made on the preparatory material, which is an important part of the creative work of the author.

Articles 2 and 3 define the necessary characteristics of computer programs for them to be copyrightable. First of all, software is protected in any form (as stated in the WCT), while ideas and principles behind it are excluded. Furthermore, article 3 defines originality as the only and mandatory requirement, as «the author's own intellectual creation».¹²⁸

Another important aspect is defined in article 6, which deals with decompilation, admitting reverse engineering only in this particular case, when it is not possible to gain access to the information.¹²⁹

The following Directive 2001/29/CE represented the harmonization of specific aspects of copyright and in particular it adopted the law of the WIPO Copyright Treaty.

This directive was a confirmation of the previous one, more specifically it aimed at harmonizing law in the information society.¹³⁰

Directive 91/250/CEE was abrogated by Directive 2009/24/EC,¹³¹ which is still in force today and grants a minimum level of protection.

As a matter of fact, the directive defines a certain level of protection, while the rest is autonomously decided by every single state of the EU, consequently establishing a shared competence.

¹²⁷ EUROPEAN UNION, supra note 126, article 1, stating «In accordance with the provisions of this Directive, Member States shall protect computer programs, by copyright, as literary works within the meaning of the Berne Convention for the Protection of Literary and Artistic Works. For the purposes of this Directive, the term 'computer programs' shall include their preparatory design material».

¹²⁸ EUROPEAN UNION, supra note 126, article 3.

¹²⁹ G. FUMAGALLI, *La tutela del software nell'Unione Europea. Brevetto e diritto d'autore*, Milano, Nyberg Edizioni, 2005, 46-51.

¹³⁰ EUROPEAN UNION, supra note 15.

¹³¹ EUROPEAN UNION, supra note 99.

The concept of originality is still left open, since member states have some degree of autonomy in giving a definition of this characteristic, provided that the basic requirements are met.

The last aspect of this directive is once again the lack of a proper definition for “computer program”, which remained the same as in the previous directive. In fact, it was protected as literary work, with the exclusion of ideas and principles that are behind the program, including the ones behind its interface.¹³²

In the last ten years, software copyright protection in the EU has become less and less strong, as it requires a minimum level of creativity to gain access to protection. Moreover, all the portions of computer programs that represent standard solutions or are only driven by functionality are excluded from protection, since they lack the requirement of creativity. Originality is lacking when software is copied and also when efficiency and routine represent a limit in the process of creation of computer programs.¹³³

Regarding this aspect of the topic, a brief mention goes to lawsuit SAS Institute Inc v World Programming Ltd¹³⁴ of 2012, when the Court of Justice of the European Union drew important conclusions that represent the new attitude towards software copyright protection. First, it was stated that the functionality of a computer program, the programming language and the format of data files of software are not a form of expression and therefore are excluded from copyright protection.¹³⁵

Second, «a person who has obtained a copy of a computer program under a licence is entitled, without the authorisation of the owner of the copyright, to observe, study or test the functioning of that program so as to determine the ideas and principles which underlie any element of the program...». ¹³⁶ Therefore, the decision provides a list of acts that are allowed also without the authorization of the right owner. The condition for the

¹³² M. BROMAN, *Harmonized Intellectual Property protection for software solutions within EU*, 2014, 27-30.

¹³³ AREZZO, *supra* note 101, at 90-92.

¹³⁴ SAS Institute Inc v World Programming Ltd, JUDGMENT OF THE COURT (Grand Chamber), 2 May 2012, at curia.europa.eu/juris/document/document.jsf?docid=122362&doclang=EN

¹³⁵ Interpretation of article 1, clause 2, of Council Directive 91/250/EEC of 14 May 1991 on the legal protection of computer programs.

¹³⁶ *Supra* note 134.

use of a copyrighted work is that these acts are aimed at interoperability by means of a licence or they are necessary for the use of the computer program itself.¹³⁷

The last part of the decision states that infringement can happen when certain elements of a copyrighted computer program are reproduced for another software, if and only if the reproduction represents the expression of the intellectual creation. In other words, a violation of copyright happens when a third-party programmer had direct access to the portion of source code or object code related to the programming language or the format of data files and used it to create similar elements in his own computer program. The decision of this lawsuit represents the attitude towards software copyright protection, which appears to be different from any other form of protection.

Software is protected given a minimum level of creation and infringement does not occur when a similar program is created, provided that development procedures differ from other software.

When it comes to the USA, software was introduced in the Copyright Act thanks to the incentive of CONTU.

In particular, Title 17 of the United States Code deals with copyright, stating general rules and requirements that must be met.

Section 101 of Title 17 defines a computer program as «a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result»,¹³⁸ where the set of instructions is indeed the source code, which can be protected by copyright. As a matter of fact, the source code is expressed in words and numbers and therefore is considered as a literary work.

The two requirements of the US law for works to be copyrightable are originality and fixation (expressed in section 102 of Title 17 USC).¹³⁹ The former refers to the autonomous, independent and creative work of the author. The latter is defined when a work is « "fixed" in a tangible medium of expression» and «is sufficiently permanent

¹³⁷ Interpretation of article 5, clause 3, of Council Directive 91/250/EEC of 14 May 1991 on the legal protection of computer programs.

¹³⁸ US Code, Title 17, section 101, [uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title17-section101&num=0&edition=prelim](https://www.uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title17-section101&num=0&edition=prelim)

¹³⁹ US Code, Title 17, section 102, [uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title17-section102&num=0&edition=prelim](https://www.uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title17-section102&num=0&edition=prelim)

or stable to permit it to be perceived, reproduced, or otherwise communicated for a period of more than transitory duration, either directly or with the aid of a machine or device».¹⁴⁰

Fixation is also a requirement for computer programs, and it is met, since software can be embodied in a tangible medium.

Moreover, section 102 states that copyright cannot protect ideas, principles or procedures and processes, and it is specified that all these aspects of computer programs are excluded from protection.

As far as copies and adaptations are concerned, they are permitted only for archival purposes or in connection with a machine.¹⁴¹

Apart from the idea-expression dichotomy process explained before, a particular tool used in the US courts is the so-called AFC test, that is the "Abstraction-Filtration-Comparison" test. It is a three-step process used to identify non-literal elements¹⁴² of computer programs that are protected and check if they were copied. This test was developed in the lawsuit *Computer Associates International, Inc. v. Altai Inc.*¹⁴³ by the US Court of Appeals and it compares two different software to demonstrate whether the program was copied or not. Non-literal elements are indeed protected if they are connected to the author in the sense that they are the expression of original ideas, while it was stated that specifications of interfaces, industry standards and programming common practices were excluded from protection.

The AFC test was also used in another lawsuit, *Whelan Associates Inc. v. Jaslow Dental Labs.*¹⁴⁴ The second step of the test, that is filtration, takes out the portions of code that are not copyrightable, including algorithms, which are not creative. As a matter of fact, only the way algorithms are written can be protected by copyright.¹⁴⁵

¹⁴⁰ Supra note 137.

¹⁴¹ US Code, Title 17, section 117, uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title17-section117&num=0&edition=prelim

¹⁴² For instance, structure, sequence and organization of computer programs.

¹⁴³ *Computer Associates International, Inc. v. Altai Inc.*, at www.bitlaw.com/source/cases/copyright/altai.html

¹⁴⁴ *Whelan Associates Inc. v. Jaslow Dental Labs*, at digital-law-online.info/cases/230PQ481.htm

¹⁴⁵ *Software Patent or Copyright: Everything You Need to Know*, www.upcounsel.com/software-patent-or-copyright

At that time (1986), the Court of Appeals decided that software was protected by copyright as literary work and extended the act of copying to the non-literal elements, which could be part of the expression and not the idea.

These examples improved the situation at a national level and opened the way to a lot of years of strong and almost excessive copyright protection for computer programs in the USA.

CHAPTER 3

PATENT PROTECTION OF SOFTWARE

SUMMARY: 3.1 Background – 3.2 Patent protection in the USA – 3.3 Patent protection in Europe – 3.3.1 From the contribution approach to the problem solution approach – 3.3.2 The Referral and the Enlarged Board of Appeal

3.1 Background

As stated in the previous chapters, software protection was born and then developed in a complicated and unstable way.

Copyright protection for computer programs developed quickly in the USA and in Europe, as a result of a growing economy and a strong need of boosting the software market.

The initial position was to create a *sui generis* protection when it comes to computer programs, since they represent an innovation in the field of technology and could not be protected as any other work existing before.

Several reasons led to the choice of copyright protection, even though it was a quite hard path. It was difficult to distinguish all the different elements of software, to clarify its purpose – whether creative or utilitarian – and not all the courts agreed on which parts of the program could or could not fall under the umbrella of copyrightable subject matters.

USA and Europe influenced one another in the choice, and for about 15 years the solution seemed quite good, given all the decisions of lawsuits that were previously mentioned. After software copyright protection was decoded in the US Copyright Act and in the EU directive, courts started to build the way to patent protection of computer programs.

The way started to open because patents represent in some respects a better alternative than copyright.

First, despite creating a sort of monopoly, they would improve knowledge and culture, given the mandatory disclosure that is direct consequence to the patent application.

Second, the disadvantage of creating a monopoly would be balanced by licences that would allow other inventors to patent their work by paying royalties, so that the industry development would not stop. Moreover, patent protection would be granted only if it is worth it and when the invention meets all the requirements.

Another important aspect concerns the term of protection. In the case of patents, the time of protection would be shorter (20 years from application) with respect to copyright,¹⁴⁶ so that the invention would become available to the public long before a copyrighted computer program would do.

3.2 Patent protection in the USA

Patent protection in the USA falls under section 101 of the Patent Act, which regulates the area of patentable subject matter.

Section 101 provides a list of objects categories that can be protected by patent, that is processes, machines and manufacture that have new and useful improvements.

Besides, the exclusions stated by the US law do not concern specific technologies or works but they are quite general, since they regard ideas and anything that is abstract.

The main issue with the patentability of computer programs is that, given their particular nature of being a set of instructions in a code, they appeared close to processes, due to their abstractness. At the same time software is composed of mathematical algorithms, which are close to scientific knowledge and so once again abstract.

The long road of US law towards patentability of computer programs started with the so-called patent-eligibility trilogy, a series of US Supreme Court cases that represents the first attempt to establish a guideline regarding software patents during the 1970s.¹⁴⁷

¹⁴⁶ SCHIUMA, supra note 114, at 686-687.

¹⁴⁷ THE HISTORY OF SOFTWARE PATENTS: FROM BENSON, FLOOK, AND DIEHR TO BILSKI AND MAYO V. PROMETHEUS, www.bitlaw.com/software-patent/history.html

The trilogy underlined the fact that mathematical algorithms that are the basis of computer programs cannot indeed be patented.

The first case is *Gottschalk v. Benson* (1972) and it dealt with the patent application of the inventors Benson and Tabbot, who asked for protection for their «method for converting numerical information from binary-coded decimal numbers into pure binary numbers»¹⁴⁸.

This method was supposed to be used on any digital computer and the application was rejected since it represented only mathematical calculations and expressions, and it was not considered a process under the US patent law. Therefore, it was excluded from the patentable subject matter by the Supreme Court. First because it could not be treated as process, second because it could not be used in a particular machine or with a specific purpose that could represent an improvement with respect to the prior art.¹⁴⁹

The main outcome of this case was the declaration of patent ineligibility of computer programs as a whole, even if doubts arose about the future of software patentability. This case opened the way to other applications, since software was not excluded in general but only referring to its purpose. Moreover, from this case it was clear that the algorithm of a computer program could not be the only useful characteristic for it to be patentable.

The following case of the trilogy is *Parker v. Flook* of 1978, which managed to clear some of the doubts from the previous case.

The invention considered in this case is a «method for updating alarm limits during catalytic conversion processes»¹⁵⁰. The issue of this case is the fact that the catalytic converter was a prior invention and the only novelty that this method brought was a mathematical formula that improved the invention.

Once again, the decision of the Court was the rejection of the patent application, since the only difference with the prior art was the algorithm, which is excluded from patent protection by definition.

The case was brought before the Board of Appeal of the Patent and Trademark Office which agreed to the decision using the point of novelty approach.

¹⁴⁸ *Gottschalk v. Benson*, 409 U.S. 63 (1972), at supreme.justia.com/cases/federal/us/409/63/

¹⁴⁹ *Supra* note 58, Title 35 USC, section 101.

¹⁵⁰ *Parker v. Flook*, 437 U.S. 584 (1978), at supreme.justia.com/cases/federal/us/437/584/

As a matter of fact, the work did not have any inventive concept since «once that algorithm is assumed to be within the prior art, the application, considered as a whole, contains no patentable invention».¹⁵¹ The discovery of a formula is not patentable unless it brings some inventive concept with regard to its application.

When it comes to the last decision, *Diamond v. Diehr*¹⁵² of 1981 represents a change of direction of the Supreme Court.

The question of this case was whether a software used during the process for molding rubber into specific products was patent eligible. The invention would improve the process by constantly monitoring heating times.

The decision of the Court was for the first time in favour of patent eligibility. Therefore, the patent for the invention was issued since the invention involved a physical machine which used the mathematical formula. In this sense the invention was not considered abstract and thus eligible for patent protection, opening the way to a radical change in the software patentability path.

In the following years, the focus moved to the interpretation of the Supreme Court decisions of the 1970s, comparing the cases mentioned above.

As software related inventions were entering the area of patent eligibility, inventors started to realize that it was more convenient to file application for works that were not processes but indeed products, as in the case *Diamond v. Diehr*. As a matter of fact, the requirement for software related inventions to be patentable was the ability to solve a specific problem by means of a computer program, if a concrete component of a machine was actually part of the whole invention.

This concept arose the decisions of the Court during the early 1990s, also influenced by the development of the concept of physical process.

An important confirmation for patent eligibility of computer programs is represented by the decision *In re Alappat*¹⁵³ of the Court of Appeals for the Federal Circuit (CAFC).

In re Alappat the Court recognized the requirements for patentability in the situation in which a software installed in a general-purpose computer turns it into a new machine

¹⁵¹ Ibidem.

¹⁵² *Diamond v. Diehr*, 450 U.S. 175 (1981), at supreme.justia.com/cases/federal/us/450/175/

¹⁵³ *In Re Kuriappan P. Alappat, Edward E. Averill and James G. Larsen*, 33 F.3d 1526 (Fed. Cir. 1994), at law.justia.com/cases/federal/appellate-courts/F3/33/1526/513542/

(in the sense of computer) with specific functionalities, able to produce a concrete, tangible and useful result. The effect of this decision was that every computer-related invention with a general-purpose computer on one hand and means-plus-function claims on the other was patent eligible, meaning that functionalities, along with a concrete result, could create the appropriate patentable subject matter.¹⁵⁴

In the State Street Bank case¹⁵⁵ of 1998, the CAFC developed the concrete, tangible and useful result test in order to allow patents to be granted.

This case deals with a patent of a “pure” business method, that is a data processing system (with computer processor means) used to manage several investments in a portfolio, in order to save money with regard to taxes and operating costs.¹⁵⁶

The CAFC stated that both the software as such and the business methods were patentable, since the invention produced a useful, concrete and tangible result, in this case the price. Moreover, it represented a concrete application of an algorithm and not a mathematical formula as such, which in fact could not be patented.

Practical utility was the key to the decision of the Court, since the focus was on the result rather than on the category to which the invention belonged.¹⁵⁷

For the first time in US case law, business methods were declared to be patentable subject matter as any other industrial process, provided that it passed the concrete, tangible and useful result test.

The State Street Bank decision opened the way to a period of openness in the US law with regard to patentability of software and business methods. In the following years a huge number of patents was granted in all industrial sectors. These patents were potentially invalid since they had been granted without much care in checking the requirements, following the way opened by State Street Bank.

As a consequence, during the early 2000s, criticism was made on these decisions.

¹⁵⁴ AREZZO, *supra* note 101, at 110-111.

¹⁵⁵ State Street Bank & Trust Co. v. Signature Financial Group, Inc., 149 F.3d 1368 (Fed. Cir. 1998), at openjurist.org/149/f3d/1368/state-street-bank-trust-co-v-signature-financial-group-inc

¹⁵⁶ The system transformed data, that is money, into a final share price through a series of mathematical calculations.

¹⁵⁷ Commentary on State Street Bank & Trust Co. v. Signature Financial Group www.law.cornell.edu/patent/comments/96_1327.htm#commentary

The act of granting patents that would later prove to be invalid had negative consequences on other innovations.

A negative outcome that must be mentioned is the so-called phenomenon of patent thicket, that is the dense overlapping set of patents that a company must face when a new technology must be put on the market. Therefore, a company would need several licensing deals from different sources in order to be able to commercialize its product. Some patents are indeed connected to others through licences which require the payment of royalties while in other cases patents have different owners. It is indeed necessary to reach the primary source and get all the required licensing deals.

This phenomenon represented a barrier to innovation since it discouraged inventors due to the long-required process.¹⁵⁸

Patent hold-up is another negative consequence that characterized the early 2000s in the US patent environment. Patent hold-up refers to an opportunistic behaviour of a patent holder that demands higher royalties in case of licensing agreements by actually lying about the real licensing conditions. When the licensor has reached the point of no return in terms of investments, the licensee asks for higher royalties, that is the hold-up value.¹⁵⁹

These attitudes represented the negative and ferocious exploitation that was a direct consequence of the path that began with the State Street Bank decision.

In the late 2000s, the Supreme Court changed direction with respect to patentability of business methods, influencing in a relevant way the sector of information technologies. The first change occurred in 2008 with the Supreme Court decision *In re Bilski*.¹⁶⁰

This case is one of the most representative since it regards the patent of a business method that concerns risk in commodities trading. Without going into details of the method itself, the decision of the Court changed from the past.

¹⁵⁸ C. SHAPIRO, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting*, (2001), Innovation Policy and the Economy 1, University of California at Berkeley.

¹⁵⁹ P. BELLEFLAMME, *What is 'patent holdup'? Should it be regulated? If yes, how?*, (June 2016). www.ipdigit.eu/2016/06/what-is-patent-holdup-should-it-be-regulated-if-yes-how/
Patent hold-up, definition, itlaw.wikia.org/wiki/Patent_hold-up

¹⁶⁰ *In re Bernard L. BILSKI and Rand A. Warsaw*, 545 F.3d 943 (Fed. Cir. 2008), at casetext.com/case/in-re-bilski

As a matter of fact, the test based on the concrete, tangible and useful result was abolished as it was not considered adequate to determine the patentable subject matter, at least not anymore.

This test was replaced by the so-called machine or transformation test, which is based on two alternative criteria: The first states that the process must be «tied to a particular machine or apparatus», the second states that the process «must transform a particular article into a different state or thing».¹⁶¹

If the process meets one of these two requirements, it is eligible for patentability.

When it comes to the first requirement, it was not described in detail since In re Bilski did not involve a machine or apparatus, being a pure business method. The Court stated that the presence of “physical steps” was not enough to be patent eligible, but the process must be tied to a machine.¹⁶²

The alternative was represented by the second requirement, which applied to this case and therefore was explained in detail by the Court. The transformation of the article performed by the invention «must be central to the purpose of the claimed process»¹⁶³. Consequently, the process must consist in the transformation itself, which cannot just be a side effect to it.

Then, the Court provided a definition for “article of manufacture” with a list of processes that can satisfy the test, for instance chemical or physical transformations. If these kinds of transformation appear almost obvious to be part of the list for patent eligibility, it does not happen when it comes to processes in the field of information technology that involve manipulation of data.

As a matter of fact, a process that manipulates data was considered patent eligible by the Court only if the process referred to concrete elements which appear in the result of the process itself and exist outside of the apparatus.

Finally, the Court rejected the patent eligibility because the machine or transformation test was not satisfied. First, the object of the process was legal rights, which are abstract

¹⁶¹ Supra note 160, at 955.

¹⁶² Supra note 160, at 961.

The Court did not clarify the most unclear part of the decision, that is if a connection to a computer is enough to include the work in the patentable subject matter.

¹⁶³ Supra note 160, at 962.

by nature. Second, these elements did not have a transformation during the process, so that also the second requirement of the test was not met.

From this decision it appears clear that the CAFC took a step back from the decisions that characterized the early 2000s and got closer to the Supreme Court principles expressed in the past.¹⁶⁴

A confirmation to this position arrived in 2010, when the Supreme Court rejected the application of a patent for a business method in *Bilski v. Kappos*.¹⁶⁵

Despite the confirmation through the rejection, the Supreme Court took a distance from the position of the CAFC with regard to the machine or transformation test. As a matter of fact, the Court defined this test only as a clue used to evaluate the patent eligibility. It was described as «useful and important clue or investigative tool»¹⁶⁶ but not the only means of evaluation of a process, since in this case the process was considered an abstract idea and therefore not patentable.

Furthermore, according to the Court, the CAFC had made a wrong interpretation of the patent law because the machine or transformation test considered a process patentable only if it was connected to an apparatus or if a transformation occurred, confining the definition to these two requirements only.

The Court also believed that the test was not suitable for the information age since a lot of inventions in the field of information technology (software in the first place) regarded intangible data transformation and therefore were abstract by nature.

The main aspect on which the Court focused was the pre-emption, according to which a process that implies an abstract idea is outside of the patentable subject matter. The purpose of this position is driven by the fact that these ideas and principles are fundamental truths and therefore must be available to everyone, especially to other inventors for their following works.

In conclusion, through this case the US law regarding patentability of business methods, and consequently also of computer programs, changed direction towards a more moderate position.¹⁶⁷

¹⁶⁴ See the patent-eligibility trilogy.

¹⁶⁵ *Bilski v. Kappos*, 561 U.S. 593 (2010), at supreme.justia.com/cases/federal/us/561/593/

¹⁶⁶ *Ibidem*.

¹⁶⁷ AREZZO, *supra* note 101, at 214-215.

3.3 Patent protection in Europe

In order to create a comparison with all the facts that happened in the United States, the history of software patents in Europe will be described.

Patent protection of computer programs was more than just an idea long before copyright was officially adopted as intellectual property right. As a matter of fact, since the mid-1980s, the European Patent Office had a favourable position towards the granting of patents for computer implemented inventions.

Article 52 of the EPC clearly excludes computer programs from patentable subject matters. During the 1980s, the EPO Technical Boards of Appeal tried to figure out a way to bypass this obstacle by interpreting article 52.

As a matter of fact, the second paragraph of this article was interpreted as a list of inventions excluded from patentability only in their abstract form. Therefore, computer programs were excluded only “as such”, i.e. when they had no practical functions and lacked the so-called “technical character”. This expression explains the characteristic that software must have, in order to be patentable. Computer programs must be part of the field of technology and so belong to one of the sectors of this area. The “technical character” was treated as a fundamental requirement: The invention must provide a solution to a technical problem that must be clear and comprehensible.¹⁶⁸

The first decision that involved the “technical character” requirement and that declared the patentability of computer implemented inventions was *Vicom/Computer-related invention*,¹⁶⁹ a case happened in 1986 which dealt with an invention that aimed at improving the digital image processing by reducing the calculations made by the computer. The patent was first denied by the EPO because the application was made for a pure mathematical procedure (in the part of the process) and for a general-purpose computer (with regard to the apparatus).

The Board of Appeal stated that this method was susceptible of industrial application, which is in fact one of the main requirements for patentability. Moreover, the method was declared to be used in a technical process with the technical means of a computer,

¹⁶⁸ H.C. THOMSEN, *The patentability of computer programs and methods of doing business*, EPO Official Journal, Special Edition, n.2, 2001, 150-152.

¹⁶⁹ T 0208/84 (*Computer-related invention*) of 15.7.1986, at www.epo.org/law-practice/case-law-appeals/recent/t840208ep1.html

therefore distant from pure mathematical algorithms. The process had a specific function which was performed through a computer and it involved novelty in both hardware and software. As a consequence, the claim did not concern an application for patentability of a computer program as such. Besides, if an invention as a whole solves a technical problem, it is patentable despite the invention incorporates computer software or not. Therefore, both the apparatus claim, and the method claim were accepted, and a whole content approach¹⁷⁰ was used. In addition, a transformation happened by technical means on a physical object producing technical results,¹⁷¹ relating to the system for the digital processing of images which represents the invention of the case.

This case was an example of “mix invention”, that is an invention with patentable and non-patentable elements combined together. The issue was to evaluate whether the elements that did not comprise in the patentable area were too many and therefore the whole invention should have been rejected.¹⁷²

The outcome of this case was the focus on the technical result of the invention in the sense of transformation or change on the state of things. This requirement was fundamental, since a mere interaction of technical and non-technical means was not enough to qualify an invention as patentable, if the invention as a whole could not produce a technical result.

The Board of Appeal also clarified the meaning of technical result. For an invention to produce a technical result, it is not enough to have an interaction between the elements of the software and the ones of the hardware, but the program must produce a physical transformation in the machine.¹⁷³

In conclusion, the Board of Appeal found a way to create new requirements to determine the patent eligibility for computer programs, and in general computer

¹⁷⁰ The whole content approach used by the Board of Appeal in the *Vicam* decision consists in considering at the same time all the elements of the invention to determine if it can qualify for patent protection. In this case the invention was composed of a known computer with new algorithms, which meet the novelty requirement.

¹⁷¹ THOMSEN, *supra* note 168.

¹⁷² THOMSEN, *supra* note 168, at 154.

¹⁷³ This explanation can remind of the *Diehr* decision with respect to the transformation test, that is transforming or reducing an article to a different state of things.

implemented inventions, by creating a new methodology that looked at the invention as a whole, with technical and non-technical components.

3.3.1 From the contribution approach to the problem solution approach

As written above, the Board of Appeal tried to determine the patent eligibility of an invention based on article 52, clause 1 EPC, by analysing it as a whole. Moreover, this evaluation was based on the presence of a further technical contribution, that is a concrete transformation or change as a direct consequence of the upload of software on hardware. Between technical and non-technical elements, the technical character should prevail.

This method was defined “contribution approach” or “technical effect approach” and it involved a few steps in order to evaluate the technical character of the invention. The first step was the comparison between the claim and the closest prior art. Once the elements and the problem were defined, the second step was meant to determine whether the elements were part of the list of features excluded from patentability by article 52 EPC. On the basis of this method, it was possible to distinguish patentable and unpatentable subject matters.¹⁷⁴

In the following years, the “contribution approach” was left behind since other elements were taken into consideration when evaluating patent eligibility.

In the mid-1990s, the Boards of Appeal defined a new element to determine the technical character of an invention, which was based on the presence of mere technical considerations that resulted in a technical contribution to the art.¹⁷⁵

This new element represented a further method to determine the technical character of an invention, along with the ones used in previous cases.

As a matter of fact, the validity of the contribution approach was confirmed by the Board of Appeal in the decisions *Ibm/Computer Program Product I e II*. At the same time, these

¹⁷⁴ Y. SKULIKARIS, *Patenting Software-related Inventions according to the European Patent Convention, A review of past and present law and practice*, (2000), www.informatics-europe.org/images/ECSS/ECSS2013/slides/ECSS2013-Skulikaris-paper.pdf

¹⁷⁵ See *Sohei/General-purpose management system*, T 0769/92 of 31.5.1994, at www.epo.org/law-practice/case-law-appeals/recent/t920769ep1.html

cases represented a change with respect to the technical character. In fact, before then software had always been considered as a non-technical element, while in that moment the Board of Appeal stated that it had the potential to produce technical effects, since it actually produces them when it is run on a computer.¹⁷⁶

As a consequence, the possibility of patent eligibility for software as such became concrete. For the first time software could be patented as a product and was indeed an invention in an autonomous way, which also included computer programs in their abstract forms, provided that they could produce further technical effects and features once run on a computer.

Finally, the patent eligibility of a computer program as such led to the highest point in the long path of software patentability.

The Board of Appeal introduced new types of claims for software patent eligibility in the Guidelines for Examination of the European Patent Office.¹⁷⁷ In particular, part C of the guidelines refers to software as such, that is in its abstract form, disembodied from the apparatus (hardware), representing a huge step ahead in intellectual property protection of computer programs.

In the following years, right after *Ibm/Computer Program Product I e II* decisions, the EPO Board of Appeal changed direction with respect to the past.

As a matter of fact, the 2000 *PBS Partnership/Controlling Pension Benefit Systems* decision represented a fundamental change, that is the rejection of the “contribution approach” in the case of inventions with both technical and non-technical elements.

The *PBS* case dealt with a method to control a computer program for pension benefits funds claimed as “method and programmed apparatus”, whose protection was denied as it was considered only as a mere business method lacking technical character.

The Board confirmed the rejection and underlined the most important points of its direction. First, the importance of the «technical character as an implicit requirement of

¹⁷⁶ *Ibm/Computer Program Product I*, T 1173/97 of 1.7.1998, stating that «Every computer program product produces an effect when the program concerned is made to run on a computer. The effect only shows in physical reality when the program is being run. Thus the computer program product itself does not directly disclose the said effect in physical reality. It only discloses the effect when being run and consequently only possesses the "potential" to produce said effect». www.epo.org/law-practice/case-law-appeals/recent/t971173ex1.html

¹⁷⁷ Guidelines for Examination, EPO, www.epo.org/law-practice/legal-texts/html/guidelines/e/index.htm

the EPC to be met by an invention in order to be an invention within the meaning of article 52(1) EPC».¹⁷⁸ Second, it was stated that the technical character depends on the technical effect produced by the invention or on the presence of technical considerations related to the invention itself, and not on the mere use of computing means if they appear general or abstract.

These were confirmations of principles stated in previous decisions, but despite this, the Board of Appeal became slightly incoherent by stating that the “contribution approach” was not adequate to check the technical character of an invention when it was composed of both technical and non-technical elements. This statement appeared odd since up to that moment the “contribution approach” had been the main tool used in similar cases to declare patent eligibility, particularly when it comes to computer related inventions.

The Board explained that this approach measured the elements of novelty and originality that the invention brought with respect to the prior art, without distinguishing technical and non-technical elements during this analysis. In this way, the novelty and inventive requirements would have been confused with the analysis of the invention itself, while they were actually two different analysis and examinations. Therefore, according to the Board of Appeal, the EPC had no basis for applying the “contribution approach”.¹⁷⁹

Moreover, the decision also highlighted another unclear part: The Board of Appeal made a distinction between claims for method and claims for apparatus, stating that only the latter possesses technical character in any case, since it was a programmed machine and was concrete, even if it was meant to be used for economic or business purposes.¹⁸⁰ On the other hand, in the case of methods the mere use of technical means to elaborate

¹⁷⁸ T 0931/95 (Controlling pension benefits system) of 8.9.2000, at www.epo.org/law-practice/case-law-appeals/recent/t950931ep1.html

¹⁷⁹ Ibidem. («There is no basis in the EPC for distinguishing between "new features" of an invention and features of that invention which are known from the prior art when examining whether the invention concerned may be considered to be an invention within the meaning of Article 52(1) EPC»).

¹⁸⁰ Ibidem. («In the board's view a computer system suitably programmed for use in a particular field, even if that is the field of business and economy, has the character of a concrete apparatus in the sense of a physical entity, man-made for a utilitarian purpose and is thus an invention within the meaning of Article 52(1) EPC»).

non-technical information (such as financial data) could not confer technical character to the invention.

With this decision the direction changed completely without clarifying the reasons and showing an incoherent character.¹⁸¹ Besides, it represented one of the factors that led to the failure of the proposal for a Directive of the European Commission on the legal protection of computer programs.

This proposal was a project presented by the European Commission to achieve harmonization in the European patent law with respect to computer-implemented inventions, in order to improve competition and the development of the internal market.

The EU institution wanted to develop a Directive that could represent harmonization for all the member states, and in doing so they decided to follow the lead of the Boards of Appeal of the EPO, which is a body completely separated from the European Union and therefore with different interests. While the EU was about to end the first draft of the Directive, the Boards of Appeal changed direction with respect to software patent eligibility, in particular with regard to the “contribution approach” mentioned before.

In conclusion, due to the complexity of the subject, strong economic interests and contradictory decisions of the EPO, the proposal for the Directive failed completely.¹⁸²

The new approach adopted in *PBS Partnership/Controlling Pension Benefit Systems* was followed also in other decisions that characterized the first years of the 2000s.

The 2004 *Auction Method/Hitachi* decision of the EPO Technical Board of Appeal has particular significance as it started to show the new direction taken by the Boards of Appeal. This case dealt with an online sales system, which worked through the so-called Dutch auction, i.e. a method, apparatus and computer program that would give instructions based on the business method. The protection had been denied at first as it was only considered a business method as such.

The Technical Board of Appeal pointed out the characteristics of an invention and moved towards a new definition of technical character. As a matter of fact, the Board underlined the fact that the technical character was the only important element that

¹⁸¹ E. AREZZO, *La brevettabilità del software e dei metodi commerciali elettronici nella giurisprudenza dell'Ufficio Europeo Brevetti*, 2009, Assonime, 33-35.

¹⁸² AREZZO, *supra* note 101, at 176-179.

must be considered when dealing with patent eligibility, but at the same time it provided new requirements.

As written in the decision, the technical character «may be implied by the physical features of an entity or the nature of an activity, or may be conferred to a non-technical activity by the use of technical means».¹⁸³ In other words, if a method is likely to be performed on a computer, it shows technical character, and therefore it is an invention if it involves technical means.

Consequently, the technical character and the technical contribution were completely separated. Moreover, the technical character had got such a general and broad definition that it lost its importance, so that every non-technical entity could get technical character just through the use of technical means. In this way, the openness to patent eligibility expanded considerably and the Board went the opposite direction with respect to *Ibm I e II* decisions and their further technical contribution.

The issue represented by this change of direction was related to the inventions that were excluded from patentability according to article 52, clause 2 of the EPC.

As a matter of fact, since the technical character appeared to be only a formality and it could be conferred by any technical means, the exclusions were reduced to mere abstract ideas, opening the way to a too broad interpretation in patent eligibility.

On this aspect of the topic the Board stated that «this does not imply that all methods involving the use of technical means are patentable»,¹⁸⁴ showing their awareness about the openness in patent eligibility but at the same time stating that the basic requirements for any invention would certainly be enough to evaluate the patentable subject matter.

Another important aspect of *Auction Method/Hitachi* decision related to the definition of invention. The Board underlined the requirements for a subject matter to be patentable, i.e. «inventions which are susceptible of industrial application, which are new and which involve an inventive step».¹⁸⁵

¹⁸³ T 0258/03 (*Auction method/HITACHI*) of 21.4.2004, Reasons for the Decision 4.5, at www.epo.org/law-practice/case-law-appeals/recent/t030258ep1.html

¹⁸⁴ *Supra* note 183, Reasons for the Decision 4.6.

¹⁸⁵ *Supra* note 183, Reasons for the Decision 3.1.

The most important requirement for the Board was the fact that it had to be an invention, in the sense of «subject-matter having technical character»,¹⁸⁶ even before meeting all the other requirements, so that this became a sort of prerequisite and had to be the first test applied to a claim. In this decision, the requirement of technical character was satisfied based on the presence of terms, such as “server computer”, “client computers” and a “network”, which refer to technical features.

This statement of the Board once again showed the rejection of the “contribution approach” as the way to determine patent eligibility by comparing the claim to the prior art.¹⁸⁷

In conclusion, in this case the Board rejected the application since the invention did not show any inventive step. Moreover, there was not any contribution to the technical character, and it did not provide a technical solution to the problem it aimed at solving.¹⁸⁸

Through a careful analysis of the new direction of the EPO Boards of Appeal, it appears that on one hand the requirement of technical character became only a formality since any technical means could confer this characteristic to a claim, while on the other hand the same openness did not happen with respect to other requirements for patent eligibility, in particular when it comes to originality, that is the characteristic of being non-obvious in providing a solution to a problem.

Originality became a prerequisite that appeared more important than then the technical effect itself. In other words, the technical character was implemented and included in the requirement of originality, whose lack had been the cause of several rejections of patent protection.

This “fusion” of requirements gave birth to a newly developed method that was revisited to create the so-called problem solution approach. This method is still used by the EPO

¹⁸⁶ Ibidem.

¹⁸⁷ Supra note 183, Reasons for the Decision 3.2, 3.3.

¹⁸⁸ A. STROWEL, S. UTKU, *The trends and current practices in the area of patentability of computer implemented inventions within the EU and the U.S.*, European Commission Final Report, 2016, 17-19.

to determine the presence of the inventive step¹⁸⁹ in a claimed subject matter and it involves four steps: The first one is the identification of the closest prior art and of the technical field the invention belongs to, the second step concerns the valuation of the technical effect or result of the invention with respect to the prior art, the third step aims at identifying the objective technical problem that the claimed invention wants to solve, and the fourth and last step consists in verifying whether or not a person skilled in the art would have been easily able to reach the same solution as the one provided by the claimed invention.¹⁹⁰

The determination of the technical problem appears to be the most important part of the approach, in which objectivity is a key word. The problem is not required to be extremely difficult, but it must be concrete, and the claimed subject matter must appear non-obvious to the skilled person.

The analysis of the technical character of a computer implemented invention appears easier to determine, as the invention would be considered as a whole. This aspect does not apply to the valuation of the inventive step and the non-obviousness of the solution provided by the invention. This last analysis is based on the so-called distinguishing features, i.e. all the elements of the claimed invention which are different from the closest prior art.

The main issue in this part of the analysis is that the non-technical elements of the claimed invention are often the part that provides the most innovative and inventive contribution and therefore represent the distinguishing features. Consequently, it becomes difficult to assess the inventive step basing only on the elements that are objectively non-technical. To overcome this obstacle, the EPO adopted a new strategy based on compromise with respect to the identification of the objective technical problem, which is one of the steps of the assessment of the inventive step.

¹⁸⁹ The inventive step refers to the requirement of non-obviousness, according to which the invention must not be present in the state of the art. In order to comply with this requirement, the solution of the technical problem that the invention wants to solve must be new and not obvious to a person skilled in the art. See A. VANZETTI, V. DI CATALDO, *Manuale di diritto industriale*, Giuffrè Editore, Milano, 2003, 338-339.

EPC, Supra note 49, article 56.

¹⁹⁰ Case Law of the Boards of Appeal, 8th edition, 2016, I, D, 2, Problem and solution approach, EPO, www.epo.org/law-practice/legal-texts/html/caselaw/2016/e/clr_i_d_2.htm

This new position was expressed in the 2002 Two identities/Comvik decision, in which the Board of Appeal admitted the validity of the claimed invention based on the assessment on the inventive step considering also non-technical elements, which in theory would be excluded from patent eligibility. The case dealt with digital mobile telephone systems and in particular with the subscriber identity module (SIM).

As explained by the Board, «it is legitimate to have a mix of technical and "non-technical" features appearing in a claim»,¹⁹¹ meaning that both kinds of elements were taken into consideration in the analysis. In addition, «the Board, although allowing a mix of technical and non-technical features to be claimed, considered the technical part of the invention as the basis for assessing inventive step».¹⁹² The Board tried to reach a position of compromise, but gave more importance to the technical elements of the invention.

In conclusion, in the case of the so-called mixed-type-claim-feature,¹⁹³ the technical problem as part of the assessment of the inventive step can be formed by both technical and non-technical elements, provided that the latter have the function of better explaining the problem and creating a connection between the solution and the problem itself. Non-technical elements must have the function of contributing to the technical character of the invention in order to be considered part of the inventive step.¹⁹⁴ In other words, they should provide further elements, reasons and characteristics that help understanding the solution provided by the invention.

In this case, the GSM network system in which the SIM operates addresses technical issues, while the choice of the identity connected to the SIM, the use of data and the distribution of costs are not technical functions of the invention, since they are not addressed as a technical problem, but they represent a contribution.

Moreover, when the solution proposed by the invention belongs to a non-technical field, some hints about the solution can appear in the formulation of the problem, even if it

¹⁹¹ T 0641/00 (Two identities/COMVIK) of 26.9.2002, Reasons for the decision 4, at www.epo.org/law-practice/case-law-appeals/recent/t000641ep1.html

¹⁹² Ibidem.

¹⁹³ EPO, supra note 177, art G, ch. VII, 5.4, Claims comprising technical and non-technical features.

¹⁹⁴ EPO, *Examination of computer implemented inventions at the European Patent Office with particular attention to computer-implemented business methods*, EPO Official Journal, No. 11, 2007, 599.

should not happen according to the rules.¹⁹⁵ The solution should not be even mentioned when the problem that it aims at solving is explained, but this specific case represents an exception to the rule.

The problem solution approach was applied to claimed inventions with both technical and non-technical elements (mixed-type-claim-feature) by reaching a position of compromise.

When it comes to the measurement of originality, the decision taken in the Two identities/Comvik case did not build a path strong enough to create a sort of principle that could be applied in the future. As a matter of fact, in the case Duns Licensing Associates it is stated that «It is legitimate to have a mix of technical and "non-technical" features appearing in a claim, in which the non-technical features may even form a dominating part of the claimed subject matter»,¹⁹⁶ confirming the previous direction. Despite this, the Board took a different position with respect to the past, holding that «Novelty and inventive step, however, can be based only on technical features, which thus have to be clearly defined in the claim».¹⁹⁷

The Board made it clear that non-technical elements "as such"¹⁹⁸ of the claimed invention could not be taken into consideration as they «do not provide a technical contribution to the prior art»,¹⁹⁹ and therefore could not contribute to novelty and originality analysis.

As a consequence to this decision of the Board, it was necessary to make a distinction between non-technical elements "as such" and non-technical elements that actually contributed to the solution of the technical problem of the claimed invention.

Concerning this topic, the following decisions of the EPO Technical Boards of Appeal were quite conflicting and therefore there was no unique direction.

For instance, the Ticketmaster/Ticket auctioning system decision stated the Board position on the impossibility of non-technical elements of contributing to the solution

¹⁹⁵ Supra note 191, Reasons for the decision 7.

¹⁹⁶ T 0154/04 (Estimating sales activity / DUNS LICENSING ASSOCIATES) of 15.11.2006, Reasons for decision 5, (f), at www.epo.org/law-practice/case-law-appeals/recent/t040154ex1.html

¹⁹⁷ Ibidem.

¹⁹⁸ Supra note 196, «Non-technical features, to the extent that they do not interact with the technical subject matter of the claim for solving a technical problem, i.e. non-technical features "as such"».

¹⁹⁹ Supra note 196.

of the technical problem. The presence of non-technical elements was admitted: «Although a non-technical feature may well serve to define the context in which a technical problem occurs, it cannot contribute to its solution since, by definition, it has no technical consequences».²⁰⁰ Therefore, non-technical elements were excluded as they did not produce any technical effects and had no contribution in the inventive step, while at the same time they may appear important during the analysis of the inventive step: «They must therefore be taken into consideration for the examination as to inventive step while at the same time not being permitted to contribute to it».²⁰¹

In conclusion, in this case the Board held that non-technical elements could be taken into consideration only when analyzing the technical problem but not during the assessment of originality, because of their lack of contribution to the solution.

Right after the Ticketmaster decision, the Board of Appeal dealt with other cases in which it took a slightly different direction. For instance, in Game machine/GAMEACCOUNT the Board explained that a non-eligible invention will remain so since originality will always be missing, despite its technical implementation. On the other hand, the originality requirement would be met in case the relation between technical and non-technical elements would generate further technical advantages with respect to the ones produced only by non-technical elements.²⁰²

To sum up, the Board approached the cases going into different directions. At first, it was stricter in the Ticketmaster decision, which would later be used as a model to apply in case of inventions that did not meet the requirements and therefore were completely excluded from patent eligibility. Then the approach became less strict. In the case of computer implemented inventions, the previous direction of the Board would have harmed software inventions, since computer programs were fundamental to get the technical effect. In fact, in inventions with technical and non-technical elements, the latter often prevailed and represented the innovative part of the invention itself.

Therefore, the Board decided to change direction in order to avoid possible disadvantages for computer implemented inventions in the future. The focus moved to

²⁰⁰ T 0688/05 (Ticket auctioning system/TICKETMASTER) of 19.9.2007, section B, at www.epo.org/law-practice/case-law-appeals/recent/t050688eu1.html

²⁰¹ Ibidem.

²⁰² T 1543/06 (game machine/GAMEACCOUNT) of 29.6.2007, Reasons for the decision 2, at www.epo.org/law-practice/case-law-appeals/recent/t061543eu1.html

the valuation of the further technical effect implemented by all elements that interact together within the invention, more specifically to the way non-technical elements create technical advantages through the technical elements of the invention.²⁰³

A confirmation to this position arrived during the mid-2000s, when patents were granted for computer implemented inventions regarding video games.

In these cases, the Board found the technical character of the inventions in the way the game was programmed and implemented into a computer (in the sense of machine or apparatus), for instance the implementation of a graphic user interface with both technical and non-technical features as in the case Video game/KONAMI.

This decision dealt with the technical effect produced by a simple everyday tool applied to the graphic user interface. Thus, the focus was put on the technical way in which this tool is applied to a programmed video game.²⁰⁴

The solution of these cases was indeed technical, but the problems they aimed at solving were not properly technical, since they only represented tools that were added to videogames in order to make them more interesting.

The EPO changed direction towards openness in patent protection, in particular to inventions that provided a technical solution to a problem that was not properly technical, going against the definition of patentable subject matter itself.

In conclusion, openness started to grow, as the EPO tried to adapt to the development of new technologies without falling into the trap of discrimination of the sector in which the invention was used, looking at the future rather than being stuck in the past.

3.3.2 The Referral and the Enlarged Board of Appeal

As stated in the last paragraphs, the EPO changed directions throughout the time, going from a stricter position on computer programs patent eligibility to a situation of openness that took shape in the first years of 2000.

²⁰³ AREZZO, supra note 101, at 169-170.

²⁰⁴ T 0928/03 (Video game/KONAMI) of 2.6.2006, at www.epo.org/law-practice/case-law-appeals/recent/t030928eu1.html

The lack of law that specifically regulated software patent protection in Europe led to an impasse in which the leading role was taken by the European Patent Office, which had quite a strong authority and influence over the European patent policy.

The EPO had not always been coherent in its decisions as the Boards of Appeal often changed position, as previously seen in all the cases. This behaviour caused several consequences in the national courts of countries that were part of the EPC. Some countries agreed to the position of the Board while others took some distance and kept a stricter vision. As a matter of fact, the EPO had strong influence on the EPC countries, but its decisions were and are still not binding, as the EPO is separated from national courts and EU institutions.

A brief mention goes to the mechanism of the EPO used in case of divergent decisions of two Boards of Appeal. When the Boards take different and contrasting decisions, the President of the EPO has the right to present a document – the Referral – which contains questions about that specific topic, to the so-called Enlarged Board of Appeal (EBA). This is a board which is part of the EPO and has several functions, all about taking decisions on points of law. «The main task of the Enlarged Board of Appeal is to ensure the uniform application of the European Patent Convention (EPC)»,²⁰⁵ and it has relevant importance in the EPO. A Board of Appeal or the President of the EPO can ask the EBA to decide on important matters.

At the end of 2008, the former President of the EPO Alison Brimelow made a referral to the Enlarged Board of Appeal under article 112, clause 1, b of the EPC²⁰⁶ about patent eligibility of software inventions. The referral was based on the fact that two Boards of Appeal took different and contrasting decisions, which then represented different directions. It was composed of four questions which dealt with the claim of computer programs as such and their technical character.

The first two questions were connected as they related to software as such and to the exclusion of computer programs from patent eligibility. The origin of these first two problems can be found in the Board of Appeal decisions *Ibm/Computer Program Product*

²⁰⁵ EPO, Role of the Enlarged Board of Appeal, www.epo.org/law-practice/case-law-appeals/eba.html

²⁰⁶ EPC, supra note 49, article 112, clause 1, b, («the President of the European Patent Office may refer a point of law to the Enlarged Board of Appeal where two Boards of Appeal have given different decisions on that question»).

I,²⁰⁷ which was explained in the previous paragraphs, and Clipboard formats III/Microsoft. In this last decision, a distinction was made between software related inventions claimed as method and the ones claimed as product. In the case of method, the Board stated that the technical character would be provided by the use of technical means, i.e. functional data structures (clipboard formats as the memory of the computer), independently of any content that was being transferred.²⁰⁸

When it comes to the claim as product, that is «a computer-readable medium having computer-executable instructions (i.e. a computer program) on it to cause the computer system to perform the claimed method»,²⁰⁹ the technical character could have derived from the technical nature of the clipboard or from the «potential of achieving the above-mentioned further technical effect of enhancing the internal operation of the computer, which goes beyond the elementary interaction of any hardware and software of data processing».²¹⁰ As a consequence, the computer program could not be considered as such and brought a considerable contribution to the technical character of the claimed invention.

The Board underlined this distinction by stating that an invention claimed as «method implemented in a computer system represents a sequence of steps actually performed and achieving an effect»,²¹¹ while software as product was «a sequence of computer-executable instructions which just have the potential of achieving such an effect when loaded into, and run on, a computer».²¹²

This distinction is not new to the case law: In the past computer programs were reduced to mere potentiality of achieving a technical effect only when run on a computer and therefore only when a machine was being used.

The first two questions of the referral of the President of the EPO were strictly related to these aspects of software patent protection. In particular, the first question was

²⁰⁷ Supra note 176.

²⁰⁸ T 0425/03 (Clipboard formats III/MICROSOFT) of 23.2.2006, Reasons for the decision 6.2, at www.epo.org/law-practice/case-law-appeals/recent/t030425eu1.html

²⁰⁹ Supra note 208, Reasons for the decision 6.3.

²¹⁰ Ibidem.

²¹¹ Supra note 208, Reasons for the decision 6.1.

²¹² Ibidem.

about computer programs as such.²¹³ The second question referred to the exclusion of software from patentability under article 52, clause 2, c of the CBE and in particular whether the exclusion could be avoided «by explicitly mentioning the use of a computer or a computer-readable data storage medium».²¹⁴ In case of negative answer, the second part of question number two referred to whether a further technical effect was necessary to avoid exclusion, «said effect going beyond those effects inherent in the use of a computer or data storage medium to respectively execute or store a computer program»,²¹⁵ i.e. technical effects that are naturally connected to the use of a computer. The president of the EPO had several critics about the Microsoft case that were expressed through the referral. First, the Technical Board was accused of focusing more on the form rather than on the content of the invention. Second, there was a problem concerning the technical character of the invention. As a matter of fact, in the past the Boards had stated that elements could be referred to as technical when they actually made a contribution to the realization of technical effects of the invention. What the Boards had never mentioned was how to distinguish between elements that could or could not contribute to this technical effect, leaving the analysis to a critical point.²¹⁶ Strictly linked to this aspect, the third question of the referral concerned the contribution of the elements to the technical character. It focused on the characteristics of the feature and on the way these features affected the technical effect, specifically whether the effect should happen on a physical entity or object – and in this case which kind of entity – existing in the real world.²¹⁷

The fourth and last questions related to the activity of programming a computer: «Does the activity of programming a computer necessarily involve technical

²¹³ The question is whether «a computer program can only be excluded as a computer program as such if it is explicitly claimed as a computer program», cf. *Referral by the President of the European Patent Office to the Enlarged Board of Appeal dated 23 October 2008 regarding divergent decisions of two boards of appeal*, EPO Official Journal, n.3/2009, 142.

²¹⁴ Ibidem.

²¹⁵ Referral by the President of the EPC, supra note 213.

²¹⁶ Referral by the President of the EPC, supra note 213, at 148.

²¹⁷ Referral by the President of the EPC, supra note 213, at 142, («Must a claimed feature cause a technical effect on a physical entity in the real world in order to contribute to the technical character of the claim?», «If question 3(a) is answered in the positive, is it sufficient that the physical entity be an unspecified computer?»).

considerations?».²¹⁸ This aspect appears related to the exclusion of software from patent protection according to article 52, clause 2 of the EPC. The exclusion from patent eligibility is connected to the lack of technical character, which is the reason why the last question also considers the features resulting from programming and asks whether they would contribute to the technical character of a claim. A positive answer to this last question would increase considerably the possibility of patent eligibility for computer implemented inventions, since the only reference to programming would provide technical character to the invention.

In 2010 the Enlarged Board of Appeal replied to the referral, providing its reasons for the decisions of the technical Boards of the EPO.

First of all, the EBA recognized the main topic of the referral, that is the interpretation of the exclusion of computer programs as such from patent eligibility, as admissible according to the criteria of article 112 EPC explained before.²¹⁹

When it comes to the second requirement, the one referring to different decision of Technical Boards, the EBA did not recognize the presence of different decisions on the topic as a real conflict on the interpretation of law, but only as natural development and shift in the interpretation of law itself.²²⁰ Consequently, the EBA rejected the referral as considered inadmissible under article 112 EPC, but provided answers to the questions of the EPO President.

As far as the first question is concerned, the EBA admitted a different interpretation in the IBM I and Microsoft cases, but once again it was explained as a shift in case law, a mere development and evolution.

As a matter of fact, the Microsoft decision was presented as an evolution of the Hitachi case. Finally, question one was considered inadmissible.²²¹

When it comes to the second question, the EBA focused on explaining the topic of exclusion from patentability under article 52 of the EPC. As a matter of fact, it was stated

²¹⁸ Referral by the President of the EPC, supra note 213, at 156.

²¹⁹ *Opinion of the Enlarged Board of Appeal of 12 May 2010 in relation to a point of law referred by the President of the European Patent Office pursuant to Article 112(1)(b) EPC*, Reasons for the opinion 4, www.epo.org/law-practice/case-law-appeals/pdf/g080003ex1.pdf

²²⁰ *Opinion of the Enlarged Board of Appeal*, supra note 219, Reasons for the opinion 7, 7.1.

²²¹ *Opinion of the Enlarged Board of Appeal*, supra note 219, Reasons for the opinion 10.10 – 10.12.

that a claim in the area of computer programs «can avoid exclusion under Articles 52(2)(c) and (3) EPC merely by explicitly mentioning the use of a computer or a computer-readable storage medium».²²² The EBA underlined that the lack of an inventive step would be fundamental to fail patent eligibility.

Moreover, question two was found inadmissible because there had been no divergence in the case law that supported the question, specifically referring to software claimed as methods and software claimed as products which, according to the opinion of the Enlarged Board of Appeal, are equivalent and have an identical scope.

Question three was also considered inadmissible. The EBA explained that in no previous decision of the Boards «a technical effect on a physical entity in the real world was required»²²³ as a fundamental and necessary element, but it was only considered a possible technical effect that could prevent the invention from being excluded from patent protection.²²⁴

The last question dealt with the technical character of the activity of programming a computer. The EBA acknowledged some divergence and confusion in past opinions of the Boards of Appeal, but once again these positions were not considered enough to meet the requirement of different decisions.²²⁵

In conclusion, the EBA rejected the referral but at the same time provided answers that gave confirmation to the latest Boards of Appeal case law. As a matter of fact, the EBA never recognized a divergence or the presence of different decisions – as defined in article 112 EPC – but defined them only as a shift in case law, i.e. a pure development. Despite this analysis, the questions of the President of the EPO in the referral were not properly answered and the main issue concerning the term “technical” was not solved.²²⁶

Moreover, when it comes to originality, the EBA did not give a proper explanation of the technical character of the elements of a claimed invention, specifically regarding their contribution to the technical effect.

²²² Opinion of the Enlarged Board of Appeal, supra note 219, Reasons for the opinion 10.13.

²²³ Opinion of the Enlarged Board of Appeal, supra note 219, Reasons for the opinion 12.1.

²²⁴ Opinion of the Enlarged Board of Appeal, supra note 219, Reasons for the opinion 12.3, 12.4.

²²⁵ Opinion of the Enlarged Board of Appeal, supra note 219, Reasons for the opinion 13.2 – 13.4.

²²⁶ Opinion of the Enlarged Board of Appeal, supra note 219, Reasons for the opinion 9.2.

The rejection of the referral by the EBA left a big hole in the intellectual property environment, since the need for clarification was very strong and the Opinion did not produce the awaited effects.

CHAPTER 4

WHAT'S NOW?

SUMMARY: 4.1 European position – 4.2 American position – 4.2.1 The case: Alice v. Cls Bank International – 4.3 Current situation in software protection – 4.4 Conclusion

4.1 European position

The European situation regarding the patentability of computer programs has been characterized by a constant and incoherent change of position by the Boards of Appeal of the EPO.

After the failure of the proposed Directive on the patentability of computer-implemented inventions, the institutions of the European Union took a step back and once again the EPO had the role of leader in this sector.

The main purpose of the Directive was to harmonize national patent laws and provide clear rules concerning the topic. The need for guidance was strong, since software as such was actually excluded from patentability, but a relevant number of patents for computer-implemented inventions was granted.

An agreement could not be reached, and consequently the Directive was somehow replaced by the case law of the Technical Boards of Appeal, because the referral of the President of the EPO and the Opinion of the Enlarged Board of Appeal brought doubts rather than practical solutions.

One of the main issues that characterized all the cases referring to patentability of computer programs is the issue of technical character of software. Having technical character means that the claim must be an invention, with all the requirements expressed in the EPC. The lack of technical character of computer programs has always been present and the judicial practice has always tried to find a solution to bypass this obstacle.

The tests used by the Boards of Appeal to find technical character in a claim connected to a computer have changed through the years due to different positions on the topic which were driven by the development of the industry itself.

Computer programs have always been considered something different from everything existing before. This is in part true, since they represent a very relevant invention – in its broad sense – that gave birth to a complete new industry. This aspect of software is the one that has created more doubts and problems. The Boards of Appeal did not have a clear and homogeneous idea on the sector to which software and business methods belonged to. Besides, the EPO has never provided a real definition of “technical character”, while many efforts have been made on how to find it within the claim.

The conception of technical character has changed considerably through time.

Computer programs have been treated like every other invention, in the sense that the EPO tried to find a sector where they could fit. But the main point is that they have their own particular sector, which has made it even more difficult for Boards to find proper solutions to the cases.

Thus, it is interesting to underline how the lack of technical character that naturally characterizes software has always been interpreted in the sense that computer programs did not belong to a technical sector in its traditional meaning.

Some efforts have been made in order to try to provide some clarity when it comes to the law. One example is the 2000 Amendment of the EPC, which came into force in 2007, through which an attempt was made to eliminate computer programs as such from the subject matters that were excluded from patentability by the EPC.

This attempt was a complete failure, as the countries that were part of the EPC were not ready to face it and were probably waiting for the proposal of Directive to clear the law on the topic.²²⁷

At the same time, an agreement was made in order to comply article 52 of the EPC to article 27 of the TRIPS Agreement to reach a certain level of harmonization, so that «European patents shall be granted for any inventions, in all fields of technology,

²²⁷ S. STERCKX, J. COCKBAIN, *Exclusions from Patentability: How Far Has the European Patent Office Eroded Boundaries?*, Cambridge University Press, 2012, 65.

provided that they are new, involve an inventive step and are susceptible of industrial application».²²⁸

The term “in all fields of technology” was added in order to have a wider inclusion of claims and to avoid discrimination for other technological sectors, but this wording was not enough to bypass the list of non-patentable subject matters of the EPC.

Going back to the technical character, the EPO has always been criticized for not providing a clear definition of this word. Several critics came from English Courts, which in the past had accepted the contribution approach on the line of the EPO Boards of Appeal, but then refused to accept the following constant changes.

One example that can be provided refers to the *Aerotel v. Macrossan* case, where the English Court of Appeal criticized the decisions of the EPO Technical Boards of Appeal by defining them «mutually contradictory».²²⁹

In particular, the English High Court developed its own patentability test for software inventions and e-business methods, specifically related to the technical contribution of the claim.

The test provided in this case is a four-step analysis to determine whether the claimed subject matter was indeed patentable. The first step is the analysis of the claimed invention, that is to «properly construe the claim».²³⁰ The second step is the identification of «the contribution of the invention».²³¹ The third step is to verify whether the invention is part of the excluded subject matter, and the last step concerns the technical nature of the actual contribution of the claim.

This test appears similar to the approach used by the EPO, but the main difference regards the technical nature of the claim. According to the EPO case law, the technical nature of the claim is based on the presence of technical means. In the English approach instead, the term “technical” is a “quality of the nature of the contribution” – that is the intrinsic nature of the contribution itself – provided by the claim, rather than referring to the claimed subject itself as included in the patent application. In other words, the

²²⁸ EPC, supra note 49, article 52, clause 1.

²²⁹ *Aerotel Ltd v. Telco Holdings Ltd Telco Global Distribution Ltd Telco Global Ltd*, 2006, The case law n. 25, at www.bailii.org/ew/cases/EWCA/Civ/2006/1371.html

²³⁰ J. HILL, *United Kingdom: English High Court Clarifies Patentability Test For Software Inventions*, Mondaq Business Briefing, 2008.

²³¹ *Ibidem*.

focus is on the contribution to the technical effect and not only on the invention as described in the application.

Moreover, in the English approach it is specified that «the contribution of an invention should include consideration of the how the invention actually works to solve a problem or provide an advantage».²³²

This analysis provides that both technical and non-technical elements have influence on the technical character, in line with the position of the EPO. Besides, the test requires that the contribution would indeed be technical. In other words, the mere claim of technical means in the application could be enough to prove the technical nature of the invention, but it would definitely not be enough to prove the technical nature of the contribution, i.e. the effect produced by the invention itself.

The English approach appears stricter and takes some distance from the direction used in the EPO case law.

The EPO lies now in an impasse, a situation in which clarity is lacking and the control is taken over by the EPO Boards of Appeal.

4.2 American position

When it comes to the United States, after the *Bilski* case the position of the Supreme Court became more moderate.

As a matter of fact, the *Bilski* case represented an important turning point, since the Court stated that abstract ideas were indeed unpatentable. Moreover, the machine-or-transformation test was rejected as the exclusive analysis for patentability of processes. Despite the rejection, the machine-or-transformation test was later used in other cases as an important indicator of patentability, creating a quite relevant debate.²³³

This test was used to analyse the patentability of processes and to check their pre-emption of abstract ideas. At first, the test could be avoided by shaping the claims as machines or manufactures in the patent application. Later, the test also applied to

²³² HILL, *supra* note 230.

²³³ M. A. LEMLEY, M. RISCH, T. SICHELMAN, R. P. WAGNER, *Life after Bilski*, *Stanford Law Review*, June 2011, volume 63, 1319.

claims of apparatus and machines, according to the Supreme Court view stating that method claims could pre-empt abstract ideas too.²³⁴

Like the EPO, the American Supreme Court had its faults since it never provided a definition for the wording “abstract idea”, which caused troubles in front of the Federal Circuit when trying to reach a decision for some cases in the first years of the 2010s.

As a general fact, along with the definition of “abstract idea”, the Court failed to provide guidance about the other claims that are indeed excluded from patentability, i.e. laws of nature and natural phenomena.

The main worry is that fundamental laws, such as abstract ideas, would be taken away from society in case they were patentable. In fact, claims are rejected when they appear too broad by including anything abstract or universal.²³⁵

This aspect of the topic still remains open and still represents an issue when dealing with unpatentable subject matters.

A way to clarify this aspect was created by the US Patent and Trademark Office when, in 2009, it issued the Interim Examination Instructions for Evaluating Subject Matter Eligibility Under 35 U.S.C. section 101,²³⁶ along with the 2010 Interim Guidance for Determining Subject Matter Eligibility for Process Claims in View of *Bilski v. Kappos*.²³⁷

The guidance issued in 2009 provided detailed instructions that would help with the analysis of patent eligibility. As a matter of fact, the two-step 101 analysis was explained as the fastest way to check patent eligibility. The first step regards the patent-eligible subject matter categories in order to check whether the claim belongs to one of them. The product or process claim analysis provides examples on how to verify patent eligibility so that it could meet the requirements. The second step focuses on the judicially recognized exceptions which include, for instance, abstract ideas and scientific principles. The guidance specifies that «a particular practical application of a judicial

²³⁴ Are software and business methods still patentable after the *Bilski* decision? www.bitlaw.com/software-patent/bilski-and-software-patents.html

²³⁵ LEMLEY, RISCH, SICHELMAN, WAGNER, *supra* note 233, at 1323.

²³⁶ Interim Examination Instructions for Evaluating Subject Matter Eligibility Under 35 U.S.C. section 101, www.uspto.gov/sites/default/files/patents/law/exam/101_interim_training.pdf

²³⁷ Interim Guidance for Determining Subject Matter Eligibility for Process Claims in View of *Bilski v. Kappos*, 2010, USPTO. www.uspto.gov/sites/default/files/patents/law/exam/bilski_guidance_27jul2010.pdf

exception is eligible»,²³⁸ while if a claim refers only to one of the exceptions is not eligible. Flowcharts and examples are also provided in order to improve the analysis.

The 2010 guidance provided the USPTO personnel with relevant elements that aim at determining whether a process (or method) claim is directed to an abstract idea and therefore falls outside the area of patent-eligibility.

The guidance gives a list of factors that are towards or against eligibility and which represent an important aid in determining it.

An important framework in the US law was provided by the 2012 case *Mayo v. Prometheus*, which dealt with the patent application of a medical method of giving a drug to a patient.

This case represents a relevant framework since the Supreme Court declared that this method, despite not being connected to software, was not patent-eligible subject matter. The main reason for this decision was that the *Prometheus* patent claim included a law of nature. As explained before, this represents one of the exclusions from patentability according to the US Patent Act. The only exception to the exclusion would be the case in which the claim applies the law of nature to a structure or process, so that it is not only a mere description of the excluded subject matter. A claim may be patentable if some features are added and the law of nature has a practical application, so that monopolization is avoided. Moreover, the application of the law of nature referred to in this case was based on elements that were already present in the state of the art and was therefore unpatentable.²³⁹

As an outcome to the *Mayo* case, the US Patent and Trademark Office issued a memorandum, i.e. a guidance on Interim Procedure for Subject Matter Eligibility Analysis of Process Claims Involving Laws of Nature.²⁴⁰

The main aim of this memorandum was to provide patent examiners with a procedure that would help them to analyse process claims that involved laws of nature, natural phenomena or natural principles. Besides, it would help them «in making the determination of whether a claim is a patent-eligible practical application of a law of

²³⁸ USPTO, supra note 236.

²³⁹ Supra note 147.

²⁴⁰ USPTO, Interim Procedure for Subject Matter Eligibility Analysis of Process Claims Involving Laws of Nature, 2012
www.uspto.gov/sites/default/files/patents/law/exam/2012_interim_guidance.pdf

nature or whether the claim is effectively drawn to the law of nature itself»,²⁴¹ thus it could help the examiners in making a distinction with respect to patent eligibility.

In particular, the memorandum dealt with claims with a natural principle being a limiting element or step. In this case, the natural principle must be practically applied, and the claim must significantly be more than the natural principle itself.

In conclusion, the claim must pass three inquiries: The first is about the claim being a process (or method), the second concerns the use of a natural principle, which exists regardless of any human action, and the third regards the practical application of the natural principle and its pre-emption.²⁴²

In the *Mayo v. Prometheus* case, it would pass inquiries one and two, but it would fail the third one. As a matter of fact, it was indeed a process which involved a natural principle, but the steps that were added to this natural law were already known by the scientific community and they just represented general instructions rather than adding something new to the principle.

In 2014 the USPTO issued the 2106 Manual of Patent Examining Procedure (MPEP),²⁴³ in addition to the 2012 Guidance, that provided a subject matter eligibility test for product and processes.

The test is composed of two main steps: The first step is focused on the analysis of the claim, in particular whether it was directed to one of the four statutory categories.²⁴⁴

The second step is divided in two parts, 2A and 2B, which represent the two steps of the *Mayo/Alice* test for judicial exception. In particular, step 2A focuses on the way to «determine whether the claim is directed to a law of nature, a natural phenomenon, or an abstract idea».²⁴⁵ If a claim was directed to one of the exceptions, further analysis would be required in order to determine the patent eligibility.

²⁴¹ New Examining Procedure Related to *Mayo v. Prometheus*, July 2012, Director's Forum: A Blog from USPTO's Leadership

www.uspto.gov/blog/director/entry/new_examining_procedure_related_to

²⁴² USPTO, *supra* note 240, parts B, C and D.

²⁴³ 2106 Patent Subject Matter Eligibility [R-08.2017]

www.uspto.gov/web/offices/pac/mpep/s2106.html

²⁴⁴ Process, machine, manufacture or composition of matter.

²⁴⁵ 2014 Interim Guidance on Patent Subject Matter Eligibility, Federal Register, Vol. 79, No. 241, Tuesday, December 2014, Rules and Regulations, at www.govinfo.gov/content/pkg/FR-2014-12-16/pdf/2014-29414.pdf

The Guidance provides several examples in order to help the identification of the judicial exceptions. First of all, «naturally occurring principles/substances and substances that do not have markedly different characteristics compared to what occurs in nature»²⁴⁶ are included in laws of nature and natural phenomena, such as chemical principles or isolated DNAs. Then, abstract ideas may include «fundamental economic practices, certain methods of organizing human activities, an idea ‘of itself,’ and mathematical relationships/formulas».²⁴⁷

If the answer to step 2A is negative, then step 2B is not necessary. In the opposite case, the analysis moves to step 2B, which is focused on the determination of the presence of additional elements in the claim that add “significantly more” to the judicial exception. This step is also referred to as the research of an inventive concept in the claim, i.e. the claim analysed as a whole is more than a mere application of the abstract idea.

As a matter of fact, in order to be patent eligible, a claim must contain particular and additional features that represent a meaningful and original application of the judicial exception, i.e. a law of nature, a natural phenomenon, or an abstract idea.

The wording “significantly more” is explained by the Supreme Court through examples from previous cases, such as «improvements to another technology or technical field»²⁴⁸ as in the Alice case, or «Applying the judicial exception with, or by use of, a particular machine»²⁴⁹ as in Bilski.

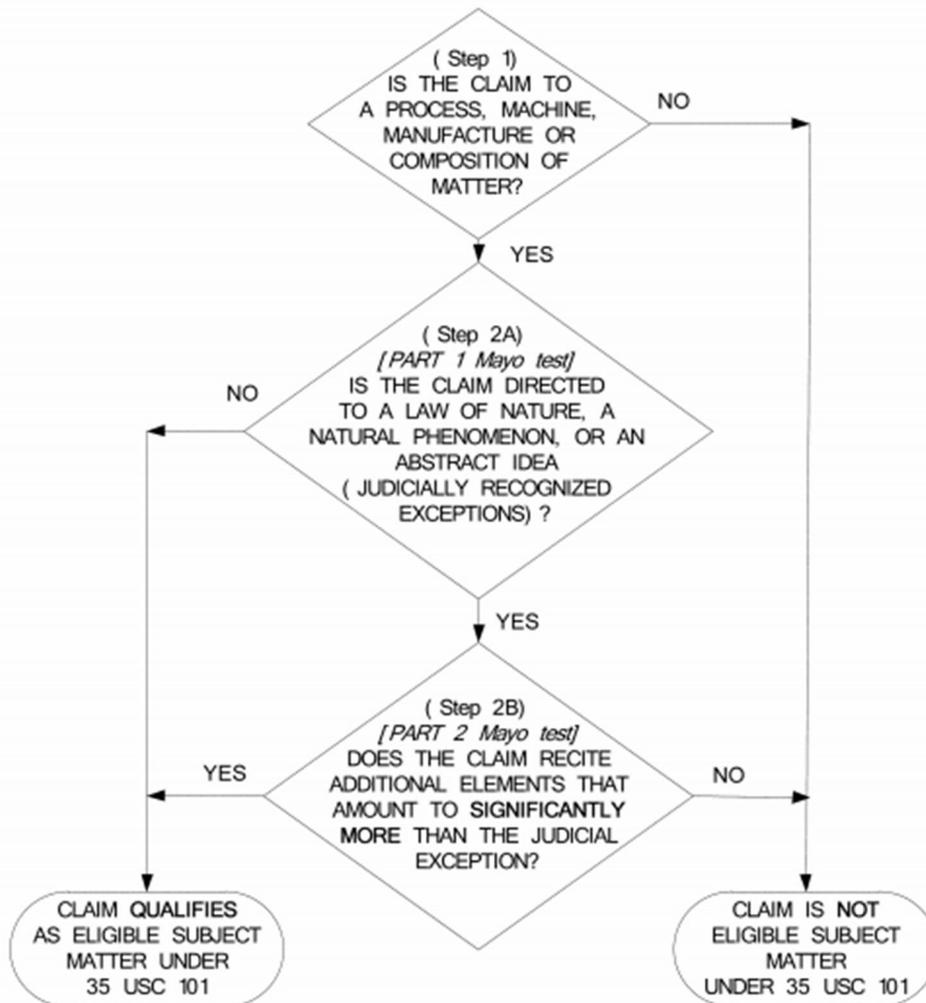
Moreover, the Guidance provided several examples on how to apply the test in order to help the US courts in deciding the patent eligibility of inventions – including software –, along with a specific and detailed summary on Supreme Court decisions that will be cited further in this work.

²⁴⁶ Supra note 245, at 74622.

²⁴⁷ Ibidem.

²⁴⁸ Supra note 245, at 74624.

²⁴⁹ Ibidem.



Source: 2014 Interim Guidance on Patent Subject Matter Eligibility

On the basis of the framework that developed through and after the Mayo case, the Supreme Court took one of the most important decisions of the last ten years in *Alice Corp. v. CLS Bank International*, which will be explained in detail in the next paragraph.

4.2.1 The case: *Alice v. Cls Bank International*

The Alice case is a decision of the US Supreme Court that took place in 2014. Up to now it represents a relevant and important point in the long path of patent eligibility.

The case dealt with electronic methods for financial-trading systems that could reduce risk between two parties that have the obligation to exchange payments.²⁵⁰ Through this invention, a programmed computer would play the role of a “third party” intermediary with the purpose of reducing the “settlement risk” that only one of the parties would fulfil its obligation.²⁵¹

The claimed patents for the case were three: First, «a method for exchanging financial obligations»,²⁵² second, «a computer system configured to carry out the method for exchanging obligations»,²⁵³ and third, «a computer-readable medium containing program code for performing the method of exchanging obligations».²⁵⁴

The case never mentioned software as such and indeed it referred to computer programs for business methods.

After being accused of infringement by Alice, CLS Bank filed suit against Alice on the base of invalidity of the patent claims. The burden fell on the Supreme Court which not only had to make a decision for this case, but at the same time was also put under pressure by many other companies that were eager to know about the future. As a matter of fact, after the Bilski case the situation regarding patent-eligible subject matters became more and more complicated and a strong clarification was needed.

A lot of companies in the software industry including Google, Microsoft and IBM stood against Alice as they considered the patents invalid for several different reasons.

The Supreme Court took into considerations these opinions and reached its decision: The patents were invalidated. In order to reach its decision, the Mayo test mentioned before was applied.

Through the first step, the Court reached the decision that the invention was directed to an abstract idea and therefore unpatentable. The abstract idea of the case was the concept of intermediated settlement, which was defined as «a fundamental economic

²⁵⁰ Alice Corporation PTY. Ltd v. CLS Bank International et al., 134 S. Ct. 2347 (2014), 1 www.supremecourt.gov/opinions/13pdf/13-298_7lh8.pdf

²⁵¹ STROWEL, UTKU, supra note 188, at 21.

²⁵² Supra note 250.

²⁵³ Supra note 250.

²⁵⁴ Supra note 250.

practice long prevalent in our system of commerce».²⁵⁵ Consequently, the claim was excluded from subject-matter eligibility.

The Court then moved to the second step of the framework, stating that the method claim only involved generic computer implementation that «fail to transform that abstract idea into a patent-eligible invention»,²⁵⁶ as it was indeed considered as routine or conventional activity.

The method was already known, and the invention lacked some important features that in another case could have turned it into a patentable subject-matter. Even when considering the invention as a whole in all its components, it was not possible to declare it patent eligible.

The main concern of the Supreme Court was strictly connected to pre-emption and a possible monopolization of the abstract idea, which must be available to everyone by definition.²⁵⁷ Moreover, the mere fact of adding the words “apply”, “generic computer” and relating the abstract idea to a specific technological environment was not enough to grant patent eligibility to an invention.

The Mayo analysis was applied to this case, and after Alice the test was referred to as the “two-step test”. The first step is the analysis of whether the claim is directed to an abstract idea. This first part of the analysis not only refers to the mere presence of an abstract idea or natural phenomenon in the claim, but it is connected to the character of the claim and to the ineligible concept. This step is not easy to define as the concept is not always clear, and for this reason it does not imply a high degree of difficulty to prove the direction to an abstract idea. Therefore, it does not represent a strong barrier to overcome.²⁵⁸

The second step is applied when the answer to the first one is positive. If a claim is in fact directed to an abstract idea, and therefore not patent eligible, patent protection could still be granted if it contains an “inventive concept”. This wording refers to the ability of the invention to transform the claimed abstract idea into a patent-eligible application. In this way, an “inventive concept” refers to specific features that make the

²⁵⁵ Supra note 250, at 2.

²⁵⁶ Ibidem.

²⁵⁷ Supra note 250, Opinion of the Court, at 6.

²⁵⁸ Applying step one of the Alice/Mayo test, www.bitlaw.com/guidance/patent/applying-step-one-of-Alice-Mayo-test.html

application of the abstract idea unique and not only a mere instruction or idea. As written above, the Supreme Court stated that «well-understood, routine, and conventional activities or claim elements cannot form an inventive concept»,²⁵⁹ and some exclusions were provided in order to better understand and apply the second step of the test.

Step two provided some exclusions, including the mere presence of generic physical computers. Besides, when there is a high degree of generality, the presence of a physical computer is not enough to find the inventive concept under step two of the Alice test. If a claim is limited to a particular technological environment by some elements of the invention itself is another exception of non-eligibility, along with all the claims that do not improve a technological process or the computer itself.²⁶⁰

Both steps have a common characteristic that was specified by the Supreme Court: It is not necessary to examine the prior art, since the focus must be on the claim.

The Alice case brought some clarity concerning the patentability of computer programs and it represents an important and turning point.

As a matter of fact, it was considered a victory because, after this case, the number of patent lawsuits considerably decreased, so as the number patents on software related inventions.²⁶¹ In 2015, «about 73 per cent of motions arguing that patents were invalid under Alice had been granted by federal courts»,²⁶² underlying the strong impact that the Alice decision had on the judicial practice.

4.3 Current situation in software protection

Right after Alice, in the USA two years followed when the Federal Circuit rejected a very high number of business method patents which were considered ineligible.

²⁵⁹ Ibidem.

²⁶⁰ Applying step two of the Alice/Mayo test, www.bitlaw.com/guidance/patent/applying-step-two-of-Alice-Mayo-test.html#instructions-to-apply

²⁶¹ G. NOTO LA DIEGA, *Software Patents and the Internet of Things in Europe, the United States and India*, University of Northumbria at Newcastle, 2017, 177.

²⁶² Ibidem.

Two relevant examples of 2014 are *Digitech Image Technologies, LLC v. Electronics for Imaging, Inc.* and *buySAFE, Inc. v. Google, Inc.*

In both cases, the patents on computer implemented inventions were invalidated by the Court. As a matter of fact, in the first case it dealt with pure data, while in the second case it was connected to fundamental economic concepts as in the *Bilski* case, and therefore they would fall outside the area of patent eligibility.²⁶³

DDR Holdings v. Hotels.com represents an exception since it was the first case after *Alice* in which the claim was found patent eligible.

Going into details, *DDR Holdings v. Hotels.com* is a 2014 decision of the US Court of Appeals for the Federal Circuit. The case dealt with the patentability of an invention, i.e. an e-commerce outsourcing system with a data store and a computer processor connected to a web page, used to retain or increase website traffic.

In order to decide on the patent eligibility of this invention, the CAFC applied the *Mayo/Alice* two-step test for the Section 101 analysis. As far as the first step is concerned, the judge was not able to clearly distinguish the abstract idea and therefore could not tell whether the invention was directed to it, as the first step would require. As written in the decision, the claims «do not recite a mathematical algorithm. Nor do they recite a fundamental economic or longstanding commercial practice».²⁶⁴

In order to avoid the obstacle, the first step was left behind as the claim would satisfy the second step of the framework regarding the inventive concept. It was necessary to spot the elements that actually made the invention patent eligible and conferred something more to the claim. The business method was not considered commonplace, but it was a new and original application to the new technological environment that was the Internet. As a matter of fact, the inventions did not «claim “use of the Internet” to perform an abstract business practice»,²⁶⁵ but «the “solution” they offer is necessarily rooted in computer technology in order to overcome a problem specifically arising in the realm of computer networks».²⁶⁶

²⁶³ Section 101 Court cases, www.bitlaw.com/patent/section-101-cases.html

²⁶⁴ *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245 (Fed. Cir. 2014), 19, at www.cafc.uscourts.gov/sites/default/files/opinions-orders/13-1505.Opinion.12-3-2014.1.PDF

²⁶⁵ *Supra* note 264, at 22.

²⁶⁶ *Supra* note 264, at 20.

A distinction was made between this case and many other cases from the past that were found patent ineligible, such as Alice and buySAFE, in order to highlight the elements that constituted the inventive concept.

Therefore, the invention was found eligible for protection under Section 101.

This case represents an important event in the long path of software patents, as it was the first decision after Alice that recognized the validity of a computer-implemented invention.

The following years were characterized by a very rigid view on the topic, as Courts never recognized the inventive concept or declared the inventions directed to an abstract idea, and consequently always found the inventions ineligible under Section 101.

The year 2016 was characterized by some relevant exceptions to this direction of the Courts, for which some inventions were found to be patent-eligible after applying the Mayo/Alice framework.

The first example is the CAFC case *Enfish, LLC v. Microsoft Corp.*, which dealt with the patent of a new logical model for computer database, i.e. the so-called self-referential database.

The invention was analysed through the Alice two-step test, in order to determine whether the claim was part of the patentable subject matters.

This decision is particularly important since, for the first time, it established «a mechanism to evaluate the first step in the Alice test as to whether a claim is "directed to" an abstract idea».²⁶⁷

As a matter of fact, before this moment the Supreme Court had not established a clear framework or rules that could help understand what an abstract idea is, obviously when connected to the first step of the test. The claim would not be patent eligible in case it was directed to the abstract idea itself, but the wording “directed to” was never really explained. In previous cases, the Courts limited to compare «claims at issue to those claims already found to be directed to an abstract idea in previous cases»,²⁶⁸ therefore using a comparison with the previous judicial practice.

²⁶⁷ Supra note 263.

²⁶⁸ *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327 (Fed. Cir. 2016), 9, at www.cafc.uscourts.gov/sites/default/files/opinions-orders/15-1244.Opinion.5-10-2016.1.PDF

The CAFC tried to analyse the wording “directed to”, stating that it does not refer to the mere involvement of the patent-ineligible concept in the claim, since inventions often involve a law of nature or natural phenomenon. Consequently, the focus of the first step must be on the evaluation of the specification in order to capture the character of the claim, which must be considered as a whole.

Moreover, a claim that aims at improving technology (as in a computer or a technological process), would be a patent-eligible subject matter in the sense that an evaluation of the second step of the Alice test would not even be needed.²⁶⁹

In this specific case, the improvement in technology refers to the self-referential table for a computer database. In fact, the novelty of this invention is in the fact that all the information included in the database are now included in a single table, rather than having several tables with different information that must be matched together.

Patent eligibility is assured from this aspect of the claim, since it brings improvements that can help in reducing search time and increasing the storage of data which represent different characteristics of the elements present in the database.²⁷⁰

For the second time after the DDR decision, the CAFC found the invention to be a patent eligible subject matter.²⁷¹

Even though 2016 was characterized by several exceptions, only five days after the Enfish decision that brought a change in the Courts direction, the TLI Communications LLC v. AV Automotive, L.L.C. case took place.

The CAFC could apply the new step one of the Alice test that derived from the Enfish decision to the claim of the case, i.e. «a method and system for taking, transmitting, and organizing digital images».²⁷²

Since this decision represents a further change of direction with respect to the Enfish case, the CAFC declared the claim as ineligible subject matter given the direction to an abstract idea. By applying the new step one, the Court declared that the claim was not

²⁶⁹ Supra note 268, at 9-10.

²⁷⁰ J. A. CRAIG, *Deconstructing Wonderland: Making Sense of Software Patents in a Post-Alice World*, 2016, Berkeley Technology Law Journal, volume 32, 368.

²⁷¹ Supra note 268, at 30.

²⁷² TLI Communications LLC v. AV Automotive, L.L.C., 823 F.3d 607 (Fed. Cir. 2016), 3, at www.cafc.uscourts.gov/sites/default/files/opinions-orders/15-1372.Opinion.5-12-2016.1.PDF

directed to a particular technological improvement but instead its use was generic and did not represent an inventive solution to a technical problem.²⁷³

As a matter of fact, the problem was not even considered as technical but only administrative, nor was its solution. The telephone was considered only a means to explain the functionalities of the claim and «a conduit for the abstract idea of classifying an image and storing the image based on its classification».²⁷⁴

When it comes to the second step of the test, the Court could not find any inventive concept that could determine the patent eligibility of the claim. The CAFC found the claim conventional, since it involved a telephone and a generic computer that did not confer anything more.²⁷⁵ These physical components only performed their ordinary use and therefore were not qualified to convey an inventive concept to the claim, which remained a mere abstract idea.

Despite this decision, other four cases that took place in 2016 had a positive outcome, as they were declared patent eligible, either because the claims were not abstract or because the Court could find the inventive concept, always applying the Mayo/Alice framework.

Just to mention the cases, the Alice test proved right in the following decisions: Rapid Litigation Management Ltd. v. Cellzdirect, Inc., Bascom Global Internet Services, Inc. v. AT&T Mobility LLC, McRO, Inc. v. Bandai Namco Games America Inc. and Amdocs (Israel) Ltd. v. Openet Telecom, Inc.

Among these four cases, Bascom represents an important step in the direction of the Courts. The case dealt with a claim related to Internet content filtering, which was considered patent eligible subject matter under the second step of the Alice framework. As a matter of fact, when the Court applied the first step of the test, they could not tell whether it was directed to an abstract idea and so they moved to the second step.

The second step represented the most important part of this decision. In fact, a new approach was taken when analysing the second step. In the first place, the Court found

²⁷³ Supra note 272, at 8.

²⁷⁴ Supra note 272, at 9.

²⁷⁵ Supra note 272, at 11-12.

that the elements of the claim did not add anything to it and were generic computer components connected to routine.²⁷⁶

All the elements that were analysed were well-known, but despite this, the Court declared that «an inventive concept can be found in the non-conventional and non-generic arrangement of known, conventional pieces».²⁷⁷ Consequently, the focus was on how the elements of the claim – which were known in the prior art – could create something new after being combined together, so that the claim became a method that would be nothing but conventional or generic.

The novelty in this claim was that the technological implementation it brought was enough to qualify the inventive concept. Moreover, «the invention is not claiming the idea of filtering content simply applied to the Internet»,²⁷⁸ but it «is instead claiming a technology-based solution to filter content on the Internet that overcomes existing problems with other Internet filtering systems».²⁷⁹

The solution was far from unconventional as it was not based on an abstract idea implemented with generic technical components, but it represented a new combination of already existing internet filtering methods so that it could have all their benefits while leaving the defects of traditional filtering systems behind. Moreover, the inventive concept involved the customization of filtering options in order to improve the system for the usage operated by customers, so that it was defined unconventional.²⁸⁰

Therefore, the invention was declared patent eligible under Section 101 and under the Alice test.

Another relevant example happened in the same year is the *McRO, Inc. v. Bandai Namco Games America Inc.* case, which dealt with a method for animated video lip syncing.

The CAFC followed the *Enfish* decision and analysed the claims as a whole, according to the Alice two-step test. The Court found the claim patent eligible under step one of the

²⁷⁶ *Bascom Global Internet Services, Inc. v. AT&T Mobility LLC*, 827 F.3d 1341 (Fed. Cir. 2016), 14, at www.cafc.uscourts.gov/sites/default/files/opinions-orders/15-1763.Opinion.6-23-2016.1.PDF

²⁷⁷ *Supra* note 276, at 15.

²⁷⁸ *Supra* note 276, at 18.

²⁷⁹ *Ibidem*.

²⁸⁰ *CRAIG*, *supra* note 270, at 371.

test, since the invention was directed to a technological improvement, rather than to an abstract idea. As a matter of fact, there was indeed the use of a general computer, but the invention did not perform a conventional activity.²⁸¹

An important aspect of the case was the fact that the invention was not only automating the human animation process because it involved elements that would never be done by humans. Consequently, the claim brought novelty and improvement in technology, not known in the prior art and applied to different technological aspects.²⁸²

2016 was also characterized by the issue of a Memorandum by the USPTO on «Formulating a Subject Matter Eligibility Rejection and Evaluating the Applicant's Response to a Subject Matter Eligibility Rejection».²⁸³

The main aim of the 2016 Memorandum was to provide instructions on how to apply the 2014 Interim Eligibility Guidance, so that examiners would be helped during the analysis of a subject matter eligibility rejection.

As a matter of fact, the Memorandum provides rules on how to formulate a Section 101 rejection, which must be clear and specific and must meet some requirements related to the expression and the form of the rejection itself. For example, the answer must contain specific references to some parts of the claim, in order to provide understandable reasons for the rejection. Furthermore, the steps of the 2014 Guidance (including the Mayo test) must be followed in order to explain the rejection. The judicial exception to which the claim refers must be described in details and reasons must be provided to explain why both the claim as a whole and its elements are not enough to overcome the obstacle of the exception.²⁸⁴

Moreover, by following the first step of the Mayo framework, the abstract idea – or law of nature or natural phenomenon – to which the claim is directed to must be explained, and examples are provided to help the examiners.

²⁸¹ *McRO, Inc. v. Bandai Namco Games America Inc.*, 837 F.3d 1299 (2016), 24, at www.cafc.uscourts.gov/sites/default/files/s15-1080.Opinion.9-9-2016.2.pdf

²⁸² *Ibidem*.

²⁸³ Memorandum, Formulating a Subject Matter Eligibility Rejection and Evaluating the Applicant's Response to a Subject Matter Eligibility Rejection www.uspto.gov/sites/default/files/documents/ieg-may-2016-memo.pdf

²⁸⁴ *Supra* note 276, at 2.

When it comes to the second step of the Mayo test, a clear explanation is needed on why the combination of the elements of the claim do not provide something additional that can overcome the judicial exception.²⁸⁵

In conclusion, several Memoranda and Guidance were issued by the USPTO in order to provide some general rules and instructions in the field of subject matter eligibility under Section 101, since clarity was needed.

During the years 2017 and 2018 there were several other examples on the application of the Alice test. Some of them were found to be patent eligible under Section 101, either for passing step one or step two.

For instance, in the case *Vanda Pharmaceuticals Inc. v. West-Ward Pharmaceuticals International Limited*,²⁸⁶ the claim was found to be patent eligible under step one, as it was not directed to a natural phenomenon, i.e. a way to treat schizophrenia.

A similar case to *Vanda Pharmaceuticals* was *Endo Pharmaceuticals Inc. v. Teva Pharmaceuticals USA, Inc.*, which took place in 2019 and dealt with a method for pain treatment in patients with kidney diseases. The claim was found patent eligible under the first step of the Alice framework since it was not directed to a natural phenomenon.²⁸⁷

Other decisions were taken by the CAFC, which found the claims patent eligible, such as *Data Engine Technologies LLC v. Google LLC*, which dealt with a tab interface for 3-D spreadsheets and passed the step one of the test as not directed to an abstract idea.

The latest cases in which the CAFC found the claims patent eligible show a common characteristic, which can be found in the invention itself. In all the cases the invention represents a technical solution to a technical problem. This aspect can be referred to as “technological arts” test, which aims at defining whether a claim addresses a technological and scientific problem, and therefore brings innovation in one of these fields, or whether it aims at social, commercial, or economic innovation.²⁸⁸

²⁸⁵ Supra note 276, at 3.

²⁸⁶ *Vanda Pharmaceuticals Inc. v. West-Ward Pharmaceuticals International Limited*, 16-2707 (Fed. Cir. 2018), at www.cafc.uscourts.gov/sites/default/files/16-2707.Opinion.4-12-2018.1_0.pdf

²⁸⁷ *Endo Pharmaceuticals Inc. v. Teva Pharmaceuticals USA*, 15-2021 (Fed. Cir. 2018), at www.cafc.uscourts.gov/sites/default/files/opinions-orders/17-1240.Opinion.3-28-2019.pdf

²⁸⁸ A. STEELMAN, *Note, Curiouser and Curiouser! Why the Federal Circuit Can't Make Sense of Alice*, 2016, 98 J. PAT. & TRADEMARK OFF. SOC'Y 374, 384 («The technological arts test seeks to

This test was previously rejected but then included again into practice during the Alice case. The interesting aspect of this test is that it is similar to the requirement of technical character applied by the EPO. However, the obtained result is the same as in the case of the application of the inventive concept according to the two-step test.²⁸⁹

As far as the latest news is concerned, at the beginning of the current year USPTO issued the 2019 Revised Patent Subject Matter Eligibility Guidance, again in order to help the personnel in the analysis of claims. This Guidance represents a revision in relation to step 2A of the subject matter eligibility analysis, and in particular to two aspects, i.e. the abstract idea and the judicial exception.

Going into details, the Guidance provides a new way of dividing abstract ideas to which the claim can be directed to, and specifically they are grouped into three different categories: Mathematical concepts, certain methods of organizing human activity, and mental processes.²⁹⁰ This division was adopted because, since after Alice, it has always been difficult to distinguish between patentable subject matters and subject matter that was directed to a judicial exception, and clarification was needed when it comes to the application of Section 101. Moreover, a longer and longer list of examples that represented eligible or non-eligible subject matter was developed through times and through the Supreme Court and the CAFC cases. The list was obviously non-exhaustive and sometimes contradictory, so that it could not cover all the feasible possibilities.²⁹¹ To overcome this obstacle, a few groups were created which represent the possible abstract ideas to which the claim could be directed to.

The first group, i.e. mathematical concepts, includes «mathematical relationships, mathematical formulas or equations, mathematical calculations».²⁹² The second group involves «fundamental economic principles or practices, commercial or legal interactions, personal behavior or relationships or interactions between people».²⁹³ The

provide patent-eligibility for scientific innovation but not for social/commercial/economic innovation»).

²⁸⁹ CRAIG, supra note 270, at 375.

²⁹⁰ 2019 Revised Patent Subject Matter Eligibility Guidance, Federal Register, Vol. 84, No. 4, Monday January 7, 2019, 50, at www.govinfo.gov/content/pkg/FR-2019-01-07/pdf/2018-28282.pdf

²⁹¹ Supra note 286, at 51.

²⁹² Supra note 286, at 52.

²⁹³ Ibidem.

third and last category is about mental processes, i.e. «concepts performed in the human mind».²⁹⁴

These groups are specific and clear and represent the solution to several doubts that arose in the judicial practice. As a matter of fact, claims that are not part of one of this groups cannot be treated as abstract ideas.

The remaining part of the Guidance focuses on whether claims are directed to a judicial exception and are therefore non-eligible, or they are a practical application of a judicial exception and therefore eligible.

The analysis of patent eligibility required clarification and consistency, which was actually provided by the instructions present in the Guidance.

USPTO steps 2A and 2B were revised, so that a claim that showed a practical application of a judicial exception had to be analyzed and, «if the claim as a whole integrates the recited judicial exception into a practical application of that exception»²⁹⁵ it is patent eligible. The claim must be more than an attempt to monopolize the judicial exception, i.e. a law of nature, a natural phenomenon, or an abstract idea.

In conclusion, in 2019 the need for clarification is still so strong that the USPTO had to issue this Guidance in order to explain a method of analysis that up to now has been used multiple times by US Courts.

In order to better understand the dynamics of the direction in the patent eligibility path, it is useful to show some numbers.

After the Alice decision, the number of granted patents dropped significantly since the case brought a very strong test for patents to pass in order to be eligible.

In the first two years after the Alice case, specifically between 2014 and 2016, US courts examined 568 cases that dealt with patents connected to Section 101 and citing Alice.

The results of these cases were 190 valid patents and 378 patents that were declared invalid because they did not pass the Alice two-step test. Therefore, these numbers show an average invalidation rate of 66.5%.²⁹⁶

²⁹⁴ Supra note 286, at 52.

²⁹⁵ Supra note 290, at 53.

²⁹⁶ J. TRAN, *Two Years After Alice v. CLS Bank*, 2016, *Journal of the Patent and Trademark Office Society*, volume 98, No. 3, 370.

Moreover, the CAFC validated 3 patents and invalidated 34 patents, with an average invalidation rate of 91.9%,²⁹⁷ showing how things have changed through the years.

4.4 Conclusion

At present, patentability of computer programs represents an open debate characterized by a constant struggle in defining a way to make software patent eligible. As a matter of fact, computer programs are excluded from patentability by law and courts – both in Europe and in the USA – have tried to overcome this obstacle by applying several tests and by trying to approach the topic from different points of view. Some explanations were provided in order to clarify and justify the exclusion of software from patentability. The first explanation is strictly connected to copyright, in the sense that copyright law was the proper protection for computer programs, which must be considered only as intellectual works of the author. In fact, from this point of view, software is not considered a technical invention – which would be suitable for patent protection – but only the expression of an idea.

A further explanation that was used refers to the nature of software itself, in the sense that computer programs are indeed composed of mathematical formulas and algorithms, which by definition are excluded from patent protection. Moreover, the abstract nature of software was considered as a valuable reason to confirm its exclusion, given its lack of practical application, which is usually recognised as a fundamental requirement for an invention to be patentable.²⁹⁸

The judicial practice that was examined in this paper shows the attempt that was made in order to reach patent eligibility for something that was indeed excluded from it. The effort put in this path was considerable as it was driven by the strong importance that computer programs have reached through time. The innovation brought by software and computer-implemented inventions is indeed undeniable, since they were the

²⁹⁷ TRAN, *supra* note 296, at 358.

²⁹⁸ B. SHERMAN, *Computer Programs As Excluded Patentable Subject Matter*, 2010, WIPO Standing Committee on the Law of Patents, Exclusions from Patentability and Exceptions and Limitations to Patentees' Rights, 4-6.

protagonists of the technological revolution that paved the way to the digital age we are currently living.

Furthermore, regardless being protected by copyright or patent, computer programs have always shown the need to reach a high level of protection, driven by their particular nature. Software requires high processing and production costs, while costs of reproduction are extremely low. Consequently, the risk perceived by the creator of a computer program is bigger with respect to other kinds of creations or inventions.

Moreover, the risk of unauthorized use of computer programs by others would erase all the effort – also from the economic point of view – made by the inventor, who would not gain from the sale of copies of his program.

For these reasons, the requested level of protection is considerable in order to safeguard the authors.

As seen in the previous chapters, both copyright and patents have advantages and disadvantages connected to the requirements of IP rights themselves and to the nature of software. They show some differences, for instance related to the terms of protection or to the specific characteristics required in order for protection to be granted.

In general, it appears easier to place computer programs in the area of copyrightable subject matter, as they are an expression of an idea and they involve creativity and novelty. On the other hand, in order to be protected by copyright, they are compared to literary works and treated like them. A legal fiction is necessary to include them in the area of copyrightable subject matters. This appears uncertain, in the sense that software does not belong to this area if the focus is put on its nature. Nor is it easy to place it under the umbrella of patentable subject matters. Once again, the nature of computer programs is by definition a set of instructions, which are mathematical formulas and algorithms that are excluded from patentability by law.

The focus of this work was placed on the long path that led to the actual situation: Patentability of computer programs has always been and still is a very complicated but important topic, which unfortunately has been left behind when it comes to making relevant decisions on intellectual property rights protection.

Personally, I believe that the way the topic was treated has shown some pitfalls and has not been completely satisfactory. Computer programs have been underestimated, in the sense that the judicial practice has always tried to associate them to already existing

creations or inventions, instead of trying to create their own path. The initial idea of a *sui generis* form of protection would have been difficult to create, and a long way would obviously characterize it, but in my opinion, it still represents the best possible outcome. Software should be treated with its own unique characteristics, considering its particular industry and environment, recognising the kind of work that lies behind and the kind of effort that is needed in order to create it.

Both European and US courts have tried to create new tests in order to overcome the obstacle that, in my opinion, could have been avoided in the first place. The obstacle was created by courts and governments themselves, and it was confirmed by the failure of the EU Directive that should have brought clarity and strong rules to eliminate confusion and ambiguity.

The creation of a *sui generis* protection would not be easy, and it would require a strong effort that many countries have proven not to be ready for. Clearer rules should be provided, and some decisions should be made, at least to improve the situation and provide the courts with stronger rules that can be applied.

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