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LEGAL PROTECTION FOR COMPUTER SOFTWARE

DOCTORAL THESIS
SUMMARY

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1. The subject under investigation.

The study aims to identify the role and position of national regulation in European and International contexts, weather or not this regulation follows the European or the international practice in intellectual property of computer programs. The conclusion was that, in general, Romanian legislation follows the same direction as other European countries. However, we cannot ignore the fact that in the US, Germany, France,and the UK, the existing legal tools and complex debates on copyright protection for these atypical creations were the result of practical situations stemming from economic implications based on a cult of creativity and innovation, which, unfortunately, are lacking in Romania for at least the last decades. Probably this explains the fact that, in the absence of group interests, computer software makers in Romania have been much more comfortable adopting already-known legal solutions whitch were not challenged, and the fact that in Romania a legal debate on the patentability of computer programs does not exist.

However, it could be that the examination of the problem of the protection of the authors of the computer programs will have reverberations on a practical level, both national, considering the vertiginous development of the information technology market in Romania (with special emphasis in Cluj and Iasi) but also at an international level, because it seems (at least judging the perspective of the workforce involved) that Romania occupies an important place on the map in regard of computer software developers. Unfortunately, the research carried out during my doctoral stage has revealed an extremely modest jurisprudence in the field of practical applicability of the (domestic and / or community) legal regulations gouverning copyrights of computer software.

2. Purpose and objectives of the research

The main objective of the present study is the contour, in regard with the current domestic and international legislation, the incidence of the legal regulations of computer programs copyrights. The research includes a complete approach of the history of copyright regulation for computer programs, with the emphasis on debates addressing this protection from the point of view of copyright, patents and *sui generis* protection. The general goal is to make a deeper understanding of the particular type of intellectual creation and to anticipate future legal solutions that really meet the current economic and social needs while at the same time considers a substantial development of computer software.

3. Research methodology

In order to achieve the proposed objectives, historical analysis and comparative law analysis of the evolution of the notion and regulation of computer programs were necessary. The methodology chosen for the research was a complex one, the two types of analysis being equally addressed, with the emphasis on novelty elements in the interpretation of the legal concept of computer program and sometimes with assessments regarding the economic and / or political context in which they presented themselves.

4. Structure of the paper

The thesis, resulting from the following methodology, is structured in a way which makes it easier to navigate and give coherence to discourse. For this reason, the work was structured in seven chapters.

Chapter I, entitled *Research Relevance. The peculiarities of the computer program and controversy on protection* is structured into two subchapters, namely: *The relevance of research*,

which emphasizes the embedded nature of the computer program which distinguishes it from other intellectual creations, the most important being derived from the fact that it is not intended to provoke artistic emotions, being closer to the basic, utilitarian, than to the formal ones. Thus, it cannot be perceived by the senses; it is necessary to have means capable of translating the information and commands contained in a man-made language and created for and with the help of computers which, in turn, operate with the help of programs, and executes the commands they receive from users through these programs. The computer program is fundamentally different from any other copyrighted work, but also from any invention or innovation with which the patent system has ever encountered, and through which it is often protected, in spite of the fact that formally, the computer program is copyrighted and excluded by itself from patent protection.

The computer program is not limited to any physical constraint and results in the creation of "another type of industry with its own economic structure".

The complexity of the computer programs has increased so much that some of them cannot be understood by a single person; a computer program can include millions of code lines and an immeasurable number of pieces, using multiple abstraction techniques, intended to be used in increasingly larger structures, making it difficult to partition these technologies.

The complexity of the program also comes from the very dynamic industry that develops new computer software products. Due to these unique features in computer software, innovation in computer program industry is sequential, because each new invention builds directly on the previous and is complementary, based on complementary efforts of many inventors. Patents may interrupt the mechanism of innovation sequentially by preventing the use of a previous invention as the basis for further innovations.

The computer program does not fit comfortably into the traditional concept of intellectual copyright protection for literary works, nor can it be regarded as patented as this invention becomes evident after the debate on graphical interfaces and the patent of the ability of algorithms which demonstrates the impossibility of framing computer programs in existing legal concepts.

Although it is not unique in the history of debates due to the legal nature and the appropriateness of the protection of intellectual creations, such controversies as for phonograms, sequencing of images, audio and video recorders, genetic engineering, it seems, however, that the new electronic technologies offer many major challenges to works, largely because they are increasingly difficult to extract and freely use ideas communicated only in the form of expressions that convey intellectual property rights.

Software and hardware technologies are rapidly changing, both qualitatively and quantitatively, which makes it difficult to design and develop a computer program protection as long as we cannot foresee the evolutionary direction. In a constant concern to identify the essence of the computer program as creation, in a period of effervescence where, when a controversy is resolved, another emerges, the theoretical distinctions between the notion of expression (protected) and the notion of an idea (unprotected).

Legal controversies can also be determined by the author's identification, in the case of a computer program created by artificial intelligence, or a system that in turn includes a hardware-software mélange. Another issue is rapid technological change without an agreement on language and definitions. Moreover, the international computer software market requires unique standards and legislation, applicable to all countries.

Some current copyright controversies imply a distinction between expression (protected) and ideas (unprotected). Future techno-legal controversies could involve "authorized" works of advanced artificial intelligence systems.

By their complexity as creations of the human mind, encapsulating in a single product both the resources of the creative mind and the practical mechanisms, the scope of applicability and the enormous jump imposed on the quality of life in general, it seems that computer programs are the first step of assuming man's existence. The omnipresence of computer programs and the power of

man manifested through these creations to radically change the world as well as the individual, the new way of referring to the world having these creations, a world that it is generally concerned with courage and without major limitations, measuring the importance of these creations. Traditionally, the creator is a dictator whose rules, whims, and interests he imposez in his work. The interest in establishing the principles to which these rules are subject is one of humanity in general.

The debate on how to integrate into a legal system, although it has been going on for nearly 70 years, seems far from being able to propose an acceptable solution in the context of so many major interests in computer programs

An overview, after the encoding and historical judgment of computer software regulation, the understanding of causes of malfunctions of current protection systems, and a timid forecast of a future outlook of effects of current regulations can contribute to a deeper understanding of the software phenomenon from a intellectual property perspective (and not only) to a better view of the most appropriate regulation of these creations.

Subchapter 2 entitled *Controversy on protection deriving from the peculiarities of computer programs* follows the evolution of legal significance of notion of the computer program in the context of its evolution from copyright, followed by the possibility of patenting computer programs, firm prohibition of patenting these creations, to the notion of *sui generis* protection and anticipates future solutions in the sense of adopting legal solutions that respect the reality of the fast technological evolution and the scale of the importance of computer programs in the context of daily existence.

Chapter II, entitled *Computers and Computer Programs*, contains four subchapters. The first subchapter follows a history of the concept of a computer program, noting (in chronological order) the significant moments from a historical and technical perspective of the emergence, development and complexity of computer programs. I started from the general notion of computer programs (software), which include a computer program system with their application procedures, a system delivered together with a computer or subsequently created by the user or / and delivered as a package and and followed the evolution of this notion to date, noting the most significant products, concepts and innovations.

Subchapter 2, entitled *The Economic Importance of Computer Programs /Creations as such*, aimed to highlight the increased importance of intellectual property concepts in international trade, investment and economic relations and the important commercial value of computer programs as a driving force in technological progress, which has led to an increase in competitiveness and an increase in the power of copyright on the international market.

The globalization or internationalization of trade and the economy, as well as the multilateral rules that have been accepted and respected, compel us to adopt a new approach to IPR through close interaction in between government, industry and the creative / inventive society.

The intellectual property system could play a major role in modern economic policy. A decade ago it was believed that protecting intellectual property rights for computer programs could determine the chances of an economy recovering or to become competitive. The reality in whitch we live proves that society is becoming more and more global, connecting people to their needs and interests, and yet leaves room for national or regional particularities without creating a conflict between the two areas, proving specific evolution modalities.

The computer and IP software industry is increasingly becoming an important tool for sustainable development. Understanding and assessing the social, cultural and economic fundamentals of intellectual property and the copyright system is a prerequisite for understanding the importance and the increasing role of national competition-enhancing strategies.

In software solutions, intellectual property is not and never should become the final goal, but rather a catalyst for accelerating growth and social, cultural, technical and economic development. Its evolution in providing effective protection and utilization has led to economic and social growth by providing incentives to increase creativity, inventiveness and competitive capacity.

It is believed that a quality-based approach to economic management would generate greater growth and resources for social programs, although this approach could increase the gap between people, communities or interests.

The computer software industry is a good example of what can make effective intellectual property protection to ensure economic growth. The computer programs industry has contributed to the economic development of several countries, radically changing the financial reporting values.

Digital economy is becoming an increasingly important part of the global economy. Digital multinational companies can communicate and sell to foreign customers without the need for too much physical investment on foreign markets. Their economic impact on host countries is thus less visible in generating productive capacity and creating jobs. Today, the digital economy is no longer just about the technology sector and digital firms, but more about the digitalization of supply chains in all sectors of the global economy. Rules designed for the physical economy may need to be revised in the light of new digital business models. The World Investment Report 2017 is a convincing argument for a comprehensive investment policy framework for the digital economy. It demonstrates how alignment of investment policies with digital development strategies will play a key role in integrating developing countries into the global economy in a process of sustainable globalization in the coming years. This is an important contribution to reducing the digital divide and meeting the enormous investment challenges of the 2030 sustainable development agenda.

Of all those who produce copyrighted works, computer software vendors for the computer are by far the greatest added value.

A well-balanced and precise regulation has made it possible - not only in the European Community but also in other countries where this model has been taken over and applied - to continue and expand the creative activities of computer program developers with chances of success, and many of them took advantage of this opportunity with great efficiency. The big challenge also depends on the free market (also a natural consequence of globalization) and will continue to cause a major debate without predictable effects on the intellectual property rights of computer program creators.

Subchapter 3, titled *The Beginning of Computer Software Protection (USA, Japan, Germany, France, England, EU Community Law)*, captures the way in which various countries with an innovative contribution have first approached intellectual property rights for computer programs. Referring to the regulations adopted by the US since 1960, looking at the evolution and debate on computer program in the context of recommendations made by the National Commission for New Technologies Users. We considered the special specificity of Japan's regulation, where the perceived intrinsic value associated with intangible products, such as the computer program, is relatively recent. I considered it important to mention the influence and the incorporation in this space of the Western notion of individual rights, in particular, the individual "right" of property. After the 1868 imperial leadership events triggered, the traditionalists worried that Western influences would dominate the reforms, replacing Japanese traditions and cultural values. During the Meiji Restoration, the inclusion of European ideals in Japanese law has sometimes proven to be problematic. Although there were many similar concepts in both cultures, in Japan there was no direct translation of the Western concept of "rights". Tte notion of intellectual property right has been developed since 1860 by combining the notions of fairness and justice ("tadashii") with law / rule ("ritsu") to form "reiritsu". However, this word did not have the same meaning as in Europe. Also, in Japan, the Chinese translation of the notion of rights - "kenri" - was introduced in Japan, but it also had problems of interpretation in Japanese.

We have also examined the situation of the German computer program, which has been recognized for copyright protection, but in recent years the situation of patents for computer programs has become more and more frequent by reacting to and taking position. In a resolution in 2005, the German Parliament called on the Government to ensure that patent office's remain in compliance with the relevant provisions of the World Trade Organization (WTO) Agreement on

Trade Related Aspects of Intellectual Property Rights (TRIPS) EU Directive 91/250 and the German copyright law, which established that the computer program as such cannot be patented. However, despite these circumstances, things have worsened over time, and the European Patent Office has granted up to tens of thousands of computer software patents, and German courts favor this practice, according to recent decisions.

In France, by the law of January 2, 1968 (which renewed the old law dating back to 1844), the legislator, influenced by the American position, explicitly excluded computer programs from the field of the patent. In 1973, this exclusion was also confirmed by case-law. Later, however, the courts have widely applied an antagonism. Surprisingly, when in March 1986, three decisions of the Court of Cassation finally resolved the issue of copyright protection for the computer program. The 1985 Act was superseded by the law of 10 May 1994 for the transposition of the European Directive of 14 May 1991, which established at European level a unified legal regime for computer programs. Economic needs have greatly contributed to dimensioning the copyright applied to the computer program. Pursuant to Article L. 112-2 13 of the Intellectual Property Code, protection covers 'the computer program, including preparatory design equipment'. The Directive was translated into France by the adoption of Law no. 92-597 of 1 July 1992, modified by Law no. 94-36 1 of May 1, 1994.

I have also referred to UK regulation where the history of copyright begins with early privileges and monopolies for book printers. The Law of Anne 1710 regulated the first notions of copyright, but computer programs were mentioned only in the legislative changes in 1985.

The last subchapter, titled *The Uniformity of Computer Software Protection in Community Law*, has pursued the evolution of the regulation of the protection of computer programs by means of Community directives (Directive 91/250, Directive 24/2009 and Directive 29/2001), indicating the conditions for their adoption, focusing on the definitions of computer program concepts, interoperability, and the specificity of protecting these creations through normative acts specifically devoted to them, anticipating a customized approach in the future.

In Europe, the need to promote the software industry has drawn attention to the lack of proper harmonization between the copyright laws of the various European Community Member States on the protection of computer programmers. As such, economic pressure has stimulated the development of legislation in this area, and the first document regulating this matter has two main purposes: harmonizing legislation and stating the need for interoperability.

Concern about the legal regulation of copyright protection for computer programs has been for the first time reflected in the legislative framework by Directive no. 91/250 / EEC, which started from the premise of providing a unitary legal framework for the protection of computer programs, which, as a first step, merely states that Member States must grant copyright protection to computer programs as literary works within the meaning of the Berne Convention for the Protection of Literary and Artistic Works and, further, to determine the beneficiaries and subject matter of the protection, the exclusive rights which protected persons can invoke to authorize or prohibit certain acts, and the duration of protection.

As the first document that reflects the concern for the IT field, Directive no. 91/250 / EC proposes a definition of "computer program" which should include "programs of whatever form, including those embedded in hardware (...), preparatory work with the aim of developing a program, provided that they are such as to enable a computer program to be carried out at a later stage".

According to Article 1 (1) of Directive. 91/250 repealed by Directive 2009/24 EEC, computer programs are protected by copyright as literary works within the meaning of the Berne Convention. Paragraph 2 of this article extends such protection to all forms of expression of a computer program. First sentence of the seventh recital in the preamble to Directive No. 91/250, repealed by Directive 2009/24 EEC, provides that, for the purposes of the Directive, the concept of computer program includes programs, whatever their form, including those embedded in hardware.

On the other hand, art. Article 10 (1) of the TRIPS Agreement, which provides that computer programs, whether expressed in source code or in code, will be protected as literary works under the Berne Convention.

The provisions on the protection of computer programs have been legislatively addressed by Directive no. Directive 2001/29 / EC on the harmonization of certain aspects of copyright and related rights in the information society.

This directive follows the adoption in December 1996 by the World Intellectual Property Organization of two new treaties: the WIPO Copyright Treaty (WCT) and the WIPO Treaty on Public Representations and Phonograms.

Directive no. 24 / CEE / 2009 modifies the legal protection of copyright related to computer programs by expressing an objective position on the originality criteria of the object of protection.

The document specifies an objective criterion of the previous definition given by the Directive no. 250/91, namely that the assessment of originality and hence the element of protection must not concern an assessment of the quality or the aesthetic value of the program.

The object of protection provided by Directive 2009/24 EEC covers the computer program in all its forms of expression, such as the source code and its object code, which allow it to be reproduced in various computer languages.

The way in which copyright protection was enacted in the field of computer programs is a specific one. This is primarily due to the explosion of such products (fueled by the ever more avid need to use these creations in all areas), but especially by the short lifetime, the special, innovative, and creative character of a computer program.

The protection of copyright and the way of protection outlined in the Berne Convention hierarchize differently the protected values: it seems that the interoperability system directs Europe to the interests of the user, then to the economic interests of the common market and almost neglects the interests of the author, moral and patrimonial ones, they can be exercised within limits that allow the development of community consciousness through interoperability.

From this perspective, the protection measures introduced by Community legislation are more likely to be aimed at remedying the possible harm rather than securing the way in which these creations could be marketed illegally al.

Chapter III is devoted to the protection of computer programs in Romanian law with reference to the first express mention of the protection of computer programs in the Romanian legislation that was achieved by Law no. 8/1996 on copyright and neighboring rights, Chapter IX - Computer programs, art. 72-80. Chapter III is structured in 11 subchapters in which we developed and explained the notion of author in relation to the provisions of art. 74, addressed the problem of definition of computer programs and explained which are its protected components by reference to the provisions of art. 72 of Law 8/1996.

Subchapter 3 governs the criterion of originality and its specificity in computer programs, which resides rather from the originality of the way in which a (technical) problem is identified and less in the way the solution is written, concluding that the criterion of originality is the only thing to be taken in a view to protecting the work, and not the condition of patent innovation.

We have devoted another subchapter to explaining the notion of copyright holder who in this matter can be the author himself, but in most cases, he is the employer or the commissioner of the work. Unlike the approaches of other States or the provisions of the Directive, the national law does not provide for the legal construction under which the patrimonial rights of the authors of the computer programs are transferred to the employer or the person who orders them, interpreting the patrimonial right gives birth directly to the employer and the moral right in the person of the author. Regarding patrimonial rights, the law brings some limitations to ensure the use of programs as intended and the possibility of error correction, exploitation safety, encouraging creative activity, and interoperability of various programs installed on the same computer.

The function of a computer program is to communicate and operate with other components of a computer system and its users, a purpose in which a logical and, where appropriate, physical, interconnection and interaction is required to allow full operation of all software and hardware elements with other software and hardware components. Interconnection and functional interaction are called interoperability, and this can be defined as the ability to exchange information and to use each other's exchanged information. Achieving this interoperability sometimes involves decomposing the program, decompiling it by the user, implicitly limiting the copyright of the owner. The decomposition of the program without the author's permission is not allowed if it causes damage to the copyright holder or the normal use of the computer program.

Subchapters 5 and 6 have been devoted to customizing the features of moral rights and patrimonial rights of computer programmers.

Another subchapter is intended to explain the legal status of the employer / shareholder as a rights holder and another is devoted to the development of the issue of the duration of the rights to computer programs.

We have devoted a subchapter to the copyright transmission subchapter, which contains three sub-sections, namely addressing the problem of the transmission of rights through license, succession and forced execution. Regarding forced execution, i approached in a structured way: the problems of the pursued goods, the debtor of the obligation and the nature of the forced execution, pointing out that all these effects are conditioned by the initial introduction of the program to the public.

I also referred to the publicity of the forms of forced execution of patrimonial rights of authors in the public registers in the context of the Civil Code, Law 99/1999 and art. 741 and art. 742 of the Code of Civil Procedure establishes the obligation of the bailiff to make the mention of the seizure of movable goods, including computer programs in the Electronic Archive of Real Mobile Guarantees.

Subchapter 10 regulates the right to computer programs in three sub-points by civil, criminal or contravention means and ends with the treatment of the obligation to register the programs established by O. G. nr. 124/2000 approved with amendments by Law no. 213/2002 establishing producers and retailers of computer programs as well as ORDA a series of obligations aimed at preventing and limiting piracy in this area and the losses of computer program producers due to violation of rights over them.

Chapter IV addresses the problem of *Computer Software Protection by pate*nt.I proceeded from the theoretical hypothesis of excluding these creations from patent protection in accordance with the provisions of the Convention on the Grant of European Patents, adopted in Munich on October 5, 1973, which excluded the software from the patent itself and from the doctrinal discussions on the subject of this phrase, noting that the number of European patents for inventions containing computer programs is growing, we mainly analyzed the relevant provisions of Law 64/1991 on the exclusion of computer programs from patent protection into a distinct sub-point.

Also, in the context of the national legislation, I analyzed in another sub-item the *Regulation for the enforcement of Law no. 64/1991 of the inventions approved by GD no. 547/2005*, respectively the possibility of patenting the computer programs per se. I have shown that although the provisions of Law no. 64/1991 state that the computer program as such is excluded from patent protection, the provisions contained in Regulation 547/2008 on the application of Law no. 64/1991 completes substantially the provisions of Law 64/1991 with the consequence of creating an atypical situation in which the Regulation attests that the claims in the field of computer programs are implicitly accepted for patenting as long as there are mentions about the conditions that these claims are there for patenting purposes.

The result of the functionality together with a computer program and a preexisting product that involves a logical sequence of steps, phases or steps defined by the order of deployment, by initial conditions, such as the chosen starting material, by parameters, by technical conditions

deployment and / or technical means used are a patentable process according to art. 13 par. 2 of GD 547/2008. The invention resulting from the connection of a pre-existing product and a computer program must generate a technical effect equivalent to a process as defined in Art. 13 of H.G. 547/2008, so the result of the symbiosis of the two elements - a product and a computer program - provides a technical solution or achievement in a field of knowledge that represents novelty and progress to the stage known until then.

I conclude from the wording of the provision of the Regulation that a computer program may be subject to patenting under the appropriate wording of the claim, i.e. whether it is clear from the wording that the process (as defined in Article 13 of H. G 547/2008) is the result of operating a computer program in a system. I also reported the exceptional situation of a hierarchically inferior normative act modifying a hierarchically superior normative act, namely the provisions of the law 64/1991.

The last subchapter analyzes the possibility of patenting computer programs as parts of inventions, namely computer-implemented inventions (computer-implemented inventions) that can be patented according to art. 8 par. 2 of the Law no. 64/1991, and the protection has its indirect effects on the computer program, provided that the invention collectively meets the legal conditions of an invention.

Chapter V is conceived as a comparative analysis of computer software protection in the current legislation of several countries, namely Australia (where the protection of computer programs is an economic one that serves the financial interests of US companies), South Korea (whose economy relies heavily on patent development Russia (which included intellectual property rules in the Civil Code and which, although signatories to all important intellectual property conventions, even under the pressure of Member States, appears to have major practical difficulties in applying these principles), China (where I noticed that only foreign computer programs are treated as "literary works" and domestic programs are not), the United Kingdom (which has been remarked by a broad theoretical debate of the unsatisfactory nature of copyright regulation of programs for the computer and which has adopted different approaches to determine whether the claimed invention achieves such a technical contribution), Belgium (whose legal protection regime aims to create fear for the attacker to give up his attack) and Japan (where the application of the criterion is a prerequisite for patentability).

Chapter VI is entitled *Computer Program Protection under Conventional Law* and is structured in three subchapters. The first is dedicated to the *European Patent Convention* (Munich Convention 1973) *and the Implementing Regulation*, whitvh deals in an explanatory way with the practice of the European Patent Office (analyzing in two sub-sections important Decisions of the EPO Chambers of Appeal, respectively, T 0026/86 dated 21.05.1987 (Koch & Sterzel v Siemens and Philips, T 0038/86 dated 14.02.1989 (IBM) T 0204/93 dated 29.10.1993 (American Telephone and Telegraph Company) , T 0769/92 of 31.05.1994 (Sohei, Yamamoto) T 0833/91 of 16.04.1996 (International Business Machines Corporation) T 1173/97 of 01.07.1998 (International Business Machines Corporation) T 1177 / 97 of 09.07.2002 (SYSTRAN SA vs. Siemens Nixdorf Informationssysteme Aktiengeseelschaft Logos Computer Integrated Translation GmbH), T 0641/00 of 26.09.2002 (COMVIK GSM AB vs DeTeMobil Deutsche Telekom MobilNet GmbH GIESECKE & DEVRIENT GmbH), T 0125 / 01 of the given of 11.12.2002 (Control Device / HENZE vs Interessengemeinschaft für Rundfunkschutzrechte GmbH Schutzrechtsverwertung & Co. (Ricoh Company, Ltd.), T 0258/03 of 21.04.2004 (Hitachi, Ltd), T 0914/02 dated July 12, 2005 (General Electric Company), T 0424/03 dated 23.02.2006 (Microsoft Corporation), T 0154/04 dated 15.11.2006 (Duns Licensing Associates, LP) T 0471/05 dated 06.02.2007 (Koninklijke Philips Electronics NV) and the latter deals with the practice of the European Patent Office by referring to the Interpretation of the Technical Boards of Appeal due to VICOM in the IBM cases of 1998 and 1999 and the IBM Cases 1998 and 1999 and the Interpretation of the Boards of Appeal in the IBM Case of 1998 and 1999.

Within this chapter, I developed and commented on a distinct sub-item *Opinion no. 0003/08 / 12.05.2010* by which the President of the European Patent Office (EPO) addressed a number of questions to the Extended Appeal Board to obtain guidance on issues related to the patentability of computer programs. In G3 / 08 opinion, the extended committee found that any eventual divergence in time-based jurisprudence arose due to natural evolution in a changing world and that the EPO practice had practical and reliable results. It essentially stated that, due to the pragmatic problem-solving approach, such as Decisions T 641/00 (Comvik) and T 258/03 (Hitachi), OEP jurisprudence has become stable, providing predictability for the applicants for inventions implemented for computers. In particular, I have highlighted the arguments developed in this opinion, which later constituted new benchmarks for the patentability of computer programs.

Also, in the last subchapter I analyzed the provisions of the TRIPS Agreement on computer programs.

The final **chapter, VII**, consists of *Conclusions on the Protection of Computer Programs and the Future of Protection*, in which I reviewed the legal and jurisprudential approaches to the legal protection of computer programs and after the punctual observation of the validity of previous approaches in the mirror with the impediments of order essentially economic considerations, both from the point of view of copyright, patent protection and sui generis protection, I have suggested to take over some of the models proposed by some national legislation in a general framework.

For many years, the computer program has been protected primarily by copyright law and has been considered a literary work. International and regional treaties, such as the TRIPS Agreement, the US Copyright Act, and the European Community Copyright Directive are the confirmation of copyright protection generally accepted.

Clear, international copyright acceptance is rooted in the system. In addition, a program that does not meet the high requirements of the patent system would have left unprotected under the terms of copyright abrogation; moreover, copyright is at the root of one of the most important effective protection mechanisms in the computer software sector: open source software.

On the other hand, despite the fact that patenting the ability of computer programs is still a very controversial issue, its scope and development can not be ignored; moreover, the utility elements of the computer program are certainly better protected by patent than by copyright.

As such, the *sui generis* option must include the other known protection mechanisms; a completely new *sui generis* system is hard to conceive so as to encompass the multiple protection models and methods used so far to protect the program and does not seem justified as long as there are legal references in the field. I take the view that this approach is not entirely inconsistent with the solutions adopted in other areas of intellectual property that have developed substantially beyond the patterns established by existing laws such as nanotechnology (EU Directive 19/2012) or biotechnological inventions Directive 98/44 / EC).

From an economic perspective, the need to extend copyright for computer programs beyond literal protection is doubtful. On the other hand, the need for strong protection against non-literacy copying in the context of deciphering and rewriting rather suggests a "modest" level of copyright protection, which excludes nonliterally copying (relatively small changes in code could bring great functions different, and vice versa, very different codes could produce the same functions).

However, the most valuable aspects of the computer program are its functions. Strong copyright protection, which extends beyond literal copying, can prevent the most dynamic sequential innovations of the program.

As a result, both types of computer program protection could be used, and this protection practice could accommodate the shortcomings that would result from patent protection or copyright alone.

The disadvantages created by copyright-patent coexistence are a possible limitation of the right to make improvements to the patented program, the exclusive right to (or control) the program codes that would apply to letter copying, but also substantially similar changes to codes (e.g., non-

literal copying of the code). When both copyrights and patents protect a particular computer program, copyright could limit the user's right to make improvements to the patented article, the copyright owner could get the right to prevent others from copying the " improved ", even if this includes new and unknown contributions to the state of the art or the improved outcome that could be patentable. Therefore, if copyright protects against non-literal copying of the code, it could hinder the development of subsequent inventors and benefit from further improvements, thereby jeopardizing some of the most essential objectives of patent law.

Although copyright is essential to prevent the literal copying of codes, the concerns of legal, economic, technical and public policy do not appear to support its role in protecting against non-literal copying (and the notion of increasing the level of originality needed to justify effective operation is not a solution). Instead, Domain copyright enforcement should be kept narrow without extending the protection beyond the literal copying of the program code - if copyright is used to protect more than the literal code, it often ends up protecting too much. On the other hand, if copyrights are used to protect no more than literal code, it could protect too little. In order to find an appropriate balance and ensure that computer program developers will gain competitive profits on their investments, other safeguards should be set up because when copyright has been adopted as a protection measure for the computer program, it is not estimated the role that patents will play in their protection. In addition, there are patents more appropriate than copyright to protect ideas implemented in programs.

The highly debated issue of the computer program as patentable, both under the European exclusion "as such" and under the Directive, can find a solution as long as the review process is properly conducted and the inventors should be rewarded only for inventions. There is no ideology / expression dichotomy for patents. If an idea meets patenting requirements, patent protection will be granted without covering the expression of ideas. However, the risk of over-protection may arise if patents are granted too freely and interpreted too broadly. The current patent system can be improved from this perspective since the abstraction of the program in patent applications, the general lack of relevant state of the art and the insufficient level of disclosure in patent applications for computer programs have led to the excessive issuance of patents.

The role of patents is welcome in the component of the computer program that goes beyond literal copying and seems to be the only feasible means of maintaining a sufficiently clear distinction between copyright and patent and the substantial protection allowed under the Copyright Directive seems to be a solution to fill the gap left by the limited availability of patent protection for computer related inventions.

It is vital to keep patent protection for inventions implemented on the computer (at least to some extent). On the contrary, the total exclusion of the computer program from the proprietary patent could lead to situations where the innovative technical outcome would remain unprotected, only because innovation is manifested in the field of computer programs, which could lead to forced solutions again, similar to various interpretations of some notions (as happened with the notion of technical character).

The application of the principle of "mechanicalness" to computer-implemented inventions is the main problem of the European patent system, together with the increase of patents filed in a short period, the abstraction and blurring of patent claims, the lack of relevant registers of highlighting the state of the art, disclosure, which had an effect on the "quality" of the patents granted. Efforts should therefore also be directed towards promoting an effective patent system that maintains an appropriate level of novelty, inventiveness and disclosure in the patents it issues. Policy changes could include, for example, the promotion of consolidated policies, disclosure in accordance with the sufficient information requirement so as to reduce the abstraction of patent claims for computer programs and the difficulty of defining the boundary between supposed innovative inventions and state of the art. Clearer rules on disclosure could make patentability more efficient.

The copyright law fails to provide a level of protection appropriate to computer programs. The Patent Law should be applied differently in order to effectively serve the purpose of increasing innovation in the field of computer programs. The current system is causing over and under-protection issues, is overstated by the obvious development stage, and inappropriate regulation causes substantial economic consequences that may either lead to a split of economic policies contrary to the stated purpose of the treaties and conventions signed on the theme, or the enormous disproportion in earnings, to the detriment of the less developed markets that would take up their chance to grow healthely.

A better balanced and placed option, only second-best on earnings, combining a more transparent system with the recognition of inventive realities and the prerogatives of copyright seems to be the solution in the coming years. In particular, on the basis of copyright, the availability of additional protection for the innovative character of the work exclusively for functional aspects and the maintenance of a balance between the two hemispheres, prevents the extension of copyright to protect the utility elements of the program, which would allow it to act in a "patent-like" manner and also hinders the prospect of excessive patentability which can build a specific protection system. This system would require a period of protection, first and foremost, in proportion to the need for change and innovation, recognizing the merits of the creators, but limiting the possibility of accumulating disproportionate profits and, in particular, maintaining open positions for monopoly.

As for the problems caused by the interoperability requirement, there are some possible solutions. The first problem, namely that a company refuses to give a license, can be solved with compulsory licenses. At present, Article 31 of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) and Article 5A of the Paris Convention for the Protection of Industrial Property (Paris Convention) have provisions on this subject which make it possible that Member States have legislation allowing their government to license, while the patent owner does not want to do so.

Mandatory licenses may be a possible solution, as an alternative to patents that could solve the problem of innovation and if a company does not want to register its invention.

Innovation and its further evolutions are pushed in a very specific direction due to the interoperability requirement. This is inherent to the program, it is not caused by patents and cannot find another solution.

Problems arising from monopolies that arise due to market interoperability can be solved by binding licenses, as the monopoly has fewer incentives to innovate, which causes fewer innovations. By granting compulsory licenses, competitors also have access to technology, which prevents the formation of monopoly positions.

Problems related to the sequential aspect of the program and costs are hard to solve without changing the patent protection system. Probably the problems would disappear if no patents were granted for computer programs (which in other respects does not seem to be reliable) or at least if companies would not hold patents in the field in which they operate.

Due to the fact that patents are sequential, a large number of patents or licenses are required to function properly on the market, and hence the cross-licensing game that started patent wars.

A possible solution would be to reduce the duration of patent protection over a period of about three to five years. A three-year period would reduce the value of patents, change the entire licensing game as the public can wait for patent expiration and then take advantage of the information provided in the patent, and the patent seeker has enough time to recover the investment made in creating his patent computer because the development costs are today are very low.

At this point, there is a lot of discussion about whether or not computer programs should be patentable and how the way the computer software patenting system is the right way.

It seems that the current proprietary patent of computer programs is in line with the reasoning of Article 52 of the EPC but is not in line with the general reasoning of the patent system.

We certainly live in an era of intellectual property related to trade, and intellectual property rights will remain part of international trade agreements. The future approach seems to be more complex, nuanced, less absolut, more political and cooperative. This transformation into an approach of trade-related intellectual property rights reflects the evolution of social, cultural and political norms, changing attitudes, and better understanding of the relationship between innovation, creation, and wider and more effective dissemination of intellectual property. Increasingly, health, education, heritage and common assets, including environmental considerations, are preoccupations in the context of demographic change and change in public opinion; new ways of involving the general public through consultations, roundtables, discussions can sometimes overcome legislative choices, making more non-governmental actors and stakeholders involved in this important policy area. The movement of goods, services, capital, ideas and skilled people are on the rise, and the final impact of these ongoing global transitions, along with laws and policies on intellectual property in the area of trade, remains unclear.

A reputed author has surprised the dialectic of intellectual property to the balance between economic interest, copyright ownership, and the philosophy of the free nature of ideas that characterize the human being as a creative force. The first belongs to the legislature, the second to the authors, and the third belongs to the users.

The difference between the exclusion force granted by patents and the right to use copyright control is a major one: patents may prevent the creation of new, independent works, and the principles of copyright protection have evolved into open source policies.

The concept of today's computer program has fundamentally overtaken the classical copy-copy notion of copyright, recalling the rhetoric of the copying of the 16th Century Copyright Holder, as originally developed in the 18th century France, initially fought against the rights of press owners who controlled copying. The reality of the twentieth century reinvented the concept of copyright and the personal rights of computer programmers were practically eliminated. The typography of Enlightenment seems to have evolved into computer software and, in particular, in its ability to transform and adapt to anything.

One way of looking at the regulation of intellectual property rights of computer programmers is to respect the paternity of their personal creations, but without censoring the use of these creations according to the patent model.

As such, perhaps there is no need for a revolution of the concepts and principles of intellectual property in general, but perhaps it has just become a moment to recognize that the reality, ubiquity and complexity of the computer program requires that it be treated distinctly and specifically of the other creations of the human mind.

In this respect, we appreciate that many of the ambiguities generated by the complex nature of the computer program that, in order to classify, catalog and regulate this creation in the known legislative patterns, succeed in generating new and sometimes absurd interpretations, could be clarified by regulation through a special act devoted to them. As such, the Korean or Brazilian model that has adopted a special law to regulate the protection of intellectual creations seems to be, in my opinion, the right one. For reasons that are promoted by OMPI and TRIPS, it would be ideal that the specific legislation on computer programs should start from the adoption of directives valid in all Member States.

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