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# Intellectual property protection of computer program interfaces and interoperability

Ulla-Maija Mylly

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*Ulla-Maija Mylly*
Raisio, December 2013

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# Introduction

## 1 Setting the scene

### 1.1 The software industry and the role of interoperability

Software[1] is an essential element of the information and communication technology (ICT). At present, ICT has a significant impact on an ever-increasing number of other industries. This is due to the fact that many industries now converge through ICT applications. Many technological sectors, which were earlier seen as separate, are now to a large extent utilizing ICT. This brings technological sectors closer to each other and the distinctions between the sectors become blurred.[2] We live in a world of interconnected people, businesses and machines. Hence, defining the exact economic impact of the software or ICT industries is a complex task, as these industries are becoming an integrated part of many other industries. Yet, it has been recognized that ICT has a great impact on the economic growth and the social structures of a nation.[3]

Various studies have been conducted to find the links between ICT and economic growth. It has been recognized that it is not only the ICT manufacturing sector that contributes to growth, but also the utilization of ICT.[4] Some research seeks to find indicators that define a nation's ICT leverage for competitiveness more closely. Utilizing this data could lead to increased efforts on issues requiring reform, as these indicators are deemed to have an impact on economic growth. It has been recognized that the issues having an impact on the ICT leverage include, among other things, the regulatory and innovation environment of the nation. Accordingly, the intellectual property protection and the generation of technological and non-technological innovations are considered to have an impact on economic growth.[5]

For ICT connectivity, software interoperability is of great importance. Software interfaces are those elements in the program that enable the program to interoperate

1 In this research, software and computer program are used as synonyms.
2 See for example *Lee & Olson* (2010).
3 *Dutta & Bilbao-Osorio* (2012), pp. ix-xix. See generally on the economic analysis of information technologies, *Shapiro & Varian* (1999); and on the impact of information technology on society more generally, *Benkler* (2006).
4 See for example *Pilat & Lee* (2001) and *Colecchia & Schreyer* (2002).
5 *Dutta &Bilbao-Osario* (2012), pp. ix-xix.

with other computer programs or equipment.[6] If one wishes to create a computer program communicating with the original program, one needs information on how the original program communicates with other programs. Interoperability information relating to interfaces is also necessary when one wishes to create a new computer program intended to replace the original computer program. Information in interfaces is, thus, highly important both for the fitting of new applications or equipment into the already existing platforms and for the creation of enhanced or new computer program platforms. Interoperability information is, thus, essential for the general technological development of the software industry, ICT and all other industries utilizing ICT. The possibility to use interoperability information enables a variety of providers to enter into ICT and related industries. How interoperability is regulated is an important enabling factor for ICT leverage and also for economic growth. Intellectual property laws are—together with competition norms and public standardization measures—among the most important regulatory tools with which governments may affect the software interoperability question. Thus, the question of intellectual property protection of software interfaces and interoperability is of paramount importance.

## 1.2 A short history of the intellectual property protection of software

At the early stage of software industry development, the economic interests related to software were protected primarily by contracts. In the beginning of the industry's development, this was sufficient, since software was delivered as part of the enormous mainframe computers, which could not factually be transferred further. As computer technology developed and personal computers started to become commonplace, the software was increasingly delivered separately from the hardware.[7] The contractual clauses were no longer a sufficient form of protection from the perspective of the economic interests of the computer and software industries. It became physically possible to transfer a stand-alone software product to third parties. From the perspective of protection, the drawback of contracts is that they can generally bring obligations only to the contracting parties. In order to protect the economic interests vested in software from being used by third parties, it became necessary to establish intellectual property protection for computer programs.[8]

The debates on what should be the form of protection for computer programs have mostly focused on the choice between copyright and patent protection. In the 1980s, the World Intellectual Property Organization (WIPO) conducted studies on

6 For a definition of interoperability, see the preamble of Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the Legal Protection of Computer Programs (Codified version) 2009, O.J. (L 111) 16. The codified version contains the content of Council Directive 91/250/EEC of 14 May 1991 on the Legal Protection of Computer Programs as amended, 1991, O.J. (L 122) 42 [hereinafter Software Copyright Directive].

7 For the historical development of software industry, see for example *Campbell-Kelly* (2003).

8 *Bainbridge* (1999), pp. 4-5, 9 and 11-12.

the international protection of computer programs.[9] WIPO made two models for computer program protection. The first model was based on the copyright model and the second on a sui generis approach. The sui generis draft treaty articles prohibited the disclosure and copying of a computer program, among other things; the suggested term of protection was 20 years.[10] However, the sui generis proposal was not adopted, as computer programs were seemingly appropriately protected by copyright. This was reflected in the fact that at the 1985 WIPO Conference, many countries informed that they protected computer programs through copyright. International copyright treaties such as the Berne Convention[11] and the Universal Copyright Convention[12] enabled efficient international protection based on the copyright model, which was thought to foster the creation and international distribution of computer programs. Soon after the WIPO meeting, many countries amended their copyright regulations to protect computer programs with copyright.[13]

After this, copyright became the standard form of protection for computer programs. At present, the TRIPS Agreement[14] and the WIPO Copyright Treaty[15] require that computer programs are protectable by copyright. However, the problem of what should constitute protectable subject matter soon arose: What exactly in computer programs should be protected by copyright? One could ask a more significant question regarding the preconditions for gaining copyright protection: When are the programs or their parts original enough to merit copyright protection?[16] The EU has tried to answer these questions with the Software Copyright Directive. The Directive is based upon copyright but it creates specific rules for computer programs. For example, it provides that where an employee creates a computer program in the execution of

9 WIPO Advisory Group of Experts on the Protection of Computer Programs, Geneva, March 8-12 1971, Copyright 1971 pp. 35-40.

10 See WIPO Model Provisions on the Protection of Computer Software, Copyright 1978 pp. 6-19; Draft Treaty for the Protection of Computer Software Geneva June 13-17, 1983.

11 Berne Convention for the Protection of Literary and Artistic Works of September 9, 1886, completed at PARIS on May 4, 1896, revised at BERLIN on November 13, 1908, completed at BERNE on March 20, 1914, revised at ROME on June 2, 1928, at BRUSSELS on June 26, 1948, at STOCKHOLM on July 14, 1967, and at PARIS on July 24, 1971, and amended on September 28, 1979.

12 The Universal Copyright Convention, adopted at Geneva in 1952.

13 WIPO Group of Experts on the Copyright Aspects of the Protection of Computer Software, Geneva February 25 to March 1 1985; Copyright 1985, pp. 146-149. Among the countries that informed they were already following a/the copyright regime was the U.S. The U.S. had changed its Copyright Act in 1980 in order to extend copyright protection to computer programs. As a background for the change in the U.S. was an extensive report concerning the possibility to protect computer programs through copyright; see Final Report of the National Commission on New Technology Uses of Copyrighted Works (CONTU), Library of Congress, Washington D.C. July 31 1978.

14 Agreement on Trade-Related Aspects of Intellectual Property Rights, The TRIPS Agreement, Annex 1C of the Marrakesh Agreement Establishing the World Trade Organization, signed in Marrakesh, Morocco on 15 April 1994.

15 WIPO Copyright Treaty adopted in Geneva on December 20, 1996.

16 On the controversies over the scope of protection, see for example Office of Technology Assessment, United States Congress, Finding a Balance: Computer Software, Intellectual Property and Challenge of Technological Change 5 (1992) pp. 151-153.

his duties, the economic rights to that program belong to the employer.[17] It took a relatively long time before the CJEU got the opportunity to give its interpretations on what is protectable under the Software Copyright Directive. The recent cases have dealt with the issue of preconditions of protection, namely the harmonized originality criterion. Moreover, what is not protectable in computer programs has been a specific problem in the recent case law. The idea-expression dichotomy has been the means for separating the non-protectable elements from the protectable in computer programs.[18] In the U.S., these questions have also been raised in several court cases.[19] In the U.S., copyright protection was soon deemed insufficient as a form of protection, because many important elements of computer programs, such as interfaces, were deemed not to be copyrightable. This situation created a pressure that computer programs should be eligible for patent protection.[20]

In the 1985 WIPO conference, many countries had informed WIPO that specific provisions in their patent laws exclude computer programs from patent protection. Under the European Patent Convention (EPC) Article 52, computer programs are not protectable "as such". Nevertheless, gradually patent protection for computer programs has become possible under the EPC.[21] A similar trend has taken place in the U.S.[22] On both sides of the Atlantic, and despite legislative exclusions and previous practices to the contrary, computer programs are nowadays protected under nearly the same principles as other patentable subject matter. Hence, patent protection has become a normalized form of protection for software.[23]

17 Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the Legal Protection of Computer Programs (Codified version) 2009, O.J. (L 111) 16. The codified version contains the content of Council Directive 91/250/EEC of 14 May 1991 on the Legal Protection of Computer Programs as amended, 1991, O.J. (L 122) 42.

18 C-406/10, *SAS Institute Inc. v. World Programming Ltd* Judgment of the Court (Grand Chamber) of 2 May 2012, nyr, and C-393/09 *Bezpečnostní softwarová asociace – Svaz softwarové ochrany v. Ministerstvo kultury* [2010] ECR I-0000.

19 On case law, see for example *Lexmark Int'l, Inc. v. Static Control Components, Inc.*, 387 F.3d 522 (6th Cir. 2004); *Computer Assocs. Int'l, Inc. v. Altai, Inc.*, 982 F.2d. 693, 706 (2d Cir. 1992); *Whelan Assocs., Inc., v. Jaslow Dental Lab., Inc.*, 797 F.2d 1222 (3d Cir. 1986) *Atari Games Corporation v. Nintendo of America*, Inc. 975 F.2d 832, (Fed. Cir 1992), *Sony Computer Entertainment, Inc. v. Connectix Corporation* 203 F.3d 596 (9th Cir. 2000) and *Sega Enterprises Ltd. V. Accolade Inc*, 977 F.2d 1510 (9th Cir. 1992). Copyright protection of software is analysed in a more detailed manner in this research in the articles: *U-M. Mylly*, (2010 a), and *U-M. Mylly*, (2010 b).

20 *Samuelson*, (2009), p. 1959.

21 As illustrative cases on developments of software patentability at EPO see *IBM/Computer program product* T 1173/97 (1998); *Controlling pension benefits system/PBS PARTNERSHIP* T 0931/95 (2000); *Hitachi/Auction method* T 258/03 (2004) and EPO Opinion of the Enlarged Board of Appeal of 12 May G 0003/08.

22 As illustrative cases on developments of software patentability in the United States see *Diamond v. Diehr* 450 U.S. 175 (1981); *In re Alappat* 33 F.3d 1526 (Fed. Cir. 1994) (en blanc); *State Street Bank & Trust v. Signature Financial Group* 149 F.3d 1368 (Fed. Cir. 1998) and *Bilski v. Kappos* 130 S. Ct 3218 (2010).

23 The expansion of patent protection of software is analysed in a more detailed manner in this research in the article *U-M. Mylly* (2011).

At the moment, there are multi-layered, proprietary and non-proprietary forms of protection available for computer programs. They may be protected through two traditional intellectual property regimes: copyright and patent. In addition, economic interests may be protected by contract provisions and by keeping the source code a trade secret. It is also possible to complement protection by using technological protection measures. Especially in the U.S., some researchers earlier argued that copyright protection is unsuitable for computer programs due to its long term of protection, among other factors. On the other hand, patent protection was deemed inappropriate because software development is incremental—not inventive—by nature. These authors also promoted a sui generis protection for computer programs. This sui generis model included a proposal for an automatic licensing regime for software innovations. The licensing regime was based upon the model that the copyright collectives are utilizing for their licenses.[24]

The optimal form and scope of intellectual property protection has thus been debated and questioned from the early days of software history. This research participates in these debates and seeks to analyse the possible shortcomings in the protection of computer programs from the perspective of the specific characteristics of software and its efficient development.

## 1.3 The specific characteristics of the open source paradigm and its role in the industry

One way for companies and individual developers to seek and safeguard interoperability is to rely on open source products. Open source has emerged as a new paradigm within the software industry. The market shares of open source products have been increasing, and in some products they are extensive.[25] Large, established proprietary software companies have started to provide some of their products in open source format. There is ever-increasing collaboration between proprietary firms and open source projects. One notable example is IBM's involvement with Linux servers.[26] Open source is no longer an isolated phenomenon relevant only to the open source community and specific small-scale firms. At present, it is a recognized and essential part of the whole software industry.[27]

The open source innovation model has proved efficient for technological development. This research is interested in the conditions of efficient technological development within the software industry, as technological development is one of the major objectives of intellectual property protection. The prospect theory developed by Edmund Kitch recommends providing strong intellectual property rights to the inventor. The prospect theory posits that the technological opportunities would be

24 *Samuelson, Davis, Kapor & Reichman* (1994).
25 *Einhorn* (2004), p. 170.
26 See for example *Deek & McHugh* (2008), p. 8 and 276-277.
27 The open innovation model is not only applied in the software industry but is utilized widely also in other industries. See, for example, *Strandburg* (2009), pp. 878-879.

most efficiently utilized if the inventor had the power to manage the direction of the technological development.[28] In this research, I have adopted a critical position with respect to the prospect theory. My critique is anchored in an understanding of innovation and technological development, as suggested by evolutionary economics. The open source innovation model will be discussed shortly, as it provides a living example contesting the proposition that strong intellectual property protection with central management is needed for technological development.

The open source model is based on the idea of non-excludability, whereas the proprietary model is based on excludability. Property rights in the open source model are turned into rights to modify and distribute.[29] The open source paradigm relies on the copyright regime, but it does so in a creative manner. The copyright regime is used so that further development is enabled and incentivized, not blocked. Moreover, the promoters of open source have been critical towards patent protection, as it is said to be incompatible with this mode of development. This is because independently created programs may still infringe patents. Consequently, the patent protection of third parties may endanger the open source mode of development.[30]In the open source environment, technological aspects are considered key for choosing the direction of further development. New technological solutions are also immediately implemented and available. It has been shown that open source software competition leads to increased innovation within the market segments where new open source products have entered.[31]

The open source distribution model differs from the proprietary distribution models by some of its features. Firstly, the program code is transparent and available to anybody. But more importantly, anybody is allowed to make modifications to the code and avail himself of the further development of the code, as long as he agrees with the open source licensing scheme. The multiplicity of actors is intended to solve the technological problems and develop the technology further. The model enables trial-error-correction testing on a large scale. As a wide array of possible technological solutions is being tested, there are greater possibilities for finding the optimal technological solutions. This has enabled open source projects a speedy technological development. The efficiency of open source development questions the traditional proprietary licensing schemes based on a strong reliance on intellectual property exclusivity. The traditional model may lead to situations where follow-on inventions are prevented as third parties cannot access and develop the code (and also lack access to interoperability information). Exclusive rights, intended to incentivize, may as a matter of fact prevent development. Moreover, the transaction costs are higher in the proprietary model. The reduction of transaction costs within the open source model explains part of its efficiency.[32]

The weakness in the central management of the proprietary model is that it is difficult to know beforehand every possible error that may be encountered when using

28 *Kitch* (1977).
29 *Weber* (2005), p. 204.
30 *Välimäki*, (2005), p. 111-112.
31 *Bitzer & Schröder* (2006 a), p. 221, 225 and 230.
32 See for example *Einhorn* (2004), p. 170-175.

a program. In open source projects, these problems are found with more certainty because of the number of testers involved in the project. Decentralized decision-making ensures higher quality.[33] The success of the Internet has created a positive technological situation for open source markets, because many products that are important for the functions of the Internet are open source products.[34] It has been argued that the development of the Internet was successful because the developers were able to experiment with various applications at a low cost. Access to Internet connectivity through standardized protocols enabled this. Moreover, the decentralized decision-making proved efficient, as it enabled the implementation of various visions, which would have remained dormant in a centralized management.[35]

Decentralized decision-making provides possibilities for various players to take part in the technological development. This provides also other benefits than efficient technological development. Open source is seen beneficial to consumers also from the perspective that a customer lock-in with a particular vendor is less probable. Even though there are various technological strands within a specific open source project--which might not be fully interoperable with each other--the openness of the code quite effectively protects against vendor lock-in. A possibility to choose between various vendors is a welfare factor by increasing selection. This is an additional aspect where open source is regarded superior to the proprietary model.[36]

One specific characteristic of open source development is the fact that the developers of open source are often users of the program. There is no clear distinction between suppliers and users.[37] The user-initiated innovations are deemed to increase social welfare. This mode of development, where the initiators of the development of a technology are the users, also questions the traditional understanding of the required incentives for innovative activities in the form of intellectual property rights. The intellectual property legislation seems to support traditional manufacturer-managed innovation.[38] For example, the TRIPS Agreement is based on the idea that all exclusive rights mentioned in its articles are necessary for the promotion of innovation.[39] Within the open source mode of development, part of the incentives are said to stem from the joy of creating and learning.[40] Moreover, part of the incentive structure of open source development is based on the individual programmer's wish to earn a reputation. In open source projects, the names of the contributors are listed in the code.[41] This practice is different from the proprietary models, where the moral rights of a copyright owner (i.e., the right to attribution and paternity rights) are not as important in the computer

33 *Radin* (2002), p. 14.
34 For example many web servers are open source. See for example *Välimäki* (2005), p. 17 and 48.
35 *Greenstein* (2001), p. 153-154 and 175.
36 *Deek & McHugh* (2008), p. 267-268. There are various open source licenses and these are not necessarily fully compatible with each other. The licensing restrictions within open source may also occasionally lead to a lock-in situation. See for example *Välimäki* (2005), p. 115 and 140-141.
37 *Bitzer & Schröder* (2006 b), p. 4.
38 *von Hippel* (2005), p. 2.
39 *Strandburg* (2009), p. 895.
40 *Deek & McHugh* (2008), p. 286.
41 *Bitzer & Schröder* (2006 b), p. 5.

program industry, but rather the economic rights, which are based on intellectual property protection. However, this kind of reputation gaining can also provide indirect economic benefits for the programmer as it may interest possible employers and lead to hiring the skilful programmer.[42]

Open source has been a successful model for developing software technologies. Moreover, it protects against some negative economic factors. The incentives within open source development follow a logic quite different from that of intellectual property protection. The decentralized decision-making is perceived to provide benefits for technological development. This mode of development within the software industry puts into question the pursuit of technological development using current forms of strong intellectual property.

## 1.4 The research question

This research focuses on the scope of copyright and patent protection for computer program interfaces, as well as the interrelationship between these IP regimes on this question. One of the basic ideas behind both copyright and patent protection is to further general cultural and technological development so that creators and inventors have adequate incentives for creation and research investments. The incentives are given in the form of exclusive rights, which are granted to a creator or inventor for a certain period of time. The essential part of this right is the right to exclude others from the exploitation of the invention or work.[43]

The research asks whether copyright and patent laws actually fulfil this aim in the present regulations and interpretations concerning the protection of computer program interfaces: do these regulatory measures further technological development as intended? What is the role of the justifications for intellectual property protection in moulding the legislative solutions and interpretations[44], and could the justifications be re-thought so that the intellectual property institution in practice would further technological development within the software industry, as aimed? The scope of protection and incentives in the form of intellectual property rights will be subjected to critical analysis. Evolutionary economics provides an important premise for my critique. In evolutionary economics, the understanding of incentives is somewhat broader than in other branches of economic thought. Firstly, the focus is not on isolated inventions, but on technological development more generally. Secondly, incentives other than in the form of intellectual property protection are taken more seriously.[45]

42 *Deek & McHugh* (2008), p. 286-288.

43 The justifications for copyright and patent laws are elaborated more thoroughly in the next section 2.1.

44 Merges claims that deep level justifications do not play an important role in day-to-day legal practices. He argues that mid-level principles have more important role in directing e.g. court decisions. *Merges* (2011), p. 9. However, Pila disagrees with this notion and gives examples of court cases where justification grounds have had a prominent role in actual court practices both in the U.S. and in Europe. *Pila* (2013), pp. 8-10.

45 Evolutionary economics is elaborated in the section 2.2.

Evolutionary economics directs one to critique the neo-classical prospect theory's policy recommendation on broad patent rights. The idea of strong intellectual property rights does not seem to match the efficient development of software technologies.

It has been recognized that if our assumptions and beliefs do not correspond with reality, then the policy recommendations based upon those misguided assumptions do not lead to the intended outcomes.[46] I will analyse the justifications of intellectual property protection, as they direct the policy-level discussion and the formulation of the objectives for the intellectual property institution. The assumptions about good intellectual property legislation are strongly tied to the underlying justification grounds, such as those based on natural law or utilitarianism. These assumptions affect the interpretations of intellectual property legislation, as their role is to give legitimacy to the intellectual property laws and the court decisions concerning them. These premises thus seek to legitimize the system, but they also help in formulating a consistent and coherent intellectual property system. Recognizing the differences between the various justifications is thus important. My approach is critical towards some of the justification grounds. The consequences of these justification grounds will be elaborated and brought into critical analysis. The research endeavours to illustrate why a shift of emphasis towards a more utilitarian-based justification would serve well, at least in this specific area of intellectual property legislation. Moreover, I will analyse how the utilitarian-based justification for intellectual property protection could be developed from the perspective of evolutionary economics.

It seems that the technological development of the software and related industries requires, on one hand, appropriately adjusted exclusive rights guaranteed to the inventor and creator by intellectual property, and, on the other hand, sufficient availability of interoperability information. At first glance, at the company level these interests seem conflicting, since the intellectual property rights protect the developer of the original program, and the availability of interoperability information helps the newcomers access the market. In certain situations, however, it may also be in the interests of the intellectual property right holder of the original computer program to reveal or license the interoperability information at a low cost. This may help a computer program or a technical platform to become a de facto standard in the industry leading to increased demand for the program. This is due to the fact that interoperability information allows an increase in the development of application programs, accessories and services, which usually benefits the consumers, too. Nevertheless, from the right holder's perspective, publishing the interoperability information may also entail risks, since it may assist in the creation of competing products or services, which could ultimately destroy the markets of the original developer.[47]

At present, interface information is sometimes provided or licensed openly.[48] However, this is not always the case as, at present, the intellectual property legislation leaves this decision for the markets to decide. Consequently, companies and developers

46 *North* (2005), p. 5.
47 See for example *Samuelson* (2009), p. 1951-1954.
48 Ibid.

could block the availability of the information. Even though the copyright legislations allows the use of the reverse engineering technique in order to access the interoperability information, the means currently available under legislation do not always provide sufficient information for viable competition. It has also been evidenced that the possibility of the right owner to hold out on the interoperability information can have a negative impact on technological development.[49] Technological development is the key objective of patent (and copyright) laws. Therefore, it is argued that it is the role of copyright and patent laws to address this question. The other regulatory measures, such as competition law and public standardization, provide only partial solutions for interoperability. Therefore, in this research, it is argued that intellectual property regulation is the most appropriate context to address the question of interoperability.

Individual developers and companies try to achieve a, from their perspective, optimal level of openness and interoperability in computer programs, ranging from open source to closed systems controlled by single companies. Regulating the availability of interface information through intellectual property legislation may provide a middle ground between strong proprietary protection enabling closed systems and open source ideology. This may mean a reduction of intellectual property incentives of some individual companies. Yet, this may be the right solution from the perspective of general technological development as well as society. Therefore, the question should be considered at the intellectual property policy level and not left for companies to decide.

Some companies have been successful in pressing for stronger intellectual property protection to safeguard their interests.[50] As Susan Sell has recognized, the terminology within intellectual property discussions has, over time, shifted from government-granted privileges into rights. This indicates that it is an obligation of a state to grant intellectual property rights and it is no longer legitimate not to grant such rights. In some instances, the line between the interests of society and the private interests of big established companies seems to become blurred. They have been successful in their claims that strong intellectual property protection is beneficial for the general economic development.[51] Granting rights to companies seems to be the starting point for a policy formation, notwithstanding the idea that rewards and incentives in the form of intellectual property rights are in place due to their service to the public interest. From the perspective of evolutionary economics, the focus should be on the incentive structure of the industry sector as a whole, not on a particular company or an isolated innovation. Moreover, the role of other incentives, such as competitive pressure or the generation of reputation, should be evaluated as well. This research endeavours to address the questions related to incentives and intellectual property protection from the perspective of general technological development.

49 T-201/04 *Microsoft Corp. v Commission* [2007] ECR II-3601. The Microsoft case is analysed from this perspective in the article: *U-M. Mylly* (2010 a).

50 See for example, *Elkin-Koren* (2002), p. 83.

51 *Sell* (2003), p. 5, 8 and 13.

# 2 Theoretical premises

## 2.1 Justifications of intellectual property

The subject matter of intellectual property rights is non-exclusive by nature: information may be used by many at the same time without affecting the use of other users. This distinguishes intellectual property objects from the objects of physical property ownership. Possession of physical objects excludes others from using the same object.[52] Intellectual property laws create an artificial excludability for the protected subject matter of intellectual property rights. By legal arrangement, owners of intellectual property rights can exclude others from using the protected subject matter in certain ways. As this exclusion is based on the active engagement of society, the society itself owes to provide some justifications for this legislative action.[53] Property rights may be created by societies for example in response to technological change. Yet, the form of and scope of these rights depend on the vision of society.[54]

Justifications for intellectual property protection are often divided into four categories: 1) natural law; 2) just reward for labour; 3) incentive to invent and create; and 4) public interest or social requirements. These justifications are to some extent linked to each other and the line between them is not always clear. However, they have their own philosophical roots, which further differentiate them into two main categories. The first two justifications are based upon natural law, whereas the latter two are more closely associated with the utilitarian philosophy. The natural law philosophy has been more apparent in the civil law tradition whereas common law, by tradition, is more utilitarian.[55]

The natural law justification is deontological, as it assumes that intellectual property protection is right in itself and that not granting protection would be wrong. The natural law justification finds that it is only natural that those who have created or invented something should receive protection for the fruits of their labour.[56] This theory is inherently based on John Locke's theory of private ownership. According to Locke, every man has a property right in his own person and, consequently, the work of his hands belongs to him, too.[57] However, the natural law justification ground can be associated with Hegel's personality theory, as well. Under the personality theory, intellectual property is justified because the protected idea or subject matter manifests its creator's self. The personality theory is mostly applied when justifying copyright.[58]

52 See for example, *Landes & Posner* (2003), pp. 12-14.
53 *Hettinger* (1999), pp. 120-121.
54 *Demsetz* (1967), p. 350.
55 For the copyright context, see for example *Davies* (2002), pp. 13-17. There are various ways to categorize the justification grounds, see *Sterling* (1999), pp. 55-62, for patent system see for example *Sterckx* (2005), pp. 175-211.
56 *Chisum, Nard, Schwartz, Newman & Kieff* (2004), p. 39.
57 *Locke* (1690), Chapter V, Section 27.
58 *Hughes* (1988).

The natural law justification is normally what is referred to when one emphasizes that intellectual property protection is undiminished by its nature.[59] For example, the length of protection would under the natural law justification be eternal.[60]

Even though Locke tried to prove that property rights are based on natural law, he suggested some conditions for just property rights. The first condition under this theory was that property rights were to be based upon convention within the society. As an internal agreement within the society was required, in the absence of such a convention it had in principle been illogical to claim at the same time that property rights were natural rights. However, under this theory, when a person used his labour to mix something new into what has been common, then he received a property right to the outcome. In these situations, consent from the other members of a society was not required. Because of the requirement of the utilizing one's labour, the theory is often referred to as the Lockean labour theory of property. [61] Under the normative interpretation of labour theory, labour should be rewarded, as rewarding is morally right. Another line of interpretation highlights that labour is to be rewarded because it is useful for the society to do so in order to get more labour.[62] Even though the theory is often seen to justify property rights, a critical analysis highlights that, in principle, nothing requires that the utilization of labour should be rewarded. Even when the reward is thought to be just, it does not need to be given in the form of a property right –there are other options available, such as awards, recognition and public financial support. If the labourer owns the fruits of his labour, the ownership and his right to use the outcome is distinct from the right to extract some market value from selling the product. The latter right is essentially a socially created privilege and requires an agreement within society. Consequently, it can be argued that intellectual property rights are not natural rights, but require the consent of the members of a society.[63] Still, the natural law justification is applied quite one-sidedly when it is used to justify intellectual property rights. It is used in a simplistic manner to mean that there are no other options than to grant intellectual property rights, as these are somehow morally right.

The second requirement under the Lockean theory for property rights is that enough should be left in common.[64] Basically, this requirement should ensure that the created property rights do not induce unfair inequalities within a society.[65] The requirement makes the Lockean theory in principle more egalitarian than how it is often applied.[66] Hettinger has analysed this provisio in a detailed manner. As long as one's appropriation does not worsen the situation of others, the appropriation is just. If this requirement is considered in the context of current patent laws, the question rises

59 *Goldstein* (2001), p. 4.
60 *Ricketson* (1992), p. 754.
61 *Sterckx* (2005), pp. 179-180.
62 *Hughes* (1988), p. 296.
63 *Hettinger* (1999), pp. 126-127.
64 *Locke* (1690), chapter 5, section 27.
65 *Hughes* (1988), p. 297.
66 *Merges* (2011), p. 15.

whether this condition is fulfilled. When one inventor receives a patent right, other independent inventors are to some extent prevented from making a profit from their work, for example when other independent inventors just barely failed to be the first to file a patent application. As a resolution for this problem, Hettinger has suggested that the patent term be reduced. The term of protection should correspond with the time it takes from independent inventors to reach the same solution. Due to the rapid pace and extensive scale of current research activities, it is probable that the current patent term is excessive. Copyright protection is fairer from this perspective, as it does not prevent others from profiting from their independent work.[67]

Thirdly, Locke imposed a non-waste condition for property rights, meaning that one cannot remove more out of the commons than he can use.[68] Because the subject matter of intellectual property rights is non-exclusive by nature, this requirement cannot be met under exclusive intellectual property protection. Protection is wasteful because, in principle, in the absence of protection mechanisms anybody could use the subject matter of intellectual property protection.[69] It is noteworthy that these Lockean provisos are often left out of the discussion when the theory is applied, in order to justify intellectual property protection. It has been suggested that the reason for this is that usually discussants do not believe that these provisos apply in the case of intellectual property protection.[70] If this is the reason, then the question arises whether the Lockean theory is applicable to intellectual property at all. One-sided application of this theory is problematic. Locke's conditions for just property make the theory more balanced than its current applications in intellectual property contexts. For example, the requirement of intellectual commons could be deducted from the theory.[71] Moreover, the perpetual term of protection becomes questionable, since even the current term of protection can be deemed excessive under the "no loss for others" requirement. For example Litman has highlighted that it is the public domain, which should be safeguarded through legislation, as it specifically enables new creations.[72]

Locke found that an object has little value until someone invests his labour in it. He argued that most value would come from the labour.[73] However, all of the value is not necessarily attributable to labour. It is problematic if someone receives the total value of the end product notwithstanding the value that he has specifically added to it. Nothing happens in a vacuum. Intellectual creations are essentially a social phenomenon.

67 *Hettinger* (1999), p. 130.

68 *Locke* (1690), chapter 5, section 31.

69 *Hettinger* (1999), pp. 130-131. Compare, however, with Merges, who argues that intellectual property protection is wasteful only if the subject matter of protection would not be used at all. Merges defends even unused variants of patented technology by saying that these serve as a fence. Consequently, Merges also relies on the Lockean theory to justify broad protection or to favour the owner of the intellectual property. *Merges* (2011), pp. 58-60 and 11.

70 *Streckx*, (2005), pp. 182-183, footnote 35. Merges argues that provisos are valid in the IP context, but he nevertheless concludes that they are not constantly but rather rarely applied. *Merges* (2011), p. 66.

71 See also *Merges* (2011), p. 35.

72 *Litman* (1990), p. 967. Under Lockean argumentation, it is implicitly often thought that ideas are indefinite. Therefore, their appropriation does not lead to loss for others. *Hughes* (1988), p. 300.

73 *Locke* (1690), chapter 5, section 40.

Therefore, it is often difficult to identify what a specific person has contributed to an invention or a creation.[74] However, for example in the patent law discussion, Lemley has recognized that there persists a myth of a sole inventor. Inventors are considered lone geniuses capable of solving problems others are struggling with. This myth is not supported by the empirical evidence, which actually shows that often many persons come up with important inventions almost at the same time. This demonstrates how the invented solutions are often relatively easily achievable for experts working in the field in question. The solutions may be available for example due to new information or raw materials. Therefore, inventions are, in fact, mostly contributions by those who came before the generation before actual innovators. Inventions build on the foundation of previous knowledge. Yet, the theoretical background of patent law is stuck to the idea of a sole inventor, who should be rewarded in the form of patent protection.[75]

Copyright, in turn, is affected by the myth of genius authors. Authors create something that is clearly attributable to them, as their style and form of expression is connected to their unique personality. Such an understanding makes copyright inalienable.[76] When authors express their style, the outcome becomes individualized.[77] The romantic view of authorship is connected to the concept of originality. Originality refers to creativity, which is an act of bringing something into being from nothing. This view has an intuitive appeal.[78] The underlying philosophies implicitly guide all interpretation. As a policy principle, the natural law justification leads to an expansion of rights. This can mean for example a longer period of protection and a narrow construction of exceptions to the exclusive rights.[79] References to the natural law justification seek to neutralize this normative position in the broad extent of rights.[80] The romantic view of authorship is often invoked for business purposes by big copyright-owning corporations, in order to justify an expansion of their rights. Yet, in practice, the "romantic author" may be employed to design software for a specific purpose, which means that the rights go to the employer instead of the genius author.[81] Notwithstanding the referred justifications, companies, in fact, claim intellectual property protection for their own strategic ends; to expand their market power and control.[82] Moreover, the natural law philosophy manifests itself in judicial interpretations where the author's personality or high originality is required for copyright protection. In practice, high originality as a requirement for copyright protection leads to strong copyright protection.

The second justification for intellectual property protection is the just reward for labour argument.[83] The idea of just reward for labour basically stems from the natural

74 See for example *Litman* (1990), pp. 965-967.
75 *Lemley* (2011).
76 *Chartier* (1994), p. 15.
77 *Edelman* (1994), p. 83.
78 *Litman* (1990), p. 1009.
79 *Hugenholtz* (2002), pp. 239 and 250-251.
80 *Strowel* (1994), p. 240.
81 *Boyle* (1996), p. xiii.
82 *Elkin-Koren* (2002), pp. 79-80.
83 *Davies* (2002), p. 14.

law reasoning.[84] The reward justification is sometimes also called distributive justice. Under this theory, it is assumed that a society needs to reward those who have created or invented something, because they have done something useful for the whole society. Consequently, a society should protect inventors and creators against free riders. The first problem with this theory relates to the question of what the right amount of reward is. Reward can be calculated on the basis of the effort utilized or value created. Yet, patent protection lasts for twenty years for all inventions. Moreover, the first-to-file system rewards only the first one to apply for patent protection, even though there are often several researchers who have put their efforts into the same research areas. Additionally, there is no function in the patent system to solve how the reward is to be calculated so that it corresponds to the effort utilized or value created. Another problem with regard to the reward theory is that there are also areas that are not patentable. For example discoveries are not patentable, but reaching them may require enormous efforts. Yet, these efforts are not rewarded under the patent system. There are also inventions that cannot be patented because some areas are excluded from patentability, for example, due to morality issues.[85]

One should also question whether rewards in the form of intellectual property rights are necessary at all. In some sectors, the markets may entail a monetary reward in any case. This may happen due to lead-time, network effects or some other factors outside patent or copyright protection. Consequently, in these situations, a reward in the form of intellectual property rights may not be necessary and may not do justice. It is questionable if double rewarding is necessary. An essential further notion is that even though a reward is considered to be just, it does not need to be in the form of intellectual property right. Therefore, distributive justice is not a very convincing argument for intellectual property rights.[86] Even though the reward is used as a justification ground for intellectual property, Elkin-Koren has pointed out that remuneration is not the most important factor in intellectual property protection, but the control over the use of the protected subject matter. Through this control, companies are empowered to reduce competition.[87]

The third and fourth arguments for intellectual property protection are based on a utilitarian justification.[88] Under the incentive to invent an argument it is assumed that without government-provided incentives no one would have the motivation to engage in inventive activities. This would lead to a detrimental situation in society.[89] This incentive to invent and create is the third justification for intellectual property. As the reward in the form of intellectual property rights is considered as the necessary incentive mechanism, the incentive argument becomes practically intertwined with the reward justification.[90] In court cases, the instrumental justification is often

84 *Sterlin* (1999), p. 56.
85 *Sterckx* (2005), pp. 188-193.
86 *Sterckx* (2005) pp. 190-191.
87 *Elkin-Koren* (2002), p. 84.
88 *Sterckx* (2005), p. 193.
89 *Arrow* (1962), p. 617.
90 *Davies* (2002), p. 15.

complemented with the just rewards argumentation. This is probably because it is difficult to argue that the benefits created by intellectual property rights would not also be deserved.[91] However, according to utilitarian justification, a reward is not an end in itself, but is provided because society benefits from this incentive mechanism. The emphasis is thus on the benefits of society, not on the benefits of innovator or creator. Therefore, the availability of intellectual products for the whole society is more important than protecting creators and inventors.[92] For example, if new innovations are not widely available in society, the system is not as efficient as in the situations where there are fewer inventions but these are widely utilized.[93]

The fourth leading justification for intellectual property protection can be defined as social requirements or public interest. This stems from the utilitarian argument. The public interest is often assimilated with the incentive to disclose or the dissemination principle.[94] It is in the interest of society that new creations and inventions will be available and that these are, then, widely disseminated within the society. Therefore, under this argument, the incentives to invent and create are not the focal point, but the incentives for dissemination are. Even though intellectual property protection, under this justification logic, is not an end in itself, it has been argued that the focus is still on providing incentives in the form of intellectual property rights. The criticism has highlighted that in the applications of the justification logic there does not seem to be much interest in the actual efficiency of the intellectual property right system in dissemination.[95]

Different justifications lead to different outcomes. The assumptions linked to the justifications lead our analysis and decision-making.[96] Hence, it is significant which of these justification grounds we choose. Our background assumptions make the difference. They mould the legal rules and their interpretations. Therefore, it matters what kind of justification grounds an intellectual property system is based upon. However, the leading principles and conceptual premises of one intellectual property system do not form a coherent whole so as to represent only a single justification ground. The intellectual property systems of different countries often emphasize some justifications over others, notwithstanding the fact that all of these justifications typically play some role in the policy discussions of that particular intellectual property system.[97]

The existing intellectual property system and its justifications may create constraints for development, even for technological and cultural development. Moreover, it is difficult to change institutions. This is because they are tied to the surrounding society and culture. There are forces that make institutions path-dependent. Institutional constraints even accumulate over time. They become part of our inheritance and

91 *Hughes* (1988), pp. 303-304.
92 *Hettinger* (1999), p. 134.
93 See for example *Besen & Raskind* (1991), p. 6.
94 *Davies* (2002), p. 16.
95 *Hettinger* (1999), pp. 133-134.
96 *Boyle* (1996).
97 *Davies* (2002), p. 17.

form our possibilities, or at least shape our understanding and assumptions about the available possibilities. Because of this, even conscious efforts for change become difficult.[98] According to Tuori's view of the multi-layered nature of law, the surface level of law is under continuous change but legal culture and the deep structure of law are more stable and, thus, more difficult to change.[99]

In this research, I identify possibilities to develop interpretations of intellectual property legislation. The research also identifies some needs for legislative change. My recommendations are based on the existing justification grounds of intellectual property legislation, which were shortly introduced above. Due to the path-dependency of institutions, institutions cannot be changed overnight. Intending to change the deeper level justification grounds would be a more far-reaching exercise—an exercise that I leave for someone else. I emphasize a utilitarian justification over the natural law justification. Many have considered utilitarian justifications to be the most convincing in our modern conditions[100]. Utilitarian justification is especially suited for the protection of computer programs. The modes of creation and development of computer programs are far from the picture of "Romantic authorship" or "A Sole Genius Inventor". Natural law justification is not compatible with the current modes of developing and producing computer programs.

Furthermore, in Europe, the Software Copyright Directive has caused the harmonization of the originality concept as a prerequisite for the copyright eligibility of a computer program to a low level of originality. As discussed above, a stringent originality requirement resembles the logic of the natural law justification. The legislative change indicates that the role of natural law justification is also diminishing in the legislative practices. Intellectual property protection in Europe seems to become increasingly utilitarian. This is also bringing the European system closer to that in the U.S.

The father of utilitarian thought was the utilitarian theorist and economist Jeremy Bentham. Even though utilitarianism is in essence a philosophical ideology, it is often associated with economics.[101] Bentham recognized the problematic of the public good within information goods and the issue of free riding when there are no incentives to create. Consequently, according to him, society requires an institution to resolve this problem. Intellectual property was a natural solution to the problem of the incentive to create. The current debate on law and economics and intellectual property rights are continuing the Benthamian argument on the incentives to create. Yet, there are different branches of economic thought. One branch of thought considers intellectual property to be an efficient solution for the problem of public goods. Another branch of economic thought gives innovative activities a central role in economic growth. According to this school of thought, intellectual property rights also play a role in this dynamic process.[102] In this research the school of evolutionary economics is utilized to open up the discussion concerning economic justification for intellectual

98 *North* (2005), pp. 2-3 and 6.
99 *Tuori* (2007), p. 50.
100 *Sterckx* (2005), p. 193.
101 On critical analysis on links and confusions between utilitarianism and economics, see *Posner* (1979).
102 See, for example, *Ramello* (2004).

property and the possibilities to develop this justification ground. The perspectives and policy recommendations of this school of thought are utilized in the evaluation of efficient intellectual property protection. This will be contrasted with some other policy recommendations based on mainstream economic thought. This conflict will be underlined in order to clarify the differences between these schools of thought and their potential to influence policy decisions. Consequently, the methodology of this research to some extent follows that of comparative law and economics.

In the following, I will elaborate on why I consider evolutionary economics as a promising school of economic thought for the analysis of the intellectual property protection of computer programs. So far, evolutionary economics has not received much notice in legal research in Europe. This research endeavours to fill this research gap. The background assumptions of evolutionary economics will be explained, because they in the end make the difference. If these assumptions correspond with the reality more perfectly than the assumptions behind other schools of thought, then also the policy recommendations based on this school of economic thought are more likely to lead to the desired end results.[103]

## 2.2 Why evolutionary economics?

The economic argument for the necessity of intellectual property protection has been that information is a non-excludable public good. Without protection, those who have made efforts to produce the information cannot prevent others from utilizing the information. By establishing intellectual property protection, the information good is made excludable. Without protection, there are no incentives for producing information goods.[104] Intellectual property protection thus solves the public good problem of information goods.[105]

Mainstream economics is utilizing the equilibrium model for efficiency analysis.[106] The equilibrium model is accordingly applied in evaluations on the breadth of the required incentives in the form of intellectual property rights. The standard analysis on the optimal scope of intellectual property protection is based on calculations on the benefits of protection and the deadweight losses of such protection. When applying the model, a number of simplified assumptions are required to fit into the closed formal models.[107] For one thing, the mainstream economic analysis is based upon

103 Evolutionary economics is also elaborated in the following article relating to this research: *U-M. Mylly* (2010 a). The following section seeks to avoid repetition of the issues already elaborated in the article. Therefore, it takes a more abstract approach to the theme.

104 *Lévêque & Ménière* (2004), pp. 4-5.

105 *Gordon* (1982), pp. 1610-1611.

106 See for example *Varian* (2003). See especially Chapter 18 on technology; Chapter 34 on information technology; and Chapter 35 on public goods, which relate to the themes of this research.

107 For a general introduction to the economics of intellectual property rights, where mainstream economic analysis is utilized, see for example *Landes &Posner* (2003). For an analysis on the scope of patent protection, see for example *Klemperer* (1990).

the assumption that innovators and creators behave under unbounded rationality. For innovation activities, this means that innovators have full information about the potentials of their innovation and are acting in order to find the most efficient outcome.[108]

In evolutionary economics, innovations are seen as the motor of economic growth.[109] Evolutionary economics concentrates on change, be it cumulative or radical. The focus on change renders the research inherently complex and leads to a need to abandon the equilibrium model. "What constitutes the most suitable market structure for innovation?", forms the core normative question of evolutionary economics.[110] Its focus on innovation makes this branch of economic thought especially useful for intellectual property research. Schumpeter's definition of innovation, "ideas applied successfully in practice", is broad, as it covers both technical inventions and other applications of new ideas, such as the introduction of new services, organizational structures and opening new markets.[111] This broad definition thus captures patentable (technical) inventions and copyrightable creations, among others. Computer programs, even though functional by nature, are protectable under both patent and copyright regimes. They entail technical and expressive elements at the same time. The broad definition of innovation accounts for this dual capacity of computer programs.

Different strands of evolutionary economics emphasize different factors. The most important strand of evolutionary economics is the one which emphasizes the importance of novelty and creativity in moulding evolutionary processes of the economy. In situations where novelty is emphasized, indeterminacy and the possibility of divergence are often also highlighted (as in the works of such representative authors as Richard Langlois, Joseph Schumpeter, Richard R. Nelson, Sydney Winter and Giovanni Dosi).[112] An emphasis on novelty essentially leads to a situation where the analysed systems need to be understood as being open. Another important consequence of an emphasis on novelty is that the models cannot be based on agents who have fixed preferences. Instead, agents should have the possibility to choose differently. The assumptions about the social world are thus drastically different in evolutionary economics and mainstream economics.[113] When the models cannot be based on agents who have fixed preferences, the alternative approach adopted in evolutionary economics is called population thinking. The economic processes are seen to take place because of interactions between heterogeneous actors.[114]

For novelty to emerge, there has to be variety. For one thing, one cannot know the best choice beforehand. There cannot be any ready-made alternatives for the analysis of decision-making. This is due to the fact that the consequences of any given choice

108 For a critical analysis of the assumptions related to mainstream analysis of innovation activities, see *Merges & Nelson* (1994).
109 *Fagerberg* (2003), pp. 150-151.
110 *Nelson & Winter* (1982), pp. 8-10 and 356.
111 *Schumpeter* (1934), p. 66.
112 *Hodgson* (1999), pp. 131 and 135.
113 Ibid. pp. 141-145.
114 *Fagerberg* (2003), p. 150.

are not known yet. Consequently, agents (i.e. firms) are deemed to act in divergent ways in any given situation.[115] This is connected to the understanding that they act under *bounded rationality*.[116] Because innovators act under bounded rationality, they do not possess all of the relevant information. Consequently, they are also not capable of understanding all the possible tracks of future innovation related to their own innovations, and, therefore, not always capable of finding the optimal solution, or acting in accordance with it. Moreover, there is no representative agent, because different actors would see the situation differently, and consequently also make different choices. Evolutionary economics, hence, understands that inventive activities flourish more often in a competitive situation than in a monopoly (caused for example by broad intellectual property protection), since in the latter the search for alternatives is limited.[117] A market structure with competition is thus important for the diversity and for finding an optimal solution.[118]

As has been stated, in evolutionary economics, variety is deemed essential for development and economic growth.[119] There has to be a constant possibility for variety to emerge. If there are no submissions of new inventions or variety, a system will stagnate due to lock-in and path-dependency. Avoiding this requires that a society is open to innovations. This relates to the issue of how increased variety in the economy would create smoother paths of absorption.[120] It is far too easy to follow routines, which makes it more difficult to accept new ways of doing and hence create innovations. Routines support decision-making in our world of uncertainty. As the agents can never have full information nor full capacity to make rational decisions, quick decisions are based on their previous experience and learning. This cumulative knowledge prevents the agents from finding new ways of doing, that is, innovations. Firms tend to stick to their previous learning. They follow their earlier tracks of behaviour. Consequently, innovation is a highly difficult goal. Searching and introducing innovation requires a special capacity. Moreover, spreading radical innovations within society is similarly problematic. Innovations need to overcome the existing resistance linked to the common habits at the collective level.[121] Old established firms are generally more tied to conservative habits. It is the new entrants that are more innovative. At present,

115 *Nelson & Winter* (1982), p. 276.

116 In some research, the assumption of bounded rationality is taken into consideration through a transaction-cost analysis. In a transaction-cost analysis related to intellectual property rights, it is recognized that it is difficult for innovators to work out licensing agreements when those concern something yet unknown, i.e. something novel. On this kind of analysis, see for example *Scotchmer* (1991). In evolutionary economics, bounded rationality is taken into account already in the analysis concerning the actual innovative activity and the uncertainty related to this. *Merges & Nelson* (1994), p. 5.

117 *Merges & Nelson* (1994), pp. 1-3.

118 *Nelson & Winter* (1982), p. 276.

119 *Fagerberg* (2003), p. 147.

120 Ibid. pp. 151-154.

121 *Schumpeter* (1934), pp. 84-85.

there is some empirical evidence that new firms are more innovative than established organizations.[122]

The outcomes of innovative activities are unknown, and therefore evolutionary economics highlights the role of uncertainty. This is also why the idea that innovative activities could fit into closed boxes or restricted areas is incompatible with evolutionary economics. For one thing, this connotes that the sources of change cannot be understood as being either endogenous or exogenous. We cannot always know the causes of change, nor what properties will emerge through it. Therefore, one indicator only cannot explain the sources of change.[123] Dosi has proposed that technological development must be understood as interplay between scientific advances and user demand. [124] The intellectual property legislation supports traditional manufacturer-managed innovation.[125] Consequently, the roles of the various actors in the innovative activity are not appropriately taken into account within the intellectual property legislation. Freeman emphasizes that a combination of various sources is important for the national innovation systems. Having access to both technological and artistic creations and being able to develop something out of these is a factor that fosters innovation.[126] Innovation is seen as *emerging* from some key factor, which induces a wide array of related innovations, for example through combinations.[127]

The perspective of evolutionary economics is not focused on particular isolated innovations. Rather, it is a systemic approach, where the inter-relationships between innovations and their diffusion are analysed as a process.[128] Moreover, having multiple actors modifying and developing technology is essential.[129] The kind of systemic analysis that evolutionary economics has developed into is useful for intellectual property-related legal research, as it enables the question of whether the intellectual property institution fulfils its objectives related to innovation. The task of intellectual property regulation is related to the furtherance of general technological and cultural development. Like in evolutionary economics, the focus is neither on a single creative act or technological invention nor on a single innovator, but on the general technological process.

It is up to government policy to build an innovation system where the interfaces between various sources of innovation are made communicative. Yet, through their

122 *Frischmann & Lemley* (2007), footnote 69. Fuelling innovation may require that it is not the established firms that receive subsidies for R&D, but rather the new firms. *Fagerberg* (2003), pp. 151-154. The role of small firms in the emergence of the new economy in the United States has been recognized. The supporting institution in this case was private venture capital, which was accessible to these firms. It made it possible for individuals to start up their innovative firms. *Freeman* (2008 a), p. 171.

123 *Hodgson* (1999), pp. 143-149.

124 *Dosi* (1982), pp. 147-151.

125 *von Hippel* (2005), p. 2.

126 *Freeman* (2008 b), p. 17.

127 *Fagerberg* (2003), pp. 139 and 143.

128 *Freeman, Clark & Soete* (1982) pp. 68-72.

129 *Freeman* (2008 c) p. 77. Earlier research in evolutionary economics tended to overemphasize the role of a single innovation and underestimate the importance of diffusion mechanisms. The role of the entrepreneur was overemphasized. Ibid.

own activities, also companies and other actors are building such an environment. The first important interface for development is the science-technology interface. Empirical work has revealed that the emergence of ICT increased communication at the science-technology interface. Another important interface is that between users and developers. There is ample research focusing on the role of users as initiators in development processes.[130] The empirical evidence shows that the role of users has been especially significant in the case of incremental innovations. In addition to the inner learning capabilities of firms and their investments in research and development activities, sources outside the firm are broadly utilized in the innovation processes. This connotes that the creative innovation by a specific firm or actor does not depend solely on the capabilities of that very firm, but on the surrounding national (and trans-national) institutional setting in which it is searching for ways to innovate.[131] Nations capable of adapting their institutional settings to support new techno-economic paradigms tend to be successful. The techno-economic paradigms are the trajectories shaped by the interrelated innovations influencing the general economic development. These paradigms are what matters, not any single isolated innovations. These paradigms involve not only economic and technological factors, but also scientific advances.[132] Among the institutions influencing the techno-economic paradigms are the intellectual property regulations.

Under evolutionary economics, the dissemination of technologies is seen as an essential element of technological development. It is not only invention or innovation, but essentially also dissemination, which spur the economic growth. Already Schumpeter emphasized that it is innovation and imitation, which lead to a growth of a specific industrial sector. In the intellectual property systems, dissemination may be emphasized, as well. It is an important part of the utilitarian and public interest justification ground for intellectual property rights. The patent system is said to provide both incentives to innovate and incentives to disclose. However, disclosure and dissemination seem to be quite narrowly discussed in these contexts. The focus is too much on the incentives to invent.[133] In this research, the importance of dissemination for technological development is taken seriously. It is discussed in the patent context by reference to the bargaining or disclosure theory. The bargaining theory is often referred to when justifying patent protection. This research analyses how patent systems fulfil this part of its founding premises within the computer program industries.[134]

Based on the limitations on the innovator's behaviour and some empirical evidence from the history of innovative activities, Merges and Nelson have suggested that especially in system and cumulative technologies, a competitive climate is better than a monopoly situation for technological development to take place. They recommend

130 See, for example, *von Hippel* (2005).

131 *Freeman* (2008 c), pp. 78-81. Consequently, R&D investments cannot be given a decisive role as an indicator for the innovative success of a firm. Yet, it seems that the R&D intensity of a specific industrial sector correlates with the success of the sector as a whole. Ibid.

132 Ibid. pp. 83-84.

133 *Hettinger* (1999), pp. 133-134.

134 Relating to this research, see the article *U-M. Mylly* (2011).

a narrow scope of intellectual property protection for system and cumulative technologies.[135] This policy recommendation, based on an understanding of what is required for efficient technological development within these technological areas, forms an important premise of this research. Computer programs represent, at the same time, both a system and cumulative technology. However, it is noteworthy that Merges' and Nelson's policy recommendation was made for all cumulative-system technologies, not only for software.[136] In this research evolutionary economics is utilized in order to generate a nuanced understanding for outlining the proper amount of protection for software technologies, and software interoperability elements, in particular.

The demand of variety to fuel development may pose some challenges to the intellectual property protection of computer program interfaces. Intellectual property protection itself prevents similarity and hence can be understood as providing pressure for variety. However, the narrow scope of patent protection spurs more competition and technological variety.[137] This thesis recognizes that computer program interfaces are key components that should not be strongly monopolized, or otherwise the technological variety from a larger perspective will be endangered. As variety is necessary for technological development, strong intellectual property protection could also impede technological development. This would be in contradiction with the general objective of intellectual property protection, which is similarly deemed to be technological development. Consequently, a variety in computer program interface technologies could be sacrificed for the sake of the technological variety of related and connected technologies providing a wider technological area.

The focus on novelty, creativity and innovation makes evolutionary economics a fruitful line of research related to the analysis of intellectual property. Creativity and novelty are the actual subject matters of protection under the patent and copyright regimes. Moreover, it is the technological development that the patent system is aimed at promoting. Compared to mainstream economics, evolutionary economics gives other forms of incentives than intellectual property protection a more prominent role.[138] Already Schumpeter emphasized that, in addition to the potential economic rewards, there are other forms of incentives that may be even more important for the innovative actors. This approach enables different societies to rely on different ways for arranging the required incentives for innovators.[139] Hettinger has criticized the utilitarian justification ground for the lack of discussion on other forms of incentives than intellectual property rights. He has argued that for the utilitarian justification to be truly convincing, it has to honestly consider other possibilities for incentivizing innovation, such as government grants.[140] This is one additional reason for preferring evolutionary economics: its approach to the incentive discussion is broad. This

135 *Merges & Nelson* (1994), p. 16.
136 Ibid. p. 21.
137 *Merges & Nelson* (1994), p. 7; Compare the policy recommendation to the earlier simulation conducted by *Nelson & Winter* (1982), p. 350.
138 *Dosi* (1988), p. 1139.
139 *Schumpeter* (1934), pp. 93-94.
140 *Hettinger* (1999), pp. 135-137.

approach is taken into account in this research, in particular in the article discussing patent law exceptions. Here, the requirements for exceptions under the TRIPS Agreement are analysed from the perspective of taking into account other forms of incentives.[141] As the patent system is thought to foster technological development, it is useful to identify how this process is understood in the branch of economics where technological development, novelty and creativity are the key elements of research. Consequently, one cannot just think that after putting the incentives right everything will take place as intended.[142]

## 2.3 The international context and the comparative approach

As described above, the discussions about the most suitable intellectual property regime for the protection of computer programs took place on an international level from the very beginning. The international level of discussions was only natural, as the computer software markets have been international from early on. Finding an international solution that would enable the efficient development and distribution of computer programs was considered essential. A broad diversity of approaches had the potential to disrupt this efficiency at a global level. The international copyright conventions formed the framework for the already available international protection regime. Consequently, in the beginning, many countries followed the copyright model already adopted by some countries and discussed at the 1985 WIPO meeting. The TRIPS Agreement and the WIPO Copyright Agreement now explicitly require that Members protect computer programs by copyright. Moreover, the TRIPS Agreement requires that all inventions are patentable without discrimination, regardless of the area of technology. As the TRIPS Agreement has global coverage, it has caused a notable harmonization effect.[143] However, the harmonization it imposes is on a very general level. Members thus enjoy broad discretion in defining the details of the protection. This has enabled a divergence of protection.

The emphasis of this research is on European Union law and the legislations of selected European countries. However, the international context is taken into consideration both at the level of international norms as well as global economic developments. International norms binding the Union constitute part of EU law through the doctrines of direct and interpretative effect, among others. However, the EU is not a contracting party in all international intellectual property measures. Moreover, the TRIPS Agreement does not possess the capacity for direct effect in EU law. However, its norms have affected the interpretation of both Member State and EU intellectual property laws.[144]

141 See the article relating to this research, *U-M. Mylly* (2012).
142 Similarly, *Dosi* (2008) p. xv.
143 At present, there are more than 150 Members.
144 For more on the interrelationship between EU law, international intellectual property conventions, TRIPS and the law of EU Member States: *T. Mylly* (2009), pp. 134-148.

To account for the diversity of approaches, the research at hand utilizes the comparative law methodology. Applying a comparative methodology requires there to be *a problem*, which is then analysed from a comparative perspective. If the research merely collects and describes the approaches adopted within various nations, it remains descriptive comparative law. Comparative methodology can be applied to find optimal solutions from different legal system.[145] It also helps to keep distance to the researcher's own legal system, thus enabling a critical study of it. The comparative methodology enables a questioning of the justifications for differences and whether the aims of the regulation are achieved. After utilizing a comparative methodology, the researcher's interpretation of her own legal system tends to become normative.[146] Similarly, law and economics enable and encourage a normative approach. An efficiency analysis enables for example a critique of the specific ways that laws can be interpreted. The use of efficiency as a yardstick and source of critique could provide some flexibility to these interpretations, for example by making it possible to pinpoint circumstances, where the goals of the norms are not efficiently achieved.[147] As law in practice is aimed at achieving certain goals, it has been argued that the descriptive and normative analysis is often part of the doctrinal writings and the line between these is fine.[148] In this research, the analysis of the approaches adopted in the U.S. has, among other things, helped in the formulation of a critical perspective to the Finnish and European copyright doctrines. Moreover, this comparative analysis has clarified the roles of the legal culture and the background justifications within copyright laws. The comparative analysis has also helped the researcher to find an alternative approach for the interpretations of the copyright protection of computer programs.

Functional comparative analysis has, for some time, been the mainstream trend in comparative law. For any comparative analysis to be successful, it needs to define the issue to be compared without relating the definitions or legal concepts to only one of the legal systems to be compared. Often, the researcher has difficulties to define the research problem without the concepts of her own jurisdiction and legal tradition. In functional comparative analysis, the similarities are emphasized over the differences. It is assumed that, notwithstanding the varying historical developments and differing socio-economic structures, different legal systems tend to give the same or closely similar answers to the upcoming legal problems.[149] Functional comparative analysis has been criticized on this specific approach. Overemphasizing the similarities of the adopted and compared legal rules tends to neglect the cultural and historical differences forming an important part of the legal system.

In this research, how copyright and patent laws treat computer program interoperability is under analysis. The research identifies how strongly these intellectual property regimes protect computer program interfaces and what the consequences of these protection regimes are for interoperability and technological development. As the

145 *Zweigert & Kötz* (1998), pp. 6 and 15.
146 *Bell* (2011), p. 158.
147 *Mattei* (1997), pp. 9 and 15-16.
148 *Bell* (2011), p. 157.
149 *Zweigert & Kötz* (1998), pp. 34-40.

research question is not focused on just one intellectual property regime, the research problem necessarily needs to adopt a problem-based focus. The comparisons are done mainly between the European Union and the U.S. Selected European countries are also discussed. Consequently, it has been necessary to find the similarities and to define functional equivalences between the adopted legal rules within these compared legal systems. The international treaties in this area of law form an important motor for harmonization. Respectively, closer harmonization within the European Union has also taken place. The international treaties and the European harmonization have created similarities in the legal rules within the systems to be compared to. Consequently, in this research, the task of defining the functional equivalences more closely has not been as complicated as compared to some other areas of law. For example within the copyright doctrines, the idea-expression dichotomy can serve as a functional equivalence to the originality criterion, as they both define the line between what is protectable and non-protectable within copyright. These methods are available in the systems compared, but their roles have been somewhat different in different countries.[150]

Yet the underlying assumptions are what make the difference. They are not apparent on the surface level of law, but only in its deeper, socio-economic structures.[151] The functional comparative analysis has been challenged by recognition that abstracting concepts too much to find functional equivalence creates artificial objectivity and similarity. Moreover, this method arguably cuts the ties of the legal institutions to the surrounding society. It has to be realized that a researcher-observer is by necessity a product of her own legal culture and she cannot escape her own knowledge and education. The comparative law method has the potential to provide tools for critical analysis of the legal system that she has been brought up in. However, this requires that the comparative method not be purified from legal theory, critical analysis, or law's connections to society. Law cannot be merely analysed as "law in books" or "law in action". The understanding of what law is has to be broader.[152] For example, the concept of originality in copyright does not carry same meaning in different legal systems, nor is it utilized in a similar manner. The interpretation of the concept requires some other instruments than just reading through regulations and case law. The concept of originality is connected to the natural law justification ground and this could explain its varying role in different legal systems.[153]

It is often emphasized that comparative analysis should apply an interdisciplinary method. This is because law is inherently part of the surrounding society and therefore does not exist in a vacuum.[154] An interdisciplinary approach is specifically required if the compared legal systems have diverging answers to the problem being analysed. In this case, the researcher should find reasons for such differences.[155] An important element in the comparative analysis in this research has been to elaborate the role of

150 See more closely the article relating to this research: *U-M. Mylly* (2010 b).
151 See for example *Legrand* (1996), p. 236.
152 *Frankenberg* (1985), pp. 411-456.
153 See more closely the article relating to this research: *U-M. Mylly* (2010 b).
154 See for example *Legrand* (1996), pp. 236-238.
155 *Zweigert & Kötz* (1998), p. 44.

legal culture and tradition. An interdisciplinary element applied in this research is comparative law and economics. In comparative law and economics, a legal system is not seen as a static system for economic analysis, but as an evolving one. Efficiency is something that cannot be analysed in the abstract, as it always requires practical comparisons. The compared institutions can be found in other countries. Consequently, in comparative law and economics, the analysis focuses on actual institutions, and not on simplified models. As efficiency is based on a comparison of the factual models that are in use in some countries, the comparative approach enables finding a workable definition for efficiency. Law and economics is quite often utilized in legal discourses notwithstanding its interdisciplinary method, as it provides some answers to actual legal problems.[156]

The nation states confront similar problems concerning how to formulate efficient legal rules for computer program protection and computer program interoperability. This understandably makes legal borrowing a possible option when new legislation is enacted, or when this new type of problems arises in courts. However, the available acceptable answers may be somewhat limited. For example, it has been argued that the flexible legal rules are more efficient due to their capacity to react to changes taking place within the society.[157] The flexible legal rules may enable an evolution of law more easily. However, the limitations of alternative acceptable answers are also present because of the connections of the surface level legislation to the varying justification grounds and their basic assumptions. The flexibility of legal rules is relative because of the path-dependency of the arguments and their connections to the assumptions of what is right.

To some extent, the evolution of law has a trajectory of its own. Law evolves by its own speed even though it is connected to the surrounding legal culture and the society as a whole.[158] On the international scene, there are discourses on optimal legal solutions. The solutions may sometimes be borrowed without transferring the cultural meanings behind them. In the end, borrowing solutions from a different legal culture may lead to a diverging interpretation of the very same legal rule. The meaning of this rule is transformed so that it fits into the surrounding legal system. Moreover, it may irritate the surrounding legal system enough to cause it, as well, to change. One must understand that also new legal institutions and concepts are met with resistance. The legal system evolves through these changes. Even though one might conclude that the systems are converging, initial looks can be deceiving. It is noteworthy that the connections of law with the surrounding society vary from case to case, and may even

156 *Mattei* (1997), preface and pp. 1-2, 5,28 and 145.The idea of conjunctive property rights, which is based upon the comparative law approach, also provides some insights into intellectual property rights. By conjunctive property right one means that exceptions from property rights are not imposed in opposition to property rights, but they are considered as forming part of the very concept of property rights and their distribution within a society. In this notion of conjunctive property rights, it is also recognized that natural law property has never actually existed in practice. *Mattei* (1997), p. 29.

157 On the critical analysis of the flexibility of common law, *Epstein* (1980), p. 253.

158 See for example *Tuori* (2007), p. 75.

vary from one legal sector to other. One sector may have closer ties to technology and economics while the other has close ties to politics or the power structures of a society.[159]

The fact that there is a long history of international agreements in the area of intellectual property protection, as well as international organizations such as the WIPO, may make this area of law more open towards legal borrowing than most other areas of law. The long history of international cooperation in this area may also make it more loosely tied to nation states. Intellectual property discourses are very international. Moreover, the connections of the intellectual property legislation to the surrounding society relate very much to technology and economics, which as areas of society not only relate to nation states, but are also globally connected open sectors.[160]

There is no single acceptable methodology for comparative law, but a wide variety of possible approaches. One cannot know beforehand whether one's research will reveal similarity or difference. Consequently, in some instances, the use of a functional comparative methodology can prove useful, and sometimes even comparative legal dogmatics could provide some insights.[161] In this research, the comparative approach varies from article to article. Nevertheless, the conducted analysis cannot be defined as purely functional comparative law. This is because the research seeks partly to identify how the background justifications inherent or emphasized in the analysed legal systems influence the adopted legal rules and their interpretations. The comparisons are thus not made only at the surface level of law, but they also seek to illustrate the deeper reasoning trajectories anchored in the legal system being analysed. Consequently, the research also identifies the differences that stem from the legal culture.

In this research, the approaches adopted in the U.S. are compared with those adopted in Europe. The case law of the U.S. proves a fruitful source for the research, as the U.S. is a globally important software market and producer of software due to its size and the fact that many software companies are based there. Moreover, its legal culture towards filing lawsuits ensures a wide availability of contested cases and arguments. The comparison to the U.S. is made, in particular, in cases where it has clearly provided a model for Europe, or where it could provide a functioning model. Consequently, no comparisons are made where a comparative analysis would not further our understanding of the European system in relation to where we are at present, or in what direction we could go in the future.[162] For example, comparisons to the U.S. are not made in the article that focuses on patent law exceptions. This is because the European system, as it currently stands, is more capable than the U.S. of taking into account the requirements for computer program interoperability. The research elaborates some divergent approaches within Europe. The most divergent approaches in the area of intellectual property protection in Europe are often taken by Germany and the U.K.

159 *Teubner* (1998).

160 Note, however, that there are various forms of capitalist economies, i.e. these regimes are also diverging and not uniform. *Teubner* (1998), p. 24.

161 *Husa* (2010).

162 This illustrates clearly how the decisions on what will be compared are already directed by values. On this issue, see *Mattei* (1997), p. 10.

These two are typically the opposite angles that often need to be reconciled when harmonizing patent laws and copyright laws in Europe.

The use of a comparative approach has not been systematic in this research. The comparative methodology has been utilized to a varying extent and in various ways in the different articles and in the introduction of this research. The approach is rather pragmatic and illustrative. It seeks to provide comparisons at various levels: between Europe and the U.S., and sometimes between the diverse European approaches. Moreover, it seeks to provide insights to the relevant cultural and traditional differences. By utilizing varying approaches in different articles, the research as a whole seeks to provide a more holistic picture of the various levels where the evolution of law takes place. The selection of issues to be compared and the levels of comparisons have been chosen from this perspective. Importantly, the comparisons between the systems were not conducted only at the surface level of the law. In Europe, the relevant black-letter law is in many instances already harmonized. Consequently, the differences lie in the various legal traditions and their founding principles. The comparisons in this research are neither done for purely pragmatic purposes nor to find any functioning models for changing the law. The comparative approach is utilized predominantly to detect how various justifications grounds and assumptions mould the interpretations of law. It illustrates the obstacles to a true harmonization of laws and to any disruptive changes of law. The purpose in this research is to discuss the justification grounds and how these direct the surface level interpretations of law. In addition, the possibility to move the emphasis of justification grounds in the direction of economic (utilitarian) justification with an evolutionary economics perspective is another purpose of the research.

# 3 Overview of the publications

## 3.1 Copyright articles

### 3.1.1 Harmonizing copyright rules for computer program interface protection

#### *3.1.1.1 The objective of the publication and its contributions*

The main idea of the article is to show how the ideological foundations and justifications of copyright manifest themselves in copyright law and its interpretations. As legal orders emphasize different justification grounds, the legislative and judicial solutions adopted lead to diverging outcomes. These outcomes often seem logical in the national context, as copyright law, like any other laws in a particular legal system, aim to create a coherent legal system. Thus, copyright law and intellectual property laws are tightly interwoven with the surrounding legal system. The reasoning patterns of copyright cases demonstrate this kind of legal cultural embeddedness of copyright law within one legal system. The paper elaborates in particular how the emphasis on the natural law justification of copyright law is manifested in the actual interpretations of software

copyright law. This is illustrated through the Finnish case law concerning software copyright protection.

Moreover, the paper aims to show that as national interpretations are tied to the surrounding legal system, the international harmonization of laws leading to a true harmonization of substantive outcomes is a difficult task. This also implies that changing the justification grounds for copyright is difficult. Difficulties emerge especially where the harmonization measures try to modify the justification grounds embedded in the national legal cultures. One could argue that the justification for the copyright protection of computer programs as well as its harmonization within Europe have been economic by their nature. This has meant considerable changes in copyright systems where natural law has formed an important part of the copyright law justifications. The economic objectives of harmonization were clearly provided in the preamble to the Software Copyright Directive. Even though the objectives of harmonization were clearly stated in the legal texts, harmonization has not taken place easily. Finnish case law shows that the natural law justification has not lost its relevance in the area of software copyright protection, despite the emphasis on the economic rationale within the European harmonization. From the perspective of an evolutionary understanding of legal change, this is not surprising.

Moreover, the approach where only the software copyright protection was harmonized and the other areas of copyright law were left untouched was problematic.[163] This connoted that the coherence of copyright systems in the EU could be negatively affected. As a result, parts of some nation's copyright law can still be mainly based on natural law justification, whereas the copyright protection of computer programs should be based on the harmonized economic rationale. This could result in a diversification of the reasoning patterns, as they could no longer be based on the same justification ground throughout the copyright system in question. This kind of a diversification faces difficulties, as the copyright systems aim for a coherence of argumentation. Breaking down the coherence of the copyright systems created throughout the times could lead to fragmentation of the national copyright systems. In its latest case law, the CJEU has tried to prevent such fragmentation.[164]

The Software Copyright Directive aimed at uniformity of computer program copyright protection in Europe. Firstly, the threshold of protection, i.e. the originality criterion, was harmonized. This criterion is a core concept in copyright law. It is also linked to the deeper justification grounds of the relevant national copyright systems. In countries where natural law justification grounds have traditionally been important, the originality criterion has been interpreted to mean that a copyrighted work should have

163 The levels of originality for databases and photographs were harmonized later. Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on Legal Protection of Databases, 1996 O.J. (L 77) 20; Council Directive 93/98/EEC of 29 October 1993 Harmonizing the Term of Protection of Copyright and Certain Related Rights, 1993 O.J. (L 290) 9. However, in its recent copyright case law, the CJEU has started to harmonize the originality criterion for all works through a creative interpretation of the Information Society Directive. This issue is discussed more closely in the next chapter.

164 See the next chapter for further details.

an imprint of its author's personality. On the other hand, in the common law countries the originality criterion has historically meant that a work has not been copied, but is created independently. The originality criterion in the Software Copyright Directive requires that a computer program be its author's own intellectual creation. This new criterion was meant to constitute harmonization between the common law "skill and labour" criterion and the traditional German criterion, where the required level of creativity has been high. Essentially, the harmonization meant that Member States of the Union were supposed to abandon this kind of a high creativity criterion as a threshold for computer program protection.

However, the Finnish case law on computer program copyright protection shows that the reasoning trajectories may still be anchored in natural law justification rationales. On the surface level, it seems that the new originality criterion of the Software Copyright Directive is recognized. In Finnish case law, the relevant articles of the Software Copyright Directive are duly referred to. A closer analysis reveals that the argumentation patterns largely reflect the old traditions and justification grounds. The argumentation pattern repeats the following logic: if no one else can reach a similar solution, then the computer program in question is original enough and qualifies for copyright protection. This criterion is clearly too high under the Software Copyright Directive. It seems to be even higher than the old German criterion, where it was sufficient for copyright protection that a solution was above the average programmer's solution. Yet, the kind of argumentation utilized in Finland is understandable when considering how integral the natural law justification logic has been in the Finnish copyright system. It illustrates the natural law idea that a work presents its author's personality. If a work does not show this kind of originality, then it does not merit copyright protection. In other copyright cases, this kind of reasoning may still be applied in Finland. It will relatively easily form part of the reasoning in computer program cases as well, as courts tend to apply the concept of originality in a consistent manner.

The Finnish computer program copyright case law also focuses on the originality requirement. However, the line between protectable and non-protectable in computer programs can also be drawn by utilizing the idea-expression dichotomy. In fact, the Software Copyright Directive especially states that ideas and principles underlying any part of a computer program, including its interfaces, are not protectable. Yet, in Finland even the absence of the protection of computer program interfaces is reasoned with recourse to the requirement of originality. It seems that the originality requirement plays an overly important role in defining the area of what constitutes protectable subject matter in copyright. The Finnish practice does not seem to comply with the Software Copyright Directive. It does not follow the aims of the harmonization, which emphasizes that the copyright protection of computer programs should be easily achievable. The idea-expression dichotomy enables leaving critical interoperability information without protection.

The problem with the Finnish approach is that it gives an impression that copyright protection is very difficult to obtain. A high threshold of protection indicates that whenever copyright protection is given, the protection afforded is strong. This seems

to be at odds with the aims of the Software Copyright Directive. The aim was that the copyright protection of computer programs would be easily achievable, but also that the possibilities for competition should be taken into account. This was to be achieved through the low originality criterion and the specific provision regarding the idea-expression dichotomy.

The approach of the Software Copyright Directive seems to reflect the utilitarian justification grounds. Economic reasons constituted the founding justification for the European harmonization within this area of law. Common law copyright has been claimed to be more utilitarian than the civil law tradition. It has been recognized that the U.S. copyright system is nowadays closer to the European system, since the originality criterion has become higher than it used to be before the Feist case.[165] Consequently, one can find instructive interpretations of computer program copyright protection in the case law of the U.S. Even though one could argue that the originality criterion serves as a functional equivalence to the idea-expression dichotomy, it is not meaningless how these criteria are utilized. When taking into account the new lower originality threshold in Europe, one should apply the idea-expression dichotomy to its fullest extent in order to enable competition within the software industry. The case law of the U.S. could serve as a model for this kind of reasoning.

The European harmonization approach, where the necessary incentives are provided but the intellectual property protection is narrow for a possible bottleneck technology, is in line with the policy recommendations of evolutionary economics. As ideas and principles underlying computer program interoperability are not protected, the copyright protection relating to these interface elements is narrow. The approach in the Software Copyright Directive for computer program protection requires a shift of focus from the natural law justification logics towards the economic or utilitarian rationale. Yet, this article shows that even though one would agree with such a justification for computer programs, implementing it in practice takes effort and time.

The comparisons were conducted between the European harmonized legal rules and the legal rules of the U.S. When this article was written, there were not yet computer program copyright cases available from the CJEU. Consequently, national interpretations needed to be analysed instead. The Finnish case law was compared with the U.S. case law. This was a fruitful exercise in the sense that the justification grounds within these systems were, and continue to be, very different. However, cases from other EU countries were also utilized in order to illustrate the difficulties with the harmonization process at the EU level. The examples were from Germany and the U.K. The selection of these countries was motivated by the earlier mentioned fact that Germany and the U.K. represent the opposite ends of the spectrum in the EU. The Finnish approach represents the distinctive Nordic model. The case law examples were thus from the common law, the Germanic and Nordic legal families. Although the Nordic legal family is closely connected to the Germanic one, it has a distinctive character mainly due to its connections to realism.[166] In the area of intellectual property

165 *Derclaye* (2000), p. 16.
166 See Zweigert & Kötz (1998), p. 68, 278 and 285.

legislation, the Nordic countries have co-operated when drafting the new legislation. Consequently, the laws are closely similar.

In Europe, the CJEU seeks to harmonize the copyright laws further.[167] It is the only institution that can give an authoritative interpretation on how the legal rules of the European Union should be interpreted. The application of European Union laws is decentralized into the national courts of the EU Member States. As illustrated above, the national courts may have diverging approaches and understandings as to how the legal rules should be interpreted. However, the EU legal system seeks to prevent such fragmentation by the rules that enable, and in some occasions obligate, the national courts to ask the CJEU for its authoritative interpretation in the preliminary ruling procedure in accordance with Article 267 of the TFEU. This has been perceived as an important and efficient tool in the process of harmonization and unification of laws.[168] As the recent copyright law case law from the CJEU demonstrates, the CJEU has used the preliminary ruling procedure efficiently in the further harmonization of copyright law in the European Union.

#### *3.1.1.2 Recent developments*

The Software Copyright Directive was given in 1991. However, the CJEU has only recently had the chance to pronounce on computer program copyright protection. These cases in concern will be discussed here briefly, as they were delivered after the completion of the published articles that are included in this dissertation. The line between what is protectable and non-protectable in computer programs has been discussed extensively in the case of SAS Institute v World Programming Ltd.[169] What is notable about this decision is that the idea-expression dichotomy served as the core notion in defining what was left outside protection. Based on this dichotomy, it was provided that programming languages and computer program functionalities as such cannot obtain copyright protection. Yet, the decision elaborates that functionalities can be implemented in such a way that they deserve copyright protection. Consequently, a reproduction of these may lead to copyright infringement. Moreover, in the decision it is emphasized that giving protection to the functionalities of a computer program would lead to a possibility of monopolizing ideas. This, in turn, would be detrimental to technological progress.[170]

The criterion of originality provided in the Software Copyright Directive was also discussed in the case. Interestingly, but not surprisingly, in its questions for a

167 See for example *Griffiths* (2013).

168 Nevertheless, the influences between the CJEU and national courts are not one-way. This connotes that the interpretations of the national courts do have an impact in the overall harmonization process. See for example, *van Gerven* (2000), p. 433.

169 C-406/10, *SAS Institute Inc. v World Programming Ltd*, Judgment of the Court (Grand Chamber) of 2 May 2012, nyr.

170 C-406/10, *SAS Institute Inc. v World Programming Ltd*, Judgment of the Court (Grand Chamber) of 2 May 2012, nyr, paragraphs 31-32, 39-40 and 46.

preliminary ruling, the U.K. court asked if the amount of utilized skill, judgement and labour affect the question of whether the computer program functionalities are eligible for copyright protection.[171] This could indicate that the U.K. courts have not necessarily duly recognized the originality criterion as contained in the Software Copyright Directive. The U.K. courts still seem to apply their traditional skill, judgement and labour criterion.[172] This illustrates well the inherent complexities in the harmonization of copyright laws. Similarly to the Finnish courts, the interpretations of the concept of originality in U.K. courts are still anchored to the traditional justification grounds and the argumentation patterns that are prevalent in their respective legal systems.

The CJEU held that under the Software Copyright Directive, the correct criterion is whether a computer program is its author's own intellectual creation. The author's creativity is shown in how the computer program is put together. Ideas and principles underlying computer programs do not qualify for protection. However, the selection and organization of a program and the implementation of its functionalities may qualify for protection.[173] The Advocate General (AG) also stressed that the amount of labour or the level of the author's skill cannot provide any guidance in determining what is protectable by copyright.[174] The decision of the CJEU shows clearly that, in many instances, the idea-expression dichotomy serves as an important tool in demarcating the line between the protectable and non-protectable in computer programs. Moreover, the case exemplifies that the national courts are tied to their national legal systems when they try to maintain its coherent application in terms of the traditional justification grounds and the patterns of argumentation.

Somewhat surprisingly, in its recent copyright case law, the CJEU has started to harmonize the originality criterion for all works through a creative interpretation of the Information Society Directive[175]. Consequently, the originality standard would not only be harmonized for photographs, databases and computer programs, but also for other works, despite the absence of a similar provision intending to harmonize the originality criterion in the Information Society Directive. This was first expressed in the Infopaq case.[176] The interpretation has been criticized considerably. It has for example been estimated that if the aim of the Information Society Directive had been to harmonize

171 C-406/10, *SAS Institute Inc. v World Programming Ltd*, Judgment of the Court (Grand Chamber) of 2 May 2012, nyr paragraph 28.

172 Earlier, it was feared that, in the U.K., computer programs would receive protection that was too broad because the U.K. did not incorporate the new originality criterion in its legislation. Report from the Commission to the Council, the European Parliament and the Economic and Social Committee on the Implementation and Effects of Directive 91/250/EEC on the Legal Protection of Computer Programs, p. 10 COM (2000) 199 final (Oct. 4, 2000).

173 C-406/10, *SAS Institute Inc. v World Programming Ltd*, Judgment of the Court (Grand Chamber) of 2 May 2012, nyr, paragraphs 31-32 and 65-68.

174 C-406/10, *SAS Institute Inc. v World Programming Ltd*, Opinion of the Advocate General, delivered on 29 November 2011, paragraph 66.

175 Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonization of certain aspects of copyright and related rights in the information society (OJ 2001 L 167, p. 10).

176 *Infopaq International A/S v Danske Dagblades Forening* (C-5/08) [2009] ECR 16, paragraphs 35-37.

the originality criterion for all classes of works, it would have been impossible to enact the Directive in the first place. The interpretation reached in the Infopaq case has been seen as judicial activism of the CJEU, done in the name of harmonization.[177] The objective of harmonization becomes very clear from the argumentation in the Infopaq case. It is explicitly expressed that without harmonization, the differences in national laws would lead to a fragmentation of the internal market and to an inconsistency of the legal system.[178] Yet, it is argued that at the national level, for example in the U.K., the courts will follow the interpretations of the Infopaq case in a manner that will affect the national copyright system as little as possible.[179]

The discourse about the Infopaq case demonstrates well the typical obstacles that occur during the harmonization process. Harmonizing all the relevant aspects of copyright law in the EU may prove politically impossible. The national legal systems seek to keep their frameworks consistent and coherent. Therefore, international and EU harmonization efforts may not in practice change the national legal systems dramatically, at least not overnight. At the same time, the CJEU seeks to achieve consistency and coherence in the legal framework of the EU. Therefore, the CJEU may be tempted to fill the gaps in the existing legislative framework by judicial activism and creative interpretations.

Notwithstanding the controversies between the national and the European levels, the CJEU has continued to apply the approach that the originality criterion for copyrightable works is harmonized at a general level and not only in relation to photographs, databases and computer programs. The BSA case[180] concerned, among other things, the copyright protection of the graphic user interface (GUI) of computer programs. The CJEU stated that the GUI does not qualify for copyright protection as a computer program, but may qualify for protection as other work if it is its author's own intellectual creation.[181] Here, the court again confirmed that the same originality threshold should be applied to the various parts of a computer program. Therefore the GUI as a visual piece of work is eligible for protection under the same criteria as the object and source code of a computer program. This shows that it is highly difficult to apply different originality criteria on different parts of a combined copyrightable work. It is problematic to say that the computer program code behind the GUI deserves protection based on a different criterion than the visual looks or literal elements of the appearance of the GUI. The U.K. court seemed to have had similar problems earlier with its Navitaire decision. In the Navitaire case, the claim was based on non-literal copying of the source code and the copyright protection of a user interface. The criterion utilized throughout this case was the traditional 'skill and labour' criterion, notwithstanding that the questions of protection and infringement were related to the

177 *Griffiths* (2011), p. 2.
178 *Infopaq International A/S v Danske Dagblades Forening* (C-5/08) [2009] ECR 16, paragraph 8.
179 Griffiths (2011), p. 3.
180 C-393/09, *Bezpečnostní softwarová asociace – Svaz softwarové ochrany v Ministerstvo kultury* [2010] ECR I-0000.
181 Ibid. paragraphs 44-46.

program code and the visual looks of the user interface.[182] In this case, the court should have applied the Software Copyright Directive's originality criterion—not the skill and labour criterion—when analysing the code level.

Yet, it seems that the CJEU is somewhat confused in its approach to the GUI. It states as a general principle that the GUI cannot be protected as an expression of a computer program.[183] Yet, there is computer program code even behind the GUI. The GUI is built with code. Consequently, the part of the code that builds the GUI must qualify for protection under the Software Copyright Directive. This is the first issue where the analysis of the court is not completely accurate. The Court should have analysed the various layers of the GUI and their qualification for copyright protection separately. Nevertheless, in the BSA case it is understandable that the Court focused on the question of the GUI's appearance and the copyright protection of this, to the exclusion of the GUI's code level, as it was the visual appearance of the GUI that was transmitted to the TV viewers. The main question was whether this broadcasting was an infringement.

The Court's argumentation can be criticized also for other respects. The Court first considered that the GUI would never qualify as an expression of a computer program under the Software Copyright Directive. When the question came to the issue of whether the transmission of the GUI's visual appearance was an infringement, the Court changed its approach and considered the GUI's essential element to be its computer program functionality, in other words, the possibility of a user to give instructions to a computer program by recourse to the GUI. Because this essential functionality relating to the GUI was not possible for TV viewers, the broadcasting of the GUI's visual appearance could not be an infringement.[184] In conclusion, to the first question, the Court answered that the GUI would never qualify as an expression of a computer program, but as for the second question, the GUI's functionality as a computer program was seen to be its essential element. The answers to these two questions are, hence, inconsistent.

As an instruction for whether the GUI's elements qualify for protection, the CJEU emphasized that the elements which are dictated by functionality cannot be protectable. Moreover, the Court expressed that in these situations, idea and expression have merged.[185] Consequently, in accordance with the recent case law from the CJEU, many elements, both in computer program code and in its graphical user interface, are left without protection due to the technical contours that restrict the possibility for the author to use creativity. The idea-expression dichotomy serves as an important tool for drawing the line between protectable and non-protectable in computer program cases. In recent case law, the importance of the originality criterion is thus diminishing when demarcating the protectable from the non-protectable. This was actually also the author's recommendation on how cases should be reasoned in Finland, as well, in

182 *Navitaire Inc. v Easyjet Airline Company and Bulletproof Technologies Inc.*, [2004] EWHC 1725 (Ch).

183 C-393/09, *Bezpečnostní softwarová asociace – Svaz softwarové ochrany v Ministerstvo kultury* [2010] ECR I-0000, paragraph 42.

184 Ibid. paragraphs 42 and 57-58.

185 Ibid. paragraph 48.

order to be in compliance with the Software Copyright Directive. This would also make the natural law justification ground less important.

The case law also suggests that the author's own intellectual creation would be the correct criterion for all copyrightable works. This approach has been understood in the U.K. in a manner that any other criteria would no longer be allowed for works to be copyrightable. For example, the closed list of copyrightable works used in the U.K. would no longer be allowed, nor the requirement of fixation.[186] This kind of reading of the CJEU interpretation of the criterion "author's own intellectual creation" might be overreaching. Another way to understand the approach of the CJEU is that it is only an attempt to harmonize the required originality, but not the other requirements for copyright protection. Even so, the CJEU is trying to harmonize through its interpretations of elements of copyright that have not been harmonized through directive implementation.

Looking at the newest case law from the CJEU, it seems that to great extent, computer program interfaces are not protectable by copyright. Yet, they can be implemented in such a way that protection can be possible. The end result is reached through the application of the idea-expression dichotomy. Moreover, the non-protection of computer program functionalities is emphasized. This direction is in accordance with the author's recommendations. Now, we will have to see how the national courts follow the interpretation models of the CJEU. There may still be some obstacles on the way to reaching a uniform interpretation. To some extent, the various justification models may direct the solutions even in the future.

### 3.1.2 An evolutionary economics perspective on computer program interoperability and copyright

#### *3.1.2.1 The objective of the publication and its contributions*

The main idea of the article is to elaborate the economics of copyright regulation on software interoperability. More specifically, the analysis focuses on whether these rules could reflect the ideas of evolutionary economics. The standard economic argument for the necessity of intellectual property protection has been that information is a non-excludable public good. By intellectual property protection, the information good is made excludable. The standard argument provides that without protection, there are no incentives to produce information goods.[187] This understanding has served as the economic justification for intellectual property protection.

However, different economic strands of thoughts have varying understandings on technological change. In evolutionary economics, also other forms of incentives than those established by intellectual property laws are broadly analysed. Therefore, incentives in the form of intellectual property are not deemed to provide the only motivation for

186 *Griffiths* (2011), pp. 8-9.
187 *Lévêque & Ménière* (2004), pp. 4-5.

creative works and technological innovations. Instead, its policy recommendations suggest that narrow intellectual property protection would serve well at least for the cumulative and system technologies. Computer programs belong to both categories. The policy recommendation stems from the historically informed understanding that a competitive climate would be better within these areas of technology. It is not advisable to give one player the opportunity to control all future technological possibilities. Rather, the possibility to have multiple players trying various technological solutions would serve technological development more efficiently. Strong monopoly rights should be avoided, especially with regard to bottleneck technologies.

The article analyses the copyright protection of computer programs from the perspective of evolutionary economics. From the outset, it seems that copyright provides an optimal form of protection. It gives incentives by prohibiting copying. However, the protection is narrow as it excludes elements that are determined by external factors. Moreover, ideas and principles are left without protection. This connotes that computer program interfaces, key elements in this form of system technology, are not strongly protected. If there is only one way to achieve interoperability, then this way can be implemented in competing programs without fear of infringement. The copyright rules even seek to enable access to these interoperability elements through rules that allow reverse engineering activities. Consequently, the situation seems quite satisfactory.

The comparative analysis for this article was conducted between the harmonized EU level norms and the case law of the U.S. At this stage, there was no CJEU case law on the rules of reverse engineering. Consequently, with respect to the European norms, the comparisons done were mainly based on the black letter law and its interpretations by other legal scholars. The question was whether these rules (both in Europe and the U.S.) could be said to reflect the approach of evolutionary economics, and whether the legal norms within the EU and the U.S. could be tailored to reflect such ideas. To some extent such approach could be reached through law interpretation, but even then, a change in legislation would be required.

In the article, the copyright rules on allowed reverse engineering activities were analysed in a more detailed manner. The most important legal requirements of reverse engineering in the U.S. and in Europe are analysed. The requirements are to a large extent sound. For example, the fair use standard in the U.S., which takes into account whether a use is transformative or not, suits the technological development perspective well. Quite similarly, in Europe, it is required that after the needed interoperability information has been detected, one must conduct the programming task independently. Therefore, both in the U.S. and the EU, one is obligated to bring a somewhat different program on the market. This requirement does not contradict the perspectives of evolutionary economics on technological change. Under this approach, the development takes place essentially through a trial-error-correction. The multiplicity of trial-error-correction processes provides a possibility for the market to choose and consequently have an impact on technological development. The demands of the market can serve as a partial impulse for technological development, in addition to scientific advances.

In the EU, the restriction which states that interoperability information can be detected only when it relates to software-software interoperability is somewhat problematic. This kind of limitation may have an impact on technological alternatives, as only software implementations are allowed due to this legal confinement. However, in the preamble of the Software Copyright Directive it is provided that in the computer program environment it is desirable that all components be compatible. The author's suggestion is that the Software Copyright Directive be interpreted in a teleological way. This kind of interpretation method does not restrict the reverse engineering for interoperability purposes only to software-software interoperability. When one compares the situation in Europe to the U.S., one can recognize that the fair use doctrine is not similarly limited. Under the fair use doctrine, one is entitled to detect basically any information that is not protected, as long as there is no other way to access the information. Here it becomes apparent that the fair use defence is more flexible than narrowly written exceptions. Especially when technological contexts change rapidly, flexible rules are more adaptive to new situations, as their interpretations are more open.[188] Consequently, it should be considered whether the limitations for software-software interoperability should be removed as it may have an impact on the technological alternatives that can be provided for the markets.

The main problem with these interoperability exceptions, however, is the allowed technique, namely the reverse engineering technique itself. It is time-consuming and expensive. Moreover, it has been recognized that it is not always a viable means to enable sufficient interoperability.[189] Yet, interoperability sometimes appears to function as a determinant factor for consumers in choosing software. Even though consumers would deem other software otherwise technologically superior, they still choose the one with higher quality in interoperability because of lock-in. It has been demonstrated that this quality of interoperability cannot always be achieved through reverse engineering.[190] This has led to a situation where the holder of the interoperability information has been able to prevent a paradigmatic change from taking place within the software industry. Competitors have not been able to operate efficiently within the markets and disseminate new technology notwithstanding their superior technology.[191] The author's suggestion is that copyright regulation should enable access to interoperability information more efficiently, without wasteful and uncertain reverse engineering. How this could be addressed is a matter of further considerations and outside the scope of this research.

Some have reasoned that the problems in the utilization of this technique provide the necessary lead time to the first author. It has been deemed a necessary incentive

188 The requirements for accessing interoperability information under the Digital Millennium Copyright Act of the United States are written in a similarly inflexible manner as the requirements in the Software Copyright Directive. Consequently, these should also be reassessed.

189 T-201/04 *Microsoft Corp. v Commission* [2007] ECR II-3601

190 T-201/04 *Microsoft Corp. v Commission* [2007] ECR II-3601, paragraphs 650-652. For the economics of lock-in and its consequences for consumers choosing inferior technology, see *Liebowitz & Margolis* (2001).

191 T-201/04 *Microsoft Corp. v Commission* [2007] ECR II-3601, paragraph 648.

that the second-comer would not be able to reap the fruits of the first author's labour. However, copyright rules in any case require that the second-comer must conduct the programming task independently. This provides the first author with additional lead time. Moreover, in order to persuade customers, one needs to include some additional or superior features in the software. This work takes time, and it already creates the necessary lead time for the first author, so that he will be able to receive the necessary rewards. It has been recognized that double rewards are not necessary, as they do not induce more innovations.[192] Consequently, the copyright protection of interface implementation provides the required incentive mechanism in the form of intellectual property protection. Therefore, there is no need for additional incentives in the form of copyright protection. Interface information could, then, be provided through other means than reverse engineering. Probably the strong ideological emphasis on incentive mechanisms in intellectual property protection has led to the system of double rewards. These excessive rewards are not justified from the perspective that narrow protection would better serve the key components in system technologies. Instead of wasting costs in reverse engineering, they could be used for inventive and creative activities. This would constitute a more efficient use of resources. It would also foster technological development, which should in fact form the important objective of intellectual property norms.

#### *3.1.2.2 Recent developments*

From the perspective of the aims of the copyright and patent legislation, one might wish that copyright regulation would be interpreted in such a manner that technological development would be taken into more serious consideration. From the same premises, one might wish that legal rules would be changed in such a manner that they would enable easier access to computer program interfaces. Yet, the current situation in the EU seems to be that the rules enabling access to computer program interfaces are interpreted in a restrictive manner. The approach shows that the property rule imperative dominates the interpretations of software copyright norms.[193]

In the case SAS Institute Inc. v World Programming Ltd, the CJEU analysed the various methods for achieving interoperability and their legal requirements. In the AG's opinion, it was emphasized that the right of reverse engineering should be construed narrowly. The AG explained that because this right forms an exception to the exclusive rights belonging to the copyright owner of the computer program, the exceptions must be interpreted strictly. The AG referred to the additional requirements provided in the preamble to the Software Copyright Directive, which states that these acts are meant to be used in very specific circumstances, and that they therefore cannot be used in a manner to prejudice the legitimate interests of the right holder. The AG held that

192 *Frischmann & Lemley* (2007), p. 276.

193 On property rules and liability rules for intellectual property provisions, see *Lemley & Weiser* (2007). On a more general level, see also *Calabresi & Melamed* (1972).

the acts must be *absolutely* indispensable for interoperability purposes. The licensee would be obligated to show the absolute necessity of conducting reverse engineering activities.[194]

Justifications for other kinds of interpretations can also be found in the preamble to the Software Copyright Directive. In the preamble, the importance of interoperability for the software industry is emphasized, too. It is clearly provided that the function of computer programs is to communicate with other components. Moreover, it is elaborated that these communicative elements, interfaces, contain ideas and principles that are not protected by copyright.[195] Access to these unprotected elements is made possible among others through the reverse engineering exception. If interoperability were considered important and the non-protection of ideas a similarly important feature of copyright legislation, the interpretation of reverse engineering exception could be construed more broadly than suggested by AG. At least one should not place heavy burden of proof for the defendant.

The CJEU clarified that World Programming Ltd. (WPL) did not have access to the source code nor had they used reverse engineering. WPL had only observed, studied and tested the computer program in question. Consequently, the CJEU did not analyse under what requirements the reverse engineering techniques would be allowed. The Software Copyright Directive also provides other means than reverse engineering for the analysis of non-protectable elements within computer programs. The licensee is entitled to observe, study and test the functioning of a computer program in order to ascertain the ideas and principles, which underline any part of the computer program. Consequently, one could analyse certain kinds of interfaces also through these means. The acts of observing, studying and testing are allowed if they are done during the loading, displaying, running, transmitting or storing of the computer program, which the licensee is entitled to do. Here, the critical question is: What is the impact of the license agreement in restricting the available methods or acts? The CJEU concluded that the licensee is entitled to observe, study and test the program while he performs an analysis during the loading and running of a program. These acts cannot be restricted by the license agreement. Furthermore, a licensee may observe, study and test the program through other means, if these acts are permitted under the license agreement. The purposes for which these acts are permitted under the license do not restrict these acts from being used also for the analysis of non-protectable ideas and principles. Here, the CJEU emphasizes that ideas and principles should not be monopolized and that a copyright holder cannot essentially prevent access to these elements through license agreement.[196]

194 C-406/10, *SAS Institute Inc. v World Programming Ltd*, Opinion of the Advocate General, delivered on 29 November 2011, paragraph 7 and 85-88.

195 The preamble of Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the Legal Protection of Computer Programs (Codified version) 2009, O.J. (L 111) 16. The codified version contains the content of Council Directive 91/250/EEC of 14 May 1991 on the Legal Protection of Computer Programs as amended, 1991, O.J. (L 122) 42.

196 C-406/10, *SAS Institute Inc. v World Programming Ltd*, Judgment of the Court (Grand Chamber) of 2 May 2012, Nyr, paragraphs 50-59 and 44.

The case shows that some forms of interoperability can be achieved without the technique of reverse engineering. Consequently, access to non-protected information is not always problematic. Moreover, in the EU, contractual freedom is limited in the sense that copyright holder cannot limit the licensees' possibilities to access non-protectable ideas and principles. However, when a competitor cannot access the information without reverse engineering, the interpretation of this exception seems to be restrictive. The AG emphasized the exceptional nature of this provision. If the aim is to prevent the monopolization of the ideas and principles underlying any part of the computer program, then the methods available for accessing these non-protectable elements should not be overly limited.

### 3.1.3 Conclusions on the copyright articles and transitional thoughts

The analysed copyright context shows that the justifications structures of copyright law play a role when legal texts are interpreted and cases resolved. Moreover, the justification structures and reasoning trajectories are difficult to change by harmonization measures. However, it is not impossible to change them. At the European level, the CJEU directs the interpretations and holds the potential to enable efficient harmonization within Europe. When the objective of the harmonization is apparent, its target may be achieved. However, this requires conscious efforts and time.

The objectives of harmonization can be understood at various levels. Sometimes a change at the surface level of law may require changes at the level of justification structures as well. Otherwise the change may not be fully effective in practice. Moreover, changes in some part of law may in the end require wider changes in nearby areas of law. For example, a change in a part of the copyright system may require wider changes within the copyright or even within other intellectual property regimes. These changes stem from the aim of coherence in the legal system. The harmonization of the originality requirement for software copyright protection in the EU may require a change of the justification grounds. The reasoning patterns might no longer have such strong connections to the natural law justification ground. Moreover, a change in one part of copyright law may require changing other parts of copyright law so that the originality requirement is understood consistently throughout the copyright system.

Similarly, the non-protection of ideas and principles leads to additional questions. If ideas and principles are not protected for sound reasons, how is the access to these elements in computer programs guaranteed? What is the perspective of interpretations of relevant exceptions supposed to provide access to the non-protectable interface information? The preamble to the Software Copyright Directive can be interpreted in various ways depending on the emphasized perspective or objective. One can find supporting arguments for a narrow construction of the reverse engineering exception. There is also the possibility to emphasize the view where access to interoperability information is one independent objective of the Software Copyright Directive, since the importance of interoperability is highlighted in the preamble of the Directive. Moreover, the non-protection of ideas and principles is a general principle within

copyright. In addition, the non-protection of interface information and the access to this information serves as an instrument for efficient technological development within computer systems. The technological development is in itself an important aim of the copyright and patent institutions.

The evolution of copyright law takes place at the national level, the EU level and the international level. The changes in the EU may also have an impact on the regulations of states outside the EU. Similarly, the EU legislator and the CJEU may draw inspiration, for example, from the solutions achieved in the U.S. At present, it seems that the methods to define the non-protectable and protectable in computer programs are closely similar in the EU and in the U.S. Especially the most recent case law of the CJEU focuses on the idea-expression dichotomy. In the U.S., this dichotomy has also served as a tool for leaving many elements of computer programs outside protection. Moreover, the originality criteria in the EU and the U.S. have started to converge. The criterion is no longer a high originality threshold or only skill and labour, but some creativity, as well. However, in the EU, the construction of the reverse engineering exception is somewhat narrower than the fair use doctrine of the U.S. Also, in the EU, when one is entitled to have recourse to reverse engineering activities, this right cannot be contracted out. The same is not true for the U.S., as in some of its states, the copyright owners can prevent reverse engineering activities by contract.

Regulatory solutions achieved in Europe and the U.S. may also serve as a model for other countries. It has also been recognized that there are some mechanisms at the international level, which lead to a situation where the lowest protection level influences other countries. For example, when reverse engineering activities cannot be contracted out in one area (Europe), reverse engineering activities are lawful there and all entities wishing to conduct such activities may do it in that area. Consequently, national differences in legal rules may not always lead to situations where differences can be enforced in practice. This phenomenon is called IP arbitrage.[197] However, all differences in intellectual property protection are not similarly diluted. In these situations, international cooperation would be required in order to achieve a certain level of protection, or more precisely, which is recommended in this thesis, a certain level of access to information.

The current international trend does not seem to point towards a direction where intellectual property protection would be lessened. Rather, ever-stronger protection seems to be favoured.[198] The most effective international intellectual property treaty, the TRIPS Agreement, sets rules for the minimum protection level. Therefore, countries are generally free to implement a higher level of protection than required in TRIPS. There are no clear limits for this kind of development in intellectual property law. However, when countries desire to implement exceptions to their intellectual property protection, they need to follow the strict rules of the TRIPS Agreement. The three-step test of the TRIPS Agreement sets the limits for exceptions. If one endeavours to,

197 See *Samuelson* (2004).

198 For example the Anti-Counterfeiting Trade Agreement (ACTA) can serve as an illustrative example of this trend, even though the EU did not implement it.

through an exception, implement rules that enable more efficient access to interface information, this test is the relevant test for such changes. Yet, some development can already be achieved through moderate changes in the interpretations of the current copyright rules and their justification grounds. The natural law justification ground does not seem to be suitable for the copyright protection of computer programs, as it tends to lead to overprotection. The utilitarian justification ground seems to be a more logical fit for the nature of software development and the nature of the protectable work as a technological product. Yet, the economic justification should not be seen one-sidedly as only serving the reasoning of stronger protection. Economic argumentation based on the provision of the necessary incentives should be complemented with argumentation based on the importance of competition and the wastefulness of monopolistic positions. Copyright was initially selected for computer program protection because of its flexibility to both provide the incentives for creation and enable competition within the computer program and related industries. If the non-protection of ideas and principles is assessed from a utilitarian perspective, where also competitive aspects are emphasized, the end solutions to the interpretations may change. This requires conscious efforts in this direction.

Do the provisions in copyright law enabling interoperability and possible future changes require that patent laws contain similar exceptions for interoperability? How strong is the patent protection of computer program interfaces? Are there exceptions available for accessing interface information? Is there a need to change the patent laws in a manner that the solutions would resemble the quite balanced solutions already achieved in the copyright context? What level of consistency could be achieved between these two intellectual property protection mechanisms, both affecting the scope of protection of computer program interfaces? Some authors have suggested that if there is a functioning exception available in one intellectual property area and the subject matter is protected through various intellectual property regimes, then the freedom provided within the functioning exception should not be eroded by the protection of other intellectual property regimes.[199] Or is the patent institution based on fundamentally different justifications and objectives that would explain a different approach?

## 3.2 Patent articles

### 3.2.1 What ever happened to patent bargain? Prospect theory and software patentability

#### *3.2.1.1 The objective of the publication and its contribution*

Similarly to copyright, patent protection can be justified by the natural law theory, the reward theory or by public interest. Hence, patent law is based on similar premises as

199 See *Senftleben* (2010), p. 2.

copyright law. In the preceding copyright article, the prospect theory was criticized from the perspective of evolutionary economics. Prospect theory and evolutionary economics are both economic theories. However, their perspectives differ on the required incentives in the form of intellectual property protection. Prospect theory stresses broad patent protection. From the perspective of evolutionary economics, narrow protection of computer program technologies is preferable. The relevant copyright rules were analysed from this perspective. In this article, the focus is on the two theories that emanate from the utilitarian justification (public interest) for the patent institution, namely the prospect theory and the contract theory. The utilitarian justification can be divided into two subparts: the incentives to innovate and the incentives to disclose technological information. While prospect theory emphasizes that the patent holder be given sufficient incentives, the contract theory is more concerned about the incentives for disseminating technological information.

Even though both prospect theory and contract theory represent utilitarian justification, their application leads to different outcomes. Contract theory is often emphasized on an abstract level as providing justification for the patent system. It is argued that the society grants a patent monopoly and in return, the patent owner discloses new technological information for the benefit of the whole society. The patent monopoly is thus justified by its benefits to the society through the dissemination function of the patent institution. This enables technological competition and rivalry. Even though it is also an argument of prospect theory that inventions should not be kept as trade secrets, Kitch argues that the dissemination of technological information can mostly be left to the patent owners. They would voluntarily license the relevant information to third parties when they deem this appropriate and efficient. Moreover, in accordance with the prospect theory, patent law disclosure only helps in determining the limits of the patent monopoly. The disclosure requirement is not designed for the dissemination of commercially relevant information.

The detailed analysis pursued in the article revealed that the disclosure requirement in the area of software technologies does not function as intended under the contract theory or even as required by the relevant patent norms. The disclosure should take place in a manner enabling a person skilled in the art to understand the invention. However, the disclosure of a source code or anything comparable is not required for a sufficient disclosure to take place. The general description of the invention is adequate. In practice, disclosure does not take place in a manner enabling a person skilled in the art to understand how the invention works. This leads to a situation where the patent holder receives broader protection than what was intended, because the boundaries of the patent monopoly are not clear. This is similarly true in Europe as it is in the U.S.

Moreover, there are concerns that the threshold for patentability has corroded in the current patent system. Patentability and protectability seem to have become the leading principles of modern patent laws. In accordance with the recommendations of prospect theory, the threshold for patent protection is low: it is sufficient that the technological information in question is new. However, the proposals of prospect theory have faced considerable criticism. In particular, it has been argued that broad

patent protection is not suitable for software technologies.[200] Despite such arguments, the earlier limitations on the patentability of software technologies have eroded. For example, the U.S. Supreme Court did not re-enforce the machine-or-transformation test for software technologies in its Bilski case, but rather explained that the test is only an indicative of the patentability of a particular technology. Earlier, the U.S. courts accepted software patent claims if there was a reference to a machine. The physical transformation test, in turn, denotes that invention transforms an article from one state to another. The Supreme Court explained that there are other possibilities for excluding patent applications than the machine-or-transformation test, namely exclusions concerning patents on abstract ideas.[201] The initial understanding of the Bilski case was that it was a victory for software patentability, since after its judgement, it was no longer necessary to fulfil earlier requirements.

In Europe, the Enlarged Board of Appeals of the EPO has explicitly approved the current state of affairs, where the earlier restrictions on software patentability are effectively abolished. The Board has explained that the development is part of the normal evolution of laws.[202] At present, in Europe, the focus on software patentability has shifted to the inventive step analysis. This means that the same patentability test that is used in all other technological areas is now used for computer program technologies. On one hand, this could be seen as a more consistent and technology-neutral application of patent laws. As discussed previously, a similar trend is observable in Europe in the area of copyright for originality criterion. On the other hand, the legal concepts could be applied so that technology-specific issues would be taken into account. Then nature of innovation development in the technological area in question, such as cumulativeness, could be given weight. Technology-specific provisions are one way to achieve this aim, but the flexibility of the key concepts in different contexts of application could also be resorted to. Taking into consideration technology-specific issues does not necessarily mean that one is rejecting consistency.

A key concept for the patentability and disclosure requirements is "*a person skilled in the art*". It defines what is obvious and, hence, non-patentable. Furthermore, it is also relevant for the other side of the patent bargain. An invention needs to be disclosed in a manner which enables a person skilled in the art to work on the invention. These functions of the "person skilled in the art" test are important for the scope of patent protection. In the case law of the EPO, some common rules have been formed on how this concept is to be applied. Firstly, there are rules that define what kind of information is thought to be part of the knowledge sphere of a person skilled in the art. In Europe, a person skilled in the art is not necessarily a person with expertise in only one technological area. The rules make a person skilled in the art an imaginary person. Secondly, the concept should be interpreted consistently so that the level of skill assumed is the same for the obviousness analysis as it is for the disclosure requirements. If the required disclosure can be made with vague information, then

200 See for example *Cohen & Lemley* (2001).
201 *Bilski v Kappos* 130 S. Ct. 3218 (2010).
202 EPO Opinion of the Enlarged Board of Appeal of 12 May G 0003/08.

also vague information in the relevant technological area(s) can make an invention obvious to the person skilled in the art, and hence non-patentable.

The analysis in the article revealed that these general rules of interpretation are not necessarily followed in the actual practices of the patent offices in the area of software technologies. In Europe, it seems that "a person skilled in the art" in software technologies is not construed to be as skilful as in other technological areas. For some reason, this imaginary person does not need to know programming languages. It is further reasoned that disclosure does not need to take place in the form of program code. This in turn leads to a situation where it can be hard for a real person who is skilled in the art to analyse whether an invention that is claimed belongs to the prior art and, consequently, based on his expertise, oppose a patent application. Moreover, it is hard to analyse what has actually been patented, an issue which broadens the scope of protection. Both the disclosure requirements and the possible corrosion of the inventive step criterion broaden the scope of patent protection. The same is similarly true for the U.S.

At an abstract level, it seems that contract theory is an important justification for the patent system. However, a more detailed analysis in the article revealed that prospect theory may, after all, affect the interpretations of software patentability and also the level of required disclosure. Changing this would require a shift of focus regarding the justification grounds, as well as a critical re-evaluation of the surface level interpretations on this basis. If contract theory is to be regarded as an important justification of the patent institution, its basic premises should be reflected in patent law practice. This would mean that the disclosure function of the patent system should be taken more seriously also in the area of software technologies. Moreover, the inventive step requirement should be interpreted strictly enough.

#### *3.2.1.2 Recent developments and transitional thoughts*

The initial understanding of the Bilski case decision by the U.S. Supreme Court was that it did not give proper guidance on how to put limits on software patentability. It was, in fact, thought that there are no longer specific limits for software to be patentable.[203] The Supreme Court's guidance was that the machine-or-transformation test is only an indication of its patentability but it is not the only test. However, it seems that the U.S. Patent and Trademark Office (USPTO) and courts have reinvigorated the machine-or-transformation test in software patent cases. The recent case law seems to apply the test in a manner that makes it a mandatory rule.[204] These developments indicate that the USPTO now applies stricter rules on software patentability than it did some time ago. From the perspectives opened up in this research, this change could be seen as a positive development.

203 See for example *Lemley, Risch, Sichelman & Wagner* (2011), p. 1316.
204 Ibid.

However, as Lemley and others have pointed out, the machine-or-transformation test does not focus on the right question. Consequently, it might still happen that issues that are too abstract receive patent protection, leading to a broad scope of protection. Moreover, the understanding of these issues is that specific subject matter limitations do not serve well either, because in some occasions they lead to over-exclusions and sometimes to under-exclusions. This happens because the patent law subject matter categories, such as machines, are too inflexible to take into account rapid technological development. Together with other authors, Lemley has tried to construct some limitations on patent scope by suggesting how the abstract ideas doctrine should be applied. Essentially, the abstract ideas doctrine seeks to limit patent claims that are too broad: the patent application should be rejected if it is not connected to a real world application. One important consideration in the application is how broadly the patent claim prevents future follow-on-inventions based on the same idea.[205]

The proposal also stresses the nature of the industry in which the patent claim resides. It is suggested that in the industries where cumulative innovation is a specific feature, patent claims should be more carefully restricted so that follow-on inventions would not be prevented. Moreover, if the industry is developing rapidly, the claims should not be accepted for too abstract issues, because in the fast-moving industries broad patents would be more detrimental to the follow-on improvements. For the patent scope decisions, it would also be relevant what the patentee's contribution is, when compared to the prior art. The abstract ideas approach is contextual by its nature. It recommends that all other aspects relating to patentability be decided before the analysis of whether the patent application concerns an idea that is too abstract. For example, the nature of the prior art and the extent of the patent applicant's disclosure are taken into account before the analysis of the idea's real world contribution. This would help to understand the relevant aspects defining the nature of the invention and e.g. its relationship to the prior art. This way of applying the doctrine would make the patent scope clearer, as well as better enable third parties to make future improvements.[206] The theory would function as an antidote to the ideals of prospect theory. On the other hand, it is in accordance with evolutionary economics by nurturing a competitive climate for technological development. It builds a general theory applicable to all technological sectors, but it also enables taking into account the specific issues and needs of the relevant technological sectors.

The author's understanding is that in Europe, the present limitations relating to the patentability of ideas and mathematical principles still have some force, even though the limitation of patentability regarding software as such has lost its capacity to limit patentable subject matter. In the article it was elaborated that in the future, the role of the inventive step analysis will be to function as a decisive mechanism for limiting patent scope. In the above-mentioned suggestions on the abstract idea doctrine, the real world contribution of a patent application was also emphasized. The theory fits well the current European interpretative developments. It could provide a model on

205 *Lemley, Risch, Sichelman & Wagner* (2011).
206 Ibid.

how the patent scope could be limited through recourse to the same limiting principles, irrespective of the technological area subject to the patent application. Yet, taking into account the nature of the prior art and the level of disclosure would bring some flexibility into the interpretations. These aspects are analysed from the perspective of the concept of "a person skilled in the art", which essentially refers to specific elements residing in different technological areas.

Another track of development can be seen in the U.S., which may also affect the scope of patent protection. Third parties are now able to oppose patent applications, based on prior art. Those who are skilled in the software technologies are now able to participate in the process which takes place at the USPTO. The system is beneficial, as it lessens the burden of the USPTO and makes available a broader knowledge base for prior art. This has potential to decrease the number of trivial patents. Earlier, there were concerns that the USPTO would not have sufficient expertise on analysing new technological areas, but this problem is now mitigated to some extent. The big patent law reform has most probably elevated the quality of software patents.[207]

However, it is not inevitable that the law reform will have a dramatic influence on how the obviousness criterion will be applied. Even though wider range of materials will be accessible to the patent office, even in the future, the determinative issue will be how the obviousness is construed. The new system may prevent patent applications that are not novel based on prior art, the obviousness still needs to be assessed. The similar system of opposition, which is new in the U.S., has been available in Europe for a long time. Despite this, also in Europe concerns have been raised that the inventive step analysis is corroded.[208] Consequently, the change in the U.S. procedural system for patent application might not lead to a significant difference. It is more decisive how the limiting principles themselves are construed and applied.

### 3.2.2 Patents and computer program interoperability in Europe: Are the exceptions in the current patent laws and the proposed unitary patent protection sufficient?

#### *3.2.2.1 The objective of the publication and its contribution*

In Europe, a patent reform has been pending before the institutions of the European Union. The reform will mean that for the European patents with unitary effect, the scope of patent protection would become uniform in the participating Member States. This reform will not change the patentability or disclosure: these will still be

207 The reform will also change the U.S. patent system from a first-to-invent to a first-to-file system. Some have estimated that the move to the first-to-file system might decrease the patent quality. Moreover, there is some empirical evidence available, which suggests that the first-to-file system is not as beneficial for small enterprises and individual inventors as the first-to-invent system. There is also some evidence, which indicates that small enterprises are more innovative. These aspects suggest that the reform may have some negative impact on technological development. *Abrams & Wagner* (2012).

208 See for example *Bakels & Hugenholtz* (2002), pp. 36-39.

applied and interpreted by the European Patents Office under the European Patent Convention, like earlier. Even though the patentability and disclosure issues are very influential for the scope of protection, the patent law exceptions are equally important for determining the final scope of protection. After the changes take effect especially the patent law exceptions will become uniform for the European patents with unitary effect and European patents. Therefore, the patent reform will importantly affect the scope of protection issue. The patent law exceptions in Europe could provide one model on how interoperability could be taken into account internationally.

The main idea of the article was to analyse the new unitary patent protection and find out whether the proposed provisions would be sufficient for the computer program interoperability purposes in Europe. The perspective of technological development as an objective of the regulation and the perspective of evolutionary economics provided the background for the interpretation and policy recommendations.[209] One of the basic premises of patent law under the TRIPS Agreement is to contribute to the promotion of technological innovation and the dissemination of technology. All provisions of TRIPS should be construed in the light of this objective. Consequently, patent protection is not an end in itself, but an instrument to achieve other goals. It has been recognized that interoperability in the ICT sector is essential for the promotion of technological development and economic growth. As computer program interoperability arguably fosters technological development, one would assume that the needs for interoperability are taken into consideration in the current patent laws. Paradoxically, however, patents rather seem to cause problems for interoperability.

For these reasons, the first aspect of interoperability to be analyzed in this article were the extent to and ways in which it could be taken into account in the interpretations of existing patent law exceptions in Europe. Experimental use and exhaustion could provide possibilities to conduct reverse engineering activities on a computer program. Through these means, one could detect critical interface information. However, there are some limitations within these exceptions. Experimental use needs to relate to the subject matter of the patented invention. Therefore, when the interface is not patented, this exception is normally not applicable. Yet, this exception has been justified from the technological development perspective. It has been argued that it is not in the public interest to prevent acts which aim at advancing technology. Hence, there might be some possibility to interpret the experimental use exception in a manner to allow reverse engineering activities, which aim at detecting interface information. There are certain limitations in the application of the exhaustion principle, as well. The main uncertainty has been whether exhaustion takes place when delivery is provided through electronic means, without a hard copy of a program. However, in the UsedSoft case[210], the CJEU held that copyright exhaustion can also take place in situations where a program copy

209 As the European provisions on this issue are closer to the optimal solution, comparisons to the United States were not deemed appropriate for the purposes of the research in this article.

210 C-128/11, *UsedSoft GmbH v Oracle International Corp.*, 3 July 2012, nyr.

has been downloaded from the Internet. This could probably be applied analogically to patent cases.[211]

There is some uncertainty as to whether the experimental use and exhaustion exceptions can be interpreted to allow reverse engineering. For this reason, the article welcomes the fact that the new Regulation (then, Proposal) on Unitary Patent Protection provides a specific exception for reverse engineering activities. However, there are some shortcomings in the provisions. Firstly, the Regulation does not clearly state whether the right to reverse engineer can be contracted out. If contracting out is allowed, the aim of the exception can be diluted. Secondly, after the interface information has been detected, one cannot necessarily implement a patented interface in a non-infringing way. Hence, the question whether a new exception could be introduced in order to enable interface implementations is also addressed in the article.

If such an exception were to be drafted, it should comply with the TRIPS requirements. Under Article 30 of TRIPS, third party interests are taken into account. Interoperability brings technological competition and alternatives to the market. This is in the interests of the competitors, consumers and general welfare. Competition may increase overall innovation incentives in the sector, but it may also force patent owners to improve their technology further. Consequently, it may have a positive effect even on the patent owner's innovation incentives. In addition to the incentives related to patent protection, there are other incentives for making products interoperable. Therefore, strong patent protection might not be required. Moreover, interoperability is, to a certain extent, in the interest of the patent holder due to network effects, which make the patent owner's product more valuable to consumers. If the innovation incentives are analyzed in a technology-specific manner, one can find many supporting arguments for accepting a new exception for interface implementation. However, in cases where a patent owner has confined himself to interface technology, the possibility to implement the interface in competing products might be in an unreasonable conflict with the patent owner's interest. One possibility to mitigate the conflict would be through remuneration. There are, thus, many arguments to support the drafting of the exception proposed by the author. Most of these are on the side of third party interests. Supporting arguments can also be found from the general objectives of the patent institution.

#### *3.2.2.2 Recent developments*

The European Parliament has accepted the Regulation concerning Unitary Patent Protection.[212] The Parliament also stated its opinion on the Regulation of Language

211 For more in-depth analysis, see *U-M. Mylly* (2012).

212 Regulation (EU) No 1257/2012 of the European Parliament and of the Council of implementing enhanced cooperation in the area of the creation of unitary patent protection.

Arrangements[213] and on the related Agreement on Unified Patent Court.[214] Moreover, the Court of Justice of the European Union has dismissed the initial complaints made by Italy and Spain on the utilization of enhanced co-operation with regard to the Regulation.[215] However, Spain has filed new complaints questioning the validity of the Regulation.[216] In any case and even if the new complaints of Spain were dismissed, the unitary protection will at earliest take effect when the agreement on a Unified Patent Court enters into force. This requires that the Agreement on a Unified Patent Court be ratified by thirteen Member States, including Germany, the U.K. and France.[217] Consequently, in any case it will still take some time before the new uniform protection is applicable law.

The role of the patent law exceptions changed to some extent at this stage when compared to the pre-existing Proposal on Unitary Patent Protection, which is analysed in the last article of this research. The only limitation to patent protection, which was kept in the text of the Regulation on Unitary Patent Protection, is the exhaustion principle (Article 6). However, other limitations on patent protection were transferred from the Regulation to Article 14h of the international agreement on a Unified Patent Court. This is what happened to the experimental use exception (Article 14h (b)) and to the new specific exception for interoperability (Article 14h (j)). Yet, the substantive contents of these exceptions remained the same. These provisions provide a new harmonized basis for exhaustion, experimental use and for detecting computer program interoperability information within the Member States of the unitary protection. These exceptions cover both European patents with unitary effect and other European patents applied through the EPO. Yet, the exhaustion principle is part of the law of the European Union and consequently the CJEU is the instance with the power to give authoritative interpretations on the exhaustion principle. As the exhaustion principle has generally been developed by the very same instance at the European level, the core of the patent law exhaustion principle will most probably stay the same as previously.

The transfer of experimental use and interoperability provisions from the Regulation to the Article of the international agreement was done with the aim of lifting the obligation of the Unified Patent Court to request preliminary rulings from the CJEU on these limitations. Since these two substantive provisions are in the end not part of European Union law, there is neither an obligation nor a possibility to refer preliminary ruling questions to the CJEU on the interpretation of these provisions. However,

213 Council Regulation (EU) No 1260/2012 of implementing enhanced cooperation in the area of the creation of unitary patent protection with regard to the applicable translation arrangements.

214 Council of the European Union, Draft Agreement on a Unified Patent Court and draft Statute.

215 Joined Cases C-274/11 and C-295/11 *Kingdom of Spain* (C-274/11), *Italian Republic* (C-295/11) *v Council of the European Union nyr*.

216 Cases C-146/13 *Kingdom of Spain v European Parliament and Council of the European Union; and* C-147/13 *Kingdom of Spain v Council of the European Union*.

217 Article 18.2 of Regulation (EU) No 1257/2012 of the European parliament and of the Council of implementing enhanced cooperation in the area of the creation of unitary patent protection; and Article 89 of Agreement on a Unified Patent Court.

as the TRIPS agreement now belongs to the exclusive competence of the EU[218], the Unified Patent Court could have an obligation to refer questions to the CJEU about the conformity of these and other provisions of the Unified Patent Court Agreement with the requirements of the TRIPS agreement. In any case, the new Unified Patent Court will also interpret these provisions. As discussed in this research, one way to reach harmonization is to have an instance, which gives authoritative interpretations on the harmonized provisions of law. The structure of the Unified Patent Court, however, provides a possibility for diverging interpretations, at least to begin with. The Unified Patent Court will contain a number of local divisions designated by the contracting Member States, as well as regional divisions at the Court of First Instance. Although there is a Court of Appeal, the harmonization of interpretations and the building of a body of law will take time. Moreover, whether or not local divisions are bound by the interpretations of the Court of Appeal is not clear from the agreement. If the limitations on patent protection were part of the Regulation, and consequently part of the laws of the European Union, the EU law principles would have guided the binding effect of the interpretations of the CJEU.[219]

The problems related to the substantive issues discussed in the article have remained the same. The provisions regulating decompilation are still too narrow. The shortcomings of the copyright provisions have been repeated and not corrected. This is apparent, since the articles only state that the same actions are allowed as within the copyright context. As discussed in the copyright context, this may have consequences on the availability of technological alternatives. The efficiency of the respective technological solutions cannot be freely chosen due to legal constrains. Another impediment to technological development are the situations when the interoperability information is patent-protected. As suggested in the article, there may be a need to draft an additional article securing interoperability in those specific cases where an interface becomes a bottleneck within a system.

### 3.2.3 Conclusions on the patent articles

Unlike copyright law, patent law protects computer program interfaces. For patentability, there are no specific limitations preventing interfaces from becoming patent-protected. Patent protection is quite easily available. Even though one would assume that access to interface information under the patent system is guaranteed due to the disclosure requirements, this is not the case. The disclosure requirements,

218 Case C-414/11 *Daiichi Sankyo Co. Ltd., Sanofi-Aventis Deutschland GmbH v DEMO Anonimos Viomikhaniki kai Emporiki Etairia Farmakon*, *18 July 2013*, nyr.

219 The earlier draft patent court agreement was considered to be incompatible with EU law by the CJEU, because it restricted the possibility of national courts to refer cases under preliminary ruling procedure to the CJEU. For more details, see the *Opinion of the Court (Full Court) of 8 March 2011, Opinion delivered pursuant to Article 218(11) TFEU - Draft agreement - Creation of a unified patent litigation system - European and Community Patents Court - Compatibility of the draft agreement with the Treaties, Opinion* 1/09 ECR [2011] I-01137, and *Peers* (2011).

as currently interpreted, do not guarantee access to this critical information. One policy recommendation from the present author is that the disclosure requirements be interpreted in so that interoperability information could be detected by reading the patent information. Still, if the interface is not patented, making the disclosure requirements stricter does not provide better access to interoperability information. Therefore, one needs to analyse whether the patent laws provide some other means for access. In its Regulation for unitary patent protection, the EU has recently provided a new exception for detecting the critical interoperability information.

However, this provision does not enable the implementation of interfaces. If competitors attempt such a thing, they risk facing an infringement suit. The policy recommendation by the present author is that a new exception should be enacted regarding interface implementations so that in a few specific situations, competitors would not become infringers. In the following, it will be elaborated how a narrow scope of protection could be partly achieved in Europe through the application of the doctrine of equivalence. This would help to limit the risk of infringement. Another issue that will be addressed shortly is why the system of compulsory licensing has not become an efficient tool for enabling the availability of computer program interfaces.

## 3.3 Some additional remarks on the scope of patent protection

### 3.3.1 Patent claim interpretation and the doctrine of equivalence in Europe

Patent claim interpretation is one of the patent law doctrines having an impact on the scope of patent protection. In the patent law articles belonging to this research, the scope of protection issue was addressed through patent grant doctrines and patent law exceptions. In the following, it will be shortly elaborated what the possibilities are to narrow down the scope of patent protection through patent claim interpretation. Claim interpretation becomes necessary when comparing the patent protected and the potentially infringing material. This method could be said to form a functional equivalence with regard to the idea-expression dichotomy in the copyright context. The idea-expression dichotomy is similarly relevant in copyright infringement situations as it has served as a primary tool in leaving the critical interface information out of copyright protection.[220] In the following, the analysis will focus on whether the claim interpretation could serve as a similarly important tool in narrowing down the scope of patent protection for computer program interfaces whenever necessary. This section concentrates on the European doctrines.[221] The analysis is as much as possible

220 Burk and Lemley have considered methods of separating ideas from expression in copyright infringement cases to be quite a similar practise to patent claim construction in patent infringement cases. In patent cases a literal construction of an invention, its abstraction, is compared to an existing devise or other embodiment. In both copyright and patent cases one needs to conduct some level of abstraction of the compared issues. *Burk & Lemley* (2005).

221 For the situation in the U.S., see for example *Cohen & Lemley* (2001).

at the European level. The national level is elaborated to illustrate the obstacles for the harmonization efforts at the European level.

The U.K. tradition has generally been sceptical towards monopolies.[222] Earlier in the U.K., claims were given their literal meaning, as claims were there to define the exact limits and boundaries of a monopoly. This way of interpreting patent claims has been typical for common law countries.[223] In the U.K., the patent claim specifications are compared to the specifications of a potentially infringing product. The invention is divided into small components, and these are then interpreted separately. Hence, even in the cases of broad interpretation, the interpretation does not focus on a general inventive idea, but on the smaller parts of an invention, namely on one claim at a time.[224] The approach of claim interpretation is connected to the justification grounds emphasized. In common law countries, the public interest justification plays a decisive role. Patent protection is considered as an exception to the free markets, and protection is given only for the purpose of granting the required incentives. The limits of protection should be as clear as possible. Earlier in the U.K., it was considered fair to leave it to the inventor to define the exact limits of his monopoly. Furthermore, it was considered fair that the inventor should bear the burden of his own failure to define the limits properly.[225] In the U.K., the doctrine of equivalents was possible only for the inessential elements of an invention. However, after the 1949 Patents Act, a general rule was that all elements of a patent claim were considered essential. Consequently, the broadening of the patent scope through the doctrine of equivalents has had a limited role. This practice, however, was to some extent softened by allowing broader patent claims at the stage of the patent application process.[226]

In Germany, the justification ground of patents has related to the personality theory.[227] Consequently, the interpretation of patent claims has traditionally been on the other end as compared to the U.K. approach. The basic approach has been to interpret patent claims from the patent holder's perspective. Patents are thought of as providing rewards for innovative activities. The understanding has been that it is highly difficult to write patent claims in such a manner that all aspects of required protection would be taken into account. Consequently, patent claims were thought of as providing protection for the essence of a patent.[228] In other words, the German system was to provide protection for the general inventive idea. Similarly to the U.K. patent system, also the German system was softened by the patent prosecution practice.

222 *Cohen* (1998), p. 1092.
223 *Cornish & Llewelyn* (2003), p. 165.
224 *Cohen* (1998), p. 1120-1121. Cohen analysed here the differences in interpretation of Article 69 of the EPC and the Protocol after the Improver cases, which were the cases decided differently in Germany and the U.K.
225 *Weston* (1998), p. 49.
226 Ibid. pp. 50-51.
227 *Cohen* (1998), pp. 1103-1104.
228 *Brinkhof* (2002).

The patent claims were drafted in a narrow manner for the purpose of adhering to the patentability requirements.[229]

It has been recognized that even though both the U.K. and German patent systems are highly developed, they are the most diverging approaches in the world to claim interpretation and consequently to define the patent scope. The systems are tightly connected to the background interest conflicts affecting the patent scope decisions on a practical level.[230] This illustrates well the role of the basic background assumptions on the interpretation and application of legal rules. The different assumptions lead to diverging outcomes, notwithstanding the fact that the actual black-letter laws may look almost exactly the same. Yet, before the claim interpretation was regulated at the European level, many European countries did not even have any specific black-letter rules for claim interpretation.[231] Especially in such instances, the background justification grounds have a powerful influence on the reasoning of the cases. In the absence of codified norms, the interpretations are strongly based on the background assumptions anchored in the respective legal culture.

At the European level, these diverging approaches and interpretations have caused problems. Hence, there have been attempts to harmonize the laws at the European level. When the drafting work started in the framework of the European Patent Convention (EPC), the aim with regard to claim interpretation was that the interests of inventors and third parties should be reconciled for the purposes of legal certainty. The model for a compromise approach was found in Swiss law.[232] According to Article 69 of the European Patent Convention, patent claims determine the extent of the patent protection. The protocol on the interpretation of Article 69 sets claim interpretation between the above-mentioned two extreme ends represented by the German and the U.K. approaches. The Protocol provides that claims are not to be given their literal meaning, neither are they to be interpreted as general guidelines on what the patentee might have thought. Instead, claims are to be interpreted as giving fair protection for the patentee and with a reasonable certainty for third parties. The text of the Protocol shows quite clearly the earlier European approaches to claim interpretation and the intention to find a compromise between these approaches somewhere in between.

However, the case law again shows that it is hard to change national approaches. Even though the text of the Protocol is the same for the Members of the European Patent Convention, the national interpretations are tied to the national traditions. Those parts of the legal text, which are closer to the countries own historical systems, are emphasized.[233] The fact that the divergences continued to exist became apparent when the same factual case was decided both in Germany and the U.K. Based on exactly the same facts, the German court found that a competitor's solution was covered by patent claims and hence infringed, whereas the U.K. court in turn did not find an

229 *Weston* (1998), p. 57.
230 Ibid. p. 36.
231 *Stauder* (1992), p. 311.
232 Ibid. p. 315.
233 *Brinkhof* (2002), p. 918.

infringement.[234] Even in the more recent case law the differences seem to persist. The Kirin-Amgen case from the U.K. seems to be an example of extreme application of the traditional U.K. literalism. The interpretation on the scope of the protection is even more strictly tied to the claims than in some earlier cases in the U.K. The case has been criticized as providing the maximum protection for the legal certainty and to the third parties but nothing to the patentee. The critics underline that Kirin-Amgen case does not follow the middle-ground compromise for the extent of protection, which is clearly an aim in the Protocol on the interpretation of Article 69. Yet, the U.K. court claimed that its interpretation is in compliance with Article 69 of the EPC and the Protocol on the interpretation.[235] The situation illustrates how difficult the harmonization of law in fact is without any wider cultural unification.[236] Harmonization can be fully successful if the assumptions behind legal concepts are adapted accordingly.[237] The situation closely resembles what has already been elaborated in this research in the copyright context with the harmonization efforts for the originality test.

The current formulation of the Protocol regarding patent claim interpretation still leaves wide discretion to the Member States to decide how broadly patent claims are defined. There are, however, some limits on how narrowly or broadly claims can be interpreted. Notwithstanding the national persistence, the narrowest possible (as well as the broadest possible) construction seem out-ruled. Consequently, the claim construction cannot be approached purely from the public interest perspective, nor merely from the reward or natural law perspective. It is now considerably difficult to balance the background justifications grounds and to logically reason the outcomes of cases as required by the Protocol.[238]

The doctrine of equivalence further defines the rules for scope of protection. The doctrine of equivalence is an internationally recognized principle. Even before the EPC 2000, it was applied in many EU countries, as well as for example in the U.S.[239] It has been argued that for the continental tradition, the doctrine of equivalence has been part of the claim interpretation and nothing was changed by EPC 2000.[240] Yet, earlier it was questionable whether there exists any European doctrine of equivalence.[241] With the EPC 2000, doubts on this question should have evaporated, since the protocol on the interpretation of Article 69 has been amended. The amendment is now in force Europe-wide.[242] The amendment clearly provides that in the claim interpretation, due

234 *Weston* (1998), pp. 71-72. The case in question was an EPC patent for an Epilady device, so called Improver cases: Düsseldorf Court of Appeals (Oberlandesgericht) 21.11.1991 Case No. 2 U 27/89, translated in IIC 6/1993, pp. 838-245 and Improver Corporation v Remington Consumer Products Ltd [1990] FSR 181.

235 *Laddie* (2009), pp. 27-33 and Kirin-Amgen Inc v. Hoechst Marion Roussel Ltd [2004] UKHL 46.

236 *Cohen* (1998), pp. 1084-1085.

237 Ibid. p. 1086.

238 See also *Laddie* (2009), pp. 30-31 and 36.

239 *Stenvik* (2001), pp. 2-3.

240 *Meier-Beck* (2005), p. 340

241 *Brinkhof* (2002).

242 The Finnish doctrine for claim interpretation was already consistent with the equivalency requirement see Government Bill 2005/92 vp., p. 28.

account shall be taken of such elements that are equivalent to elements specified in the patent claims. The amendment means that claims can be given a broader scope than only their literal meaning. Consequently, this interpretative element enables a broadening of the patent scope. When taken into account that already the Protocol excluded the narrowest possible interpretation, the legal texts currently allow quite broad protection for the inventor. However, it is noteworthy that even the doctrine of equivalents can be utilized as a scope-restricting method, as well. If used in this manner, then only the solutions described in the specification can be understood as equivalent to the claims. In this case, patent claims can only be broadened through a description in the specifications. Consequently, if the doctrine is applied in this manner, it is up to the patent applicant to give the details of the scope and define specifications so that they cover the equivalent solutions.[243] In fact the U.K. court explained in the Kirin-Amgen case that there is no room for equivalency. However, this interpretation can be seen at odds with the legislative texts and their history.[244]In the Technip case the approach was softened so that trivial and minor modifications would be covered by equivalency, if this would be a fair way to read the claims. Still, the approach in the U.K. underlines the responsibility of the patentee to draft the claims carefully, and interpretation of the claims from the perspective of third parties.[245]

A concern in this respect is that the Protocol on the interpretation of Article 69 does not give any guidance on which solutions are to be regarded as equivalent with the elements in the patent claims, leaving the possibility that the equivalency can be interpreted even broadly. This brings some legal uncertainty into the claim construction.[246] The starting point for the definition is something, which is equal but not identical.[247] WIPO has also made a proposal for the definition of equivalency. This proposal provides that with an equivalent solution one understands a solution that essentially performs the same function in an essentially same manner and achieves the same results as the elements provided in the patent claims. Another general way to define an equivalent solution is that it is evident for a person skilled in the art that the same result can be reached by an equivalent solution as by that described in the patent claims. The relevant time for analysis is the time of a presumed infringement.[248] Based on (mostly) German case law Meier-Beck has summarized equivalency to mean that a person skilled in the art is able to find a variant solving the same technical problem at the priority date. The technical means the variant utilizes should have the same technical effect. Based upon patent claims a person skilled in the art should consider the variant as an equivalent solution. Moreover, the variant should not lack novelty based upon prior art.[249] The limits to the interpretation can be drawn from the other

243 *Stenvik* (2001), p. 4.
244 *Laddie* (2009), pp. 31 and 37 and Kirin-Amgen Inc v. Hoechst Marion Roussel Ltd [2004] UKHL 46, paragraph 44.
245 *Drathen* (2008), pp. 398-400.
246 *Brinkhof* (2002), pp. 921-922.
247 *Stenvik* (2001), p. 3.
248 *Singer & Stauder* (2003), pp. 245-246.
249 *Meier-Beck* (2005), pp. 344-345.

parts of the protocol on the interpretation of Article 69. If claims were construed too abstractly, based on the doctrine of equivalence, in its extreme this could be argued to bring the interpretation into a conflict with the second sentence of the Protocol. Namely, excessive abstraction would be in conflict with the provision which states that claims should not only be understood as general guidelines.[250]

The method for defining equivalence is connected to the concern over technological progress. Exclusive rights should not be construed in a manner detrimental to technological progress. Therefore, one should not define the scope of protection so that it includes innovative new solutions. Also the state of the art belongs to the area that should be left for free utilization. The state of the art cannot be monopolized through broadening the patent scope. The claims have been drafted and accepted at the patent prosecution stage in a limited form for a good reason. Consequently, the patent scope cannot be stretched by broad construction at the stage of infringement analysis. A state of the art restriction includes, firstly, solutions that are known from the prior art. Secondly, it encompasses obvious solutions. The new solutions, which are deemed obvious for a person skilled in the art, belong to the patent scope through the doctrine of equivalents. Modifications of *claimed invention* that are non-obvious are not covered by the doctrine of equivalents. In many European countries, the obviousness test for the equivalence at the infringement stage is based upon the same principles as the inventive step analysis at the patentability stage. Utilization of the same well-known concept brings legal certainty to the application of the test.[251]

The last borderline is to understand technically what is equal and unequal. This is the most difficult part of the analysis. A general guideline is that the solution must solve the same technical problem as described in the claims. It is noteworthy that the scope also covers solutions that are technically inferior. Controversies arise because not all embodiments, which solve the same technical problem belong to the area of claimed invention.[252]

Equivalency is analyzed based upon the claim language. The terms of the claims limit the range of included embodiments. In the U.K., the claim language is perceived from the perspective of third parties. What kind of assumptions third parties can draw from the claim language become decisive. If it is apparent to third parties that it could not have been the patentee's intention to exclude minor modifications, then those solutions are deemed to be covered by the patent scope. If, on the other hand, third parties have a reason to believe that the claim language is purposively limited, then only literal infringements are covered by the patent scope. This approach emphasizes the interests and legal certainty of third parties.[253] The approach again reflects the understanding that the limits of the patent monopoly should be clear. Moreover, patents are conceived as exceptions to the free market. The coherence of the background assumptions behind

250 *Franzosi* (2001), p. 113.
251 *Stenvik* (2001), p. 8-11.
252 Ibid. pp. 7 and 12.
253 Ibid. pp. 14-15.

traditional U.K. patent law doctrines seems to enable relatively coherent interpretations within one society.

Now the question arises, what kind of basis does the Protocol on the Interpretation of Article 69 of the EPC and the doctrine of equivalence set for patent scope? They leave some discretion to the Member States. The Doctrine could also lead to broad scope of protection. This could turn out to be problematic from the perspective of computer program interfaces. As taught by copyright cases, there might in any case be only a limited number of efficient ways to implement an interface. In copyright cases, these technical limitations have served as a reason not to give copyright protection for such elements. Thus, if interoperability information is available, copyright does not prevent other or in some cases the same implementations of interoperability elements.

If a computer program interface, instead, is protected by a patent and the already broader scope of protection is further enhanced by giving protection for equivalent solutions, the protected computer program interface could well develop into a bottleneck. In this kind of situations, the doctrine of equivalence as a scope-broadening method does not serve well. One solution could be to construe patent claims more narrowly. This would be closer to the tradition in the U.K. Additionally, this kind of claim construction would be in conformity with Merges and Nelson's idea to narrow down the scope of protection in system technologies and in such technological areas where the cumulative development of science is apparent. The specific importance of computer program interfaces suggests narrow construction.[254] However, the narrowest interpretation would not be in compliance with the Protocol on the interpretation of Article 69.

As at the patentability stage, also at the infringement stage, the concepts of "a person skilled in the art" and "obvious" become relevant.[255] If "a person skilled in the art" is construed to be highly skilful, at the patentability stage it connotes that a wide range of embodiments is considered obvious. The threshold for protection becomes high. When the concept of "a person skilled in the art" and "obvious" are interpreted in a similar manner at the infringement stage, it connotes that a wide range of embodiments is considered to be equivalent. A high threshold for protection leads to a broad scope of protection. In the current research, the concern initially was that the threshold for protection has been corroded. Computer programs qualify for protection fairly easily. For the analysis of equivalency, this would mean that persons skilled in the art are not able to find equivalency easily. This narrows down the patent protection at the infringement stage. When the threshold for protection is low, then the scope of protection becomes narrow. However, this requires that the concepts be interpreted consistently throughout the patent system. Through this way of consistent application,

254 A related problem is that intellectual property rights are protected by injunctive reliefs. This connotes that the infringing part of a product may prevent the sale of that product even if much of it contains non-infringing material. Moreover, the availability of an injunctive relief creates a situation where third parties wishing to avoid infringement suits need to circumvent quite an area because the boundaries of what is protected by patents is not clear beforehand. This broadens the scope of patent protection additionally. *Lemley & Weiser* (2007), p. 783.

255 These concepts also allow finding of technology-specific interpretations.

the area of patent monopoly would become reasonable from the society's perspective. In cases where there are fewer patents, the scope of protection for these can be broader. In cases where there are plenty of patents, which have easily qualified for protection, the scope of protection for these patents should be narrow. By these means, a reasonable amount become monopolized and sufficiently is left for the commons.

From a legal dogmatist's perspective, "the person skilled in the art" and the obviousness tests are construed inconsistently at the patentability stage in Europe; these tests are treated differently in the inventive step and required disclosure analysis. The skilfulness is understood differently at these points of law. In both cases, these concepts are interpreted in a manner to ensure a broad scope of protection. If the patentability situation, on the other hand, is analyzed from the perspective of the justification grounds, the European system seems coherent. The interests of the inventor are the ones that are systematically emphasized over the public interest. It is noteworthy that the situation seems to be closely similar to that prevailing in the U.S. This is so, even though the public interest justification has been claimed to be the decisive justification ground in the U.S. patent law. The situation reflects the teachings of prospect theory, even though in legal scholarship it has been continuously noted that prospect theory does not constitute a suitable theoretical ground for computer program technologies. My concern is that the doctrines do not leave enough room for interpretations that would enable a narrow scope of protection when needed. It would be beneficial to construe the scope of patent protection for computer program interfaces narrowly to foster technological development.

Another issue is to find a new European interpretation for the patent scope at infringement stage. Even though the legal norms at the European level have been harmonized for some time, the possibility for diverging interpretations has been there, since it has been up to national courts to draw the line on the patent scope. Also, there has been no instance to give authoritative interpretations. The absence of a European patent court has been a concern for a long time. Without such a court, it has not been possible to reach a uniform interpretation for claim interpretation and equivalency at the European level.[256] However, now, the Unified Patent Court in Europe has finally been founded,[257] but it will take some time before we start receiving interpretations from it. It remains to be seen how the harmonized text will be interpreted by the Unified Patent Court and especially how (and if) the diverging traditions can be reconciled. In any case, it seems that claim interpretation does not provide similar tools for narrowing the computer program interface protection as the idea-expression dichotomy does within the copyright context. Consequently, in cases where computer program interfaces receive patent protection, interoperability most probably cannot be safeguarded only through a narrow construction of patent claims. This is because patent protects more than one exact way to implement the invention claimed. Therefore, it is necessary to consider other patent law measures.

256 *Brinkhof* (2002), p.921-922
257 Agreement on a Unified Patent Court.

### 3.3.2 A possibility for compulsory licensing

#### *3.3.2.1 Generally about compulsory licensing*

In the article relating to this thesis, it was analysed if it were possible under the TRIPS Agreement to implement a new patent law exception for interoperability purposes. Patent law exceptions are not, however, the only means to achieve this aim. When computer program interfaces are protected by patent rights third parties can have access to interoperability also through compulsory licensing. It has been recognized that compulsory licensing is a mechanism to provide access to technological information in situations where the public interest requires such access and this interest prevails over the private rights of a patent owner.[258] However, compulsory licensing has some deficiencies when compared to patent law exceptions. If one analyses these two legal instruments and their capacity to address issues related to interoperability, a general exception under Article 30 of TRIPS seems to be more appropriate. The reason for this is that compulsory licenses are not meant for blanket authorizations. However, the need for software interoperability is a general need in the software markets. A compulsory license is meant for a specific situation, namely for a specific patent and for a specified authorized party.[259] This implies that by regulating the exceptions applicable to all parties, the general problems apparent in certain technological areas could be solved more appropriately. In the following, it will be illustrated more closely why patent law compulsory licensing is not an optimal solution for interoperability purposes.

Even though Article 31 of TRIPS specifies some grounds for compulsory licensing (such as dependent patents) it does not prevent compulsory licenses to be used for other purposes, as long as certain conditions and procedures are fulfilled when issuing these licenses.[260] The negotiating history indicates that the grounds of granting compulsory licenses are open.[261] This flexibility was also confirmed in the Declaration on the TRIPS Agreement and Public Health. Paragraph 5(b) to this so-called Doha Declaration states, "Each Member has the right to grant compulsory licenses and the freedom to determine the grounds upon which such licenses are granted."[262] Moreover, it is recognized that Articles 7 and 8 of the TRIPS Agreement are relevant when interpreting the possibilities for compulsory licensing.[263] These provisions are construed to mean that intellectual property protection is not an end in itself, but that these rights are subordinate to higher values.[264] Articles 7 and 8 of TRIPS enable Members to avail themselves of measures to fulfil needs stemming from public interest,

258 UNCTAD-ICTSD Resource Book on TRIPS and Development (2005), p. 461.
259 Ibid. p. 462.
260 *Correa* (2008), pp. 246-247.
261 *Cottier & Véron* (2008), p. 96.
262 Declaration on TRIPS and Public Health, WTO Ministerial Conference , Fourth Session, Doha, 9-14 November 2001, WT/MTN(01)/DEC/W/2. The Declaration most probably qualifies as an agreement between the Members on the interpretation of the treaty within the meaning of the Vienna Convention of the Law of the Treaties (Article 31), See for example *Cottier & Véron* (2008), p. 96.
263 *Cottier & Véron* (2008), pp. 95-96.
264 *Correa* (2008), p. 246.

including those that are of vital importance to technological development. This general framework would suggest that, in using compulsory licenses for interoperability purposes, TRIPS does not set obstacles. Even though the grounds for licenses are up to Members to decide, the list of conditions upon which the compulsory licenses are possible is extensive. Here, the attention is paid to those requirements, which are the most critical if the compulsory licensing is used for reaching software interoperability.

Firstly, each compulsory license is considered on its individual merits (Article 31 (a)). This requires that every compulsory license for example for interoperability purposes need a separate authorization from a court or from some other authorizing body. This is the provision that has been interpreted to prevent governments from granting blanket licenses for specific purposes. It has been argued that certain categories of inventions cannot automatically be eligible for a compulsory license.[265] Yet, it is possible to have presumptions about certain types of cases that licenses would be granted. Even in these presumed situations, the process functions on a case-by-case basis. Before applying for a compulsory license, an applicant is obligated to seek a commercial license on reasonable commercial terms from the right holder. If these negotiations are not successful within a reasonable time, the applicant is entitled to apply for a compulsory license. This provision enables a patent holder to prolong the process of compulsory licensing through varying negotiating tactics. [266]

These two requirements relating to compulsory licensing already make the process unduly long, and not only because the term "reasonable time" cannot be set definitely. Only in certain cases is the obligation to conduct commercial negotiations lifted, for example in case of national emergency. The procedure for seeking compulsory license is slow, which may mean that a license for interoperability purposes is not granted in such a time that would sufficiently enable evolutionary developments. If the aim is to foster technological progress, one would suggest the implementation of exceptions to allow more rapid development of the systems related to interfaces. The exceptions under Article 30 TRIPS are more flexible than compulsory licensing, among others in the sense that no prior authorization or negotiations are necessary.

Under the main rule, national officials have an authorization to grant licenses to predominantly domestic markets. This requires that more than 50 % of manufacturing is supplied to the domestic market.[267] In Europe, even though one is able to seek a bundle of patents from the EPO, including unitary patent protection, compulsory licenses for each country have to be applied for separately. This requirement was not removed by the Regulation for Unitary Patent Protection. Compulsory licensing continues to be decided on a national basis also under this new regime.[268] This is a clear shortcoming in the said Regulation. Taking into account the fact that software markets are global, it is a rare situation nowadays that the licenses covering one or few countries for these

265 *Gervais* (1998), p. 165.
266 UNCTAD-ICTSD Resource Book on TRIPS and Development (2005), pp. 468-470.
267 Ibid. p. 474.
268 Regulation (EU) No 1257/2012 of the European parliament and of the Council of 17 December 2012 implementing enhanced cooperation in the area of the creation of unitary patent protection, preamble 10.

products are sufficient. The requirement of domestic markets set by TRIPS leads to an impractical situation.[269] The administrative procedure, the uncertainty and costs of compulsory licensing effectively prevent smaller firms from depending on this measure. When contrasted to the fact that patent application processes are coordinated by the EPC and the Regulation for Unitary Patent Protection, it is somewhat unbalanced that the application of compulsory licenses takes place exclusively on a national basis.[270]

In addition to administrative costs, there are also licensing costs for each license. For a patent holder, the compulsory licenses secure a reasonable remuneration. The amount of remuneration depends on the purposes for which a compulsory license is granted, as well as the economic value of the authorization. The value of a patent is to be taken into account accordingly. Moreover, the public interest behind the granting of licenses may have an impact on the remuneration. The fee shall be decided on the basis of each case.[271] Altogether, the time lag and administrative procedure including costs and fees make the compulsory licensing impractical for those seeking a license.

Even though a general exception for the interoperability purpose would be more appropriate, in the absence of such an exception, nothing prevents a party from seeking a compulsory license—even in the current legal situation which lacks specific compulsory licensing rules for interoperability. In Europe, this would currently take place under national rules. As an example, in accordance with the Finnish Patent Act, there are some articles under which a compulsory license for interoperability purposes could potentially be obtained. If the exploitation of a second patent depends on the first patent held by another party, a court could grant a compulsory license if the second invention is significant enough when compared to the original invention (article 46 of the Finnish Patent Act). Thus, the criterion is that a party wishing to receive a license needs to contribute with a significant invention herself. This criterion follows the TRIPS requirements for dependent patents. Article 31 of TRIPS requires that the second invention need involve an important technical advantage of considerable economic significance when compared to the first invention. This criterion can be satisfied in very rare cases, and it is not apparently always a situation when a license for interface technology is necessary, especially when taking into account the cumulative nature of software development. However, the threshold of economic significance may be more easily met in developing countries than in industrialized countries.[272]

Under the Finnish Patent Act, there is another possibility to obtain a compulsory license: it can be issued when considerable public interest so requires (Article 47 of the

269 The requirement of domestic markets would in fact be similarly true for the exception that would enable the producing of an otherwise infringing interface. This would be the case since the infringing interface could not be circulated into those countries that do not have a similar exception. Yet, the biggest impracticality within the compulsory licensing is the administrative procedure, which takes place on a country-by-country basis.

270 The earlier EU patent proposal included a uniform compulsory licensing system. This was considered a good thing from the perspective of society and e.g. start-up firms. Yet, the system was thought to lead to a situation where big companies would opt out from the EU patent in order to prevent a risk of compulsory licensing. Jaeger (2010), pp. 71-72.

271 UNCTAD-ICTSD Resource Book on TRIPS and Development (2005), pp. 475-476.

272 *Correa* (2008), p. 248.

Finnish Patent Act). Even though it could be argued that enhancing interoperability is in the public interest, it is uncertain whether the requirement of considerable public interest is met. Very similar requirements are applicable for compulsory licensing for example in Germany, where it has been established in case law that to fulfil the public interest requirement it is not sufficient that a patent owner holds a monopoly situation for the product market.[273]

Moreover, it has been recognized that in many countries, compulsory licensing is to a great extent dead letter laws. It has been argued that this is due to the international regime, which makes compulsory licensing an impractical procedure.[274] Consequently, one would not easily depend on such a doctrine to seek access to the interface technology. The impracticalities of compulsory licensing are such that it cannot be deemed to generally provide access to computer program interface technologies, even though it could theoretically provide such access in some specific singular cases.

#### *3.3.2.2 Compulsory licensing on the basis of competition law*

The TRIPS provides that if compulsory licensing takes place on the basis of competition law, the obligation to conduct prior negotiations can be lifted (Art. 31 k). The same applies to the above-mentioned requirement of domestic use (Art. 31 k). Consequently, competition law -based *de facto* compulsory licensing is not as strictly controlled by the TRIPS agreement as ordinary patent law -based compulsory licensing. These reliefs in principle make the competition law compulsory licensing speedier and more practical when compared to patent law compulsory licensing. Yet, the competition law measures naturally need to follow the substantive requirements set by competition laws. Application of competition law seeks to remedy anticompetitive practices.

The CJEU and the General Court have addressed *de facto* compulsory licensing of intellectual property on competition law basis in some cases. The first competition law requirement is the existence of a dominant position. The CJEU has established in its case law that the mere ownership of intellectual property right does not create a dominant position. Moreover, a refusal to license does not automatically constitute an abuse of a dominant position, as the right to refuse licenses forms the very subject-matter of the exclusive right.[275] In specific cases, however, the CJEU and the General court have found a refusal to license to constitute an abuse of dominant position. The criteria for such an abuse can be summarized to be that 1) intellectual property protection protects *indispensable* raw material for new product or service markets, these *new products or services* are not provided by the owner of intellectual property right, and there is a potential consumer demand for these products; 2) the refusal to license is not justified by objective considerations; and 3) the refusal enables the owner of intellectual

273 See for example *Liu* (2012), p. 689.

274 Ibid. p. 681 and the references there. Yet, compulsory licensing seems to work in some countries like Canada and the United States. See for example *Reichman & Hasenzahl* (2003).. ReichmH. Reihman and Catherine Hasezahl, Non-V

275 238/87 AB Volvo v Erik Veng (UK) Ltd. [1988] ECR 6211.

property right to reserve for itself a secondary market and eliminate all competition on those markets.[276] For indispensability, it has to be analysed whether there are technical, legal or economic obstacles, which make it impossible or unreasonably difficult to create alternative products or services.[277]

In the Microsoft case the *indispensability of interoperability information* in software markets was analysed in detail. The General Court confirmed that computer programs do not function in isolation, but by their nature they are meant to communicate with other software and equipment. The General Court established that interoperability in software products needs to fulfil a certain level to satisfy customer needs. Without the required level of interoperability, competitors are not able to viably compete on the market and provide new products and features for customers for existing software environments. In the circumstances of the Microsoft case, this degree of interoperability could not be reached without disclosure of full interoperability information from Microsoft. Alternative means, such as reverse engineering, could not lead to sufficient interoperability.[278]

In the circumstances of the case, the lack of sufficient interoperability information prevented customers from choosing products which they deemed better than Microsoft's products in several features. Microsoft's conduct thus limited technological development within the software industry to the detriment of consumers. Under objective justification ground the General Court considered the impact of licensing to Microsoft's innovation incentives. It is noteworthy that the General Court concluded that Microsoft could not provide evidence that licensing would have had a sufficient negative impact on Microsoft's incentives to innovate.[279] In fact, the Commission underlined that there are other incentives at place to ensure that products are made interoperable.[280] Moreover, the overall incentive structure within the industry was analysed in the decision, and thus not only Microsoft's incentives for innovation.[281]

The Microsoft case demonstrates the importance of software interoperability for technological development and innovation. The fundamental justification of intellectual property laws is their aim to foster creative and technological development. If procedurally burdensome competition law measures have to be applied to intellectual property protection on a frequent basis in order to enable creative and innovative activities, there is a problem in the intellectual property mechanism itself. In the thesis my argument is that the requirements of interoperability should be taken into consideration within the intellectual property legislation, as interoperability is

276 Joined cases C-241/91 P and C-242/91 P RTE and ITP v Commission [1995] ECR 1-743 ("Magill") ; C-418/01 IMS Health GmbH & Co. OHG v NDC Health GmbH & Co. KG [2004] ECR I-5039 and T-201/04 Microsoft Corp. v Commission [2007] ECR II-3601, paragraph 332 .

277 In the case IMS Health v NDC Health, intellectual property right covered a standard for various information systems utilized by the customers, C-418/01 IMS Health GmbH & Co. OHG v NDC Health GmbH & Co. KG [2004] ECR I-5039.

278 T-201/04 *Microsoft Corp. v Commission* [2007] ECR II-3601, paragraphs, 369,375-376, 383, 422.

279 T-201/04 *Microsoft Corp. v Commission* [2007] ECR II-3601, paragraphs, 647-648, 661, 665 and 679.

280 COMP/C-3/37.792 *Microsoft*, paragraph 727.

281 T-201/04 *Microsoft Corp. v Commission* [2007] ECR II-3601, paragraphs 653-659 and COMP/C-3/37.792 *Microsoft*, paragraphs 725-729 and 782-783.

necessary for technological development. Yet the Microsoft case also revealed that the reverse engineering privilege under the copyright legislation does not always enable reaching the degree of interoperability required by customers. This fact has also been taken into consideration in this thesis. As it has also been recognized that reverse engineering is both technically and economically burdensome, I have recommended that access to interface information should be provided by more efficient means.

The broader approach to innovation incentives especially in the Commission decision seems to be in line with the approach of evolutionary economics endorsed in this research. In this thesis this broader approach has especially been recommended for the analysis under Article 30 of TRIPS, which concerns the permissibility of exceptions for patent protection. Other incentives than patent protection can be taken into consideration. Moreover, the impact of an exception should not focus solely on the question whether patent owner's innovation incentives are corroded. Under Article 30 of TRIPS also third party interests form a valid part of the analysis. This could lead to an analysis of third party incentives and overall technological development.

This thesis aimed at looking how intellectual property protection would more efficiently fulfil its purpose. The argument focused on the question where reform within intellectual property rules would be required, and what kind of reform would be suitable. Competition law would still have its role in fostering technological development and in preserving efficient competition. Yet, if the area where measures are required is intellectual property protection, then the aim of fostering cultural and technological development should be taken seriously in intellectual property norms themselves, and these norms and their interpretations should be revised accordingly.

### 3.3.3 Conclusions

Claim interpretation and compulsory licensing under patent law may provide means for interoperability. Through claim interpretation, computer program interfaces could receive a narrow patent protection. However, under the current European rules the narrowest possible interpretation is, in principle, excluded. Moreover, in any case, patent protection may create a bottleneck situation when there is no other efficient way to implement the interface. Therefore, interoperability needs to be achieved through other means.

Under the current international regime, patent law compulsory licensing seems to be impractical for interoperability purposes. The procedure that takes place nationally and under strict international requirements sets the limits to the usefulness of this legal instrument. One could conclude that drafting an exception for interoperability purposes would be a more reasonable solution than relying on compulsory licensing. Yet, the details of a specific exception are to be considered separately as there are various ways to draft such an exception.

# 4 Summary of the research and conclusions

## 4.1 A comparison of copyright and patent laws

From the very beginning of intellectual property protection for software, copyright was considered a more suitable form of protection than patent. One of the reasons was the flexibility within copyright protection. It gives protection, but at the same time it enables competition. One can create new programs for the same functions without much fear of infringement, since interface functionalities are not protected by copyright. For interoperability purposes, the copyright regime has provided exceptions in order to safeguard access to the interface information. Consequently, the copyright protection of computer programs is quite satisfactory from the perspective of evolutionary economics. Copyright protection does not prevent the further development of computer program systems. Key components are not strongly protected, and regulation ensures some means for accessing non-protectable information.

Patent protection is more problematic. Firstly, it gives a stronger albeit shorter protection for patentable inventions. Consequently, the patent protection of computer program interfaces may lead to a situation where interfaces cannot be implemented in a non-infringing way. Access to interface information is not necessarily enabled through the patent law disclosure requirements. The new exception in Europe will enable access to interface information in a similar manner as provided in the copyright context. However, the possibilities to make competing or new products in the software environments are restricted because patent-protected interfaces cannot be implemented without the patent holder's consent. The patent owner may prevent technological development by holding out on her consent.

## 4.2 Policy recommendations

The author of the current research has tried to make moderate policy recommendations. This means that the considerations have focused on the next necessary, but still practically possible step. At present, the copyright system is already closer to the optimal scope of protection from the perspective of competition and interoperability. Yet, the copyright system can be further developed. At the moment, the access to interoperability information is not completely satisfactory, nor are the limitations to the purposes for which interoperability information can be utilized. These are the points that need to be addressed. In the copyright context, the given policy recommendations would lead to the desired end result. However, the present author has not tried to formulate here the actual legal provisions or devise the one optimal way to address these problems. It would be satisfactory from the perspective of this research to realize the problems and to address them appropriately.

The author deems that the final optimal situation, even for the patent system, is the one the author has recommended for the copyright system. However, the patent system

is currently far behind the copyright system in securing interoperability. The analysis has shown that the evolution of laws takes time. Therefore, the changes recommended for the patent system mostly focus on the next step. The new interoperability exception in Europe is a move in the right direction. This exception could provide a model for other countries, as well. In addition to providing access to interface information, an exception for interface implementations should be considered.

# Bibliography

## Books and articles


Abrams, David S. & Wagner, R.: "Polk Poisoning the Next Apple? How the America Invents Act Harms Inventors", Stanford Law Review (2013), pp. 517-564.

Arrow, Kenneth: "Economic Welfare and the Allocation of Resources for Invention", in National Bureau of Economic Research, The Rate and Direction of Inventive Activity: Economic and Social Factors, Princeton University Press 1962, pp. 609-626.

Bainbridge, David: "Software Copyright Law", Butterworths 1999.

Bakels, Renier & Hugenholtz, P. Bernt: "The patentability of computer programs: Discussion of European-level legislation in the field of patents for software", Study for the Committee on Legal Affairs and the Internal Market of the European Parliament, Working Paper JURI 107 EN (2002).

Bell, John: "Legal Research and Comparative law", in Mark Van Hoecke (Ed.) Methodologies of Legal Research: Which Method for What Kind of Discipline, Hart Publishing 2011, pp. 155-176.

Benkler, Yohai: "Wealth of Networks: How Social Production Transforms Markets and Freedom Contract: Freedom in the Commons", Yale University Press 2006.

Besen, Stanley M. & Raskind, Leo J.: "An Introduction to the Law and Economics of Intellectual Property", The Journal of Economic Perspectives 1991, pp.3-27.

Bitzer Jürgen & Schröder, Philipp J. H.: "The Impact of Entry and Competition by Open Source Software on Innovation Activity", in Jürgen Bitzer and Philipp J. H. Schröder (Eds.), The Economics of Open Source Development, Elsevier B. V. 2006, pp. 219-246. *Bitzer & Schröder (2006 a)*.

Bitzer, Jürgen & Schröder, Phillipp J. H., The Economics of Open Source Software Development: An Introduction, in Jürgen Bitzer and Philipp J. H. Schröder (Eds.), The Economics of Open Source Development, Elsevier B. V. 2006, pp. 1-13. *Bitzer & Schröder (2006 b)*.

Boyle, James: "Shamans, Software & Spleens, Law and the Construction of the Information Society", Harvard University Press 1996.

Brinkhof, Jan: "Is there a European Doctrine of Equivalence?", IIC 2002 Heft 08, pp. 911-923.

Burk, Dan L. & Lemley, Mark A.: "Quantum Patent Mechanics", Lewis & Clark Law Review 2005, pp. 29-56.

Calabresi, Guido & Melamed, A. Douglas: "Property Rules, Liability Rules and Inalienability: One View of the Cathedral", Harvard Law Review 1972, pp.1089-1128.

Campbell-Kelly, Martin: "From airline reservations to Sonic the Hedgehog: a history of the software industry", London 2003.

Chartier, Roger: "Figures of the Author", in Brad Sherman and Alain Strowel (Eds.) Of Authors and Origins, Essays on Copyright Law, Clarendon Press 1994 pp. 7-22.

Chisum, Donald S –Nard, Craig Allen –Schwartz, Herbert F. –Newman, Pauline –Kieff, F Scott: "Principles of Patent Law, Cases and Materials", Foundation Press 2004.

Cohen, David L.: "Article 69 and European Patent Integration", Northwestern University School of Law, University Law Review 1998, pp. 1082-1128.

Cohen, Julie E. & Lemley, Mark A.: "Patent Scope and Innovation in the Software Industry", California Law Review 2001, pp. 1-57.

## Bibliography


Colecchia, Alessandra & Schreyer, Paul: "ICT Investment and Economic Growth in the 1990s: Is the United States a Unique Case? A Comparative Study of Nine OECD Countries", Review of Economic Dynamics 2002, pp. 408-442.

Cornish, William & Llewelyn, David: "Intellectual Property: Patents, Copyright, Trademarks and Allied Rights", Fifth edition, Sweet and Maxwell 2003.

Correa, Carlos M.: "Patent Rights", in Carlos M. Correa & Abdulqawi A. Yusuf (Eds.), Intellectual Property and International Trade, The TRIPS Agreement, Wolters Kluwer Law & Business 2008 pp. 227-259.

Cottier, Thomas & Véron, Pierre (Eds.): "Concise International and European IP Law, TRIPS, Paris Convention, European Enforcement and Transfer of Technology", Kluwer Law 2008.

Davies, Gillian: "Copyright and the public interest", Sweet and Maxwell 2002.

Deek, Fadi P. & McHugh, James A. M.: "Open Source, Technology and Policy", Cambridge University Press 2008.

Demsetz, Harold: "Toward a theory of Property Rights", The American Economic Review 1967, pp. 347-359.

Derclaye, Estelle: "Software Copyright Protection: Can Europe Learn from American Case Law? Part 1-2" European Intellectual Property Review 2000, pp. 7-16 and 56-68.

Dosi, Giovanni: "foreword" in Christopher Freeman, Systems of Innovation: Selected Essays in Evolutionary Economics, Edward Elgar 2008, pp. iix-xix.

Dosi, Giovanni: "Technological paradigms and technological trajectories. A suggested interpretation of the determinants and directions of technical change", Research Policy 1982, pp. 147-162.

Dosi, Giovanni: "Sources, Procedures and Microeconomic Effects of Innovation", Journal of Economic Literature Vol. XXVI (September 1988), pp. 1120-1171.

Douglass C. North, Understanding the Process of Economic Change, Princeton University Press, 2005.

Von Drathen, Christian: "Patent Scope in English and German Law Under the European Patent Convention 1973 and 2000", IIC 2008, pp. 384-419.

Dutta, Soumitra & Bilbao-Osorio, Beñat (Eds.): "The Global Information Technology Report 2012. Living in a Hyperconnected World", INSEAD and World Economic Forum 2012.

Edelman, Bernard: "The Law's Eye: Nature and Copyright", in Brad Sherman and Alain Strowel (Eds.) Of Authors and Origins, Essays on Copyright Law, Clarendon Press 1994 pp. 79-91.

Einhorn Michael A: "Media, Technology and Copyright, Integrating Law and Economics", Edward Elgar Publishing Limited 2004.

Elkin-Koren, Niva: "It's All About Control: Rethinking Copyright in the New Information Landscape", in Niva Elkin-Koren and Neil Weinstock Netanel (Eds.) The Commodification of Information, Kluwer Law International 2002 pp. 79-106.

Epstein, Richard A.: "The Static Conception of the Common Law", The Journal of Legal Studies 1980, pp. 253-275.

Fagerberg, Jan: "Schumpeter and the revival of evolutionary economics: an appraisal of the literature", Journal of Evolutionary Economics 2003, pp. 125-159.

Frankenberg, Günter: "Critical Comparisons: Re-thinking Comparative Law", Harvard International Law Journal, 1985, pp. 411-456.

Franzosi, Mario: "Three European Cases on Equivalence – Will Europe Adopt Catnic?", IIC 2001 pp. 113-124.

Freeman, Christopher: "A hard landing for a new economy", in Christopher Freeman, Systems of Innovation: Selected Essays in Evolutionary Economics, Edward Elgar 2008, pp. 159-204. *Freeman (2008 a)*.

Freeman, Christopher: "Technological infrastructure and international competitiveness", in Christopher Freeman, Systems of Innovation: Selected Essays in Evolutionary Economics, Edward Elgar 2008, pp. 6-37. *Freeman (2008 b)*.

Freeman, Christopher, Clark, John & Soete, Luc: "Unemployment and technical innovation: a study of long waves and economic development", Pinter 1982.

Freeman, Christopher, Innovation and Growth, in Christopher Freeman, Systems of Innovation: Selected Essays in Evolutionary Economics, Edward Elgar 2008, pp. 74-89. *Freeman (2008 c)*.

Frischmann, Brett M. & Lemley, Mark A.: "Spillovers", Columbia Law Review 2007, pp. 257-301.

## Bibliography


Gervais, Daniel: "The TRIPS Agreement, Drafting History and Analysis", Sweet & Maxwell 1998.

Goldstein, Paul: "International Copyright, Principles, Law, and Practice", Oxford University Press 2001.

Gordon, Wendy J.: "Fair use as market failure: A structural and economic analysis of the Betamax case and its predecessors", Columbia Law Review 1982, pp. 1600-1657.

Greenstein, Shane: "Commercialization of the Internet: The Interaction of Public Policy and Private Choices or Why Introducing the Market Worked So Well", in Adam B. Jaffe, Josh Lerner, and Scott Stern (Eds.) Innovation Policy and the Economy, National Bureau of Economic Research 2001, pp. 151-186.

Griffiths, Jonathan: "Constitutionalising or Harmonising? The Court of Justice, the Right to Property and European Copyright Law", European Law Review 2013, pp. 65-78.

Griffiths, Jonathan, Infopaq, BSA and the 'Europeanisation' of United Kingdom Copyright Law, (March 4, 2011) Media & Arts Law Review, Vol. 16, 2011. Available at SSRN: http://ssrn.com/abstract=1777027.

Hettinger, Edwin C.: "Justifying Intellectual Property", in Peter Drahos (Ed.), Intellectual Property, Ashgate 1999, pp. 117-138.

Hodgson, Geoffrey M.: "Evolution and Institutions: On Evolutionary Economics and the Evolution of Economics", Edward Elgar Publishing Limited 1999.

Hugenholtz, P. Bernt: "Copyright and Freedom of Expression in Europe", in Niva Elkin-Koren and Neil Weinstock Netanel (Eds.) The Commodification of Information, Kluwer Law International 2002, pp. 239-263.

Neil Weinstock Netanel: "The Commodification of Information", Kluwer Law International 2002.

Hughes, Justin: "The Philosophy of Intellectual Property", Georgetown Law Journal 1988, pp. 287-366.

Husa, Jaakko: "Valkoista yksisarvista pyydystämässä vai mörköä paossa – "oikeaa oikeusvertailua"?", Lakimies 5/2010 pp. 700-718.

Jaeger, Thomas: "The EU Patent: Cui Bono et Quo Vadit?" Common Market Law Review 2010, pp. 63-115.

Kitch, Edmund: "The Nature and Function of the Patent System", The Journal of Law and Economics 1977, pp. 265-290.

Klemperer, Paul: "How broad should the scope of patent protection be?" Rand Journal of Economics 1990, pp. 113-130.

Laddie, Hugh: "Kirin Amgen – The End of Equivalents in England? "Eppur si muove" – "Support the resolution and say that in any case British law already conforms", IIC 2009, pp. 3-38.

Landes, William M. & Posner, Richard A: "The Economic Structure of Intellectual Property Law", The Belknap Press of Harvard University Press 2003.

Lee, Sang M. & Olson, David L.: "Convergenomics: Strategic Innovation in the Convergence Era", Ashgate Publishing Group 2010.

Legrand, Pierre: "How to Compare Now", Legal Studies 1996, p. 232-242.

Lemley, Mark A; Risch, Michael, Sichelman, Ted & Wagner, R. Polk: "Life After Bilski", Stanford Law Review 2011, pp. 1315-1347.

Lemley, Mark A. & Weiser, Phil: "Should Property Rules or Liability Rules Govern Information", Texas Law Review 2007, pp. 783-841, available at http://ssrn.com/abstract=977778.

Lemley, Mark A. : "The Myth of the Sole Inventor" (July 21, 2011). Stanford Public Law Working Paper No. 1856610. Available at SSRN: http://ssrn.com/abstract=1856610 or http://dx.doi.org/10.2139/ssrn.1856610.

Lévêque, François & Ménière, Yann: "The Economics of Patent and Copyright", The Berkeley Electronic Press 2004.

Liebowitz, Stan J. & Margolis, Stephen: "Winners Losers and Microsoft: Competition and Antitrust in High Technology", The Independent Institute 2001.

Litman, Jessica: "The Public Domain", Emory Law Journal 1990, pp. 965-1023.

Liu, Kung-Chung: "The Need and Justification for a General Competition-Oriented Compulsory Licensing Regime", IIC 2012, pp. 679-699.

Locke, John: "Second Treatise of Government", 1690.

Meier-Beck, Peter: "The Scope of Patent Protection. The Test for Determining Equivalence", IIC 2005, pp. 339-344.

## Bibliography


Merges, Robert P.:"Justifying Intellectual Property", Harvard University Press 2011.

Merges, Robert P. & Nelson, Richard R.: "On limiting or encouraging rivalry in technical progress: The effect of patent scope decisions", Journal of Economic Behaviour and Organization 1994, pp.1-24.

Mylly, Tuomas: "Intellectual Property and European Economic Constitutional Law,: The Trouble with Private Informational Power", IPR University Center 2009.

Mylly, Ulla-Maija: An Evolutionary Economics Perspective on Computer Program Interoperability and Copyright IIC, International Review of Intellectual Property and Competition Law, 3/2010, Volume 41, pp.284 – 315. *U-M. Mylly (2010 a)*.

Mylly, Ulla-Maija: "Harmonizing Copyright Rules for Computer Program Interface Protection", University of Louisville Law Review, vol. 48, No. 4, 2010, pp. 877-909. *U-M. Mylly (2010 b).*

Mylly; Ulla-Maija: "What ever happened to patent bargain? Prospect theory and software patentability", NIR, Nordisk Immateriellt Rättsskydd, 5/2011, pp. 444-470.

Mylly, Ulla-Maija: "Patents and Computer Program Interoperability in Europe; Are the Exceptions in Current Patent Laws and the Proposed Unitary Patent Protection Sufficient?", NIR, Nordisk Immateriellt Rättsskydd 4/2012, p. 375-402.

Nelson, Richard R. & Winter, Sydney G.: "An Evolutionary Theory of Economic Change", The Belknap Press of Harvard University Press 1982.

Peers, Steve: "The Constitutional Implications of the EU Patent", European Constitutional Law Review 2011, pp.229-266.

Pila, Justine: "Pluralism, Principles and Proportionality in Intellectual Property", Oxford Journal of Legal Studies 2013, pp. 1-20.

Pilat, D. & Lee, F. C.: "Productivity Growth in ICT-producing and ICT-using Industries: A Source of Growth Differentials in the OECD?", OECD Science, Technology and Industry Working Papers, 2001/04, OECD Publishing.

Posner, Richard R.: "Utilitarianism, Economics and Legal Theory", The Journal of Legal Studies 1979, pp. 103-140.

Radin, Margaret Jane: "Incomplete Commodification in the Computerized World", in Niva Elkin-Koren and Neil Weinstock Netanel (Eds.), The Commodification of Information, Kluwer Law International 2002, pp.3-22.

Ramello, Giovanni B.: "Intellectual Property and the Markets of Ideas", Liuc Papers n. 161, Serie Economia e Impresa, 39, suppl. a dicembre 2004, pp. 161-180.

Reichman, Jerome H. and Hasenzahl, Catherine: "Non-voluntary Licensing of Patented Inventions, Historical Perspective, Legal Framework under TRIPS, and an Overview of Practice in Canada and the USA", UNCTAD-ICTSD Project on IPRs and Sustainable Development 2003.

Ricketson, Sam: "The Copyright Term", IIC 1992, pp. 753-785.

Samuelson, Pamela: "Are Patents on Interfaces Impeding Interoperability?", Minnesota Law Review 2009, pp. 1946-2019.

Samuelson, Pamela: "Intellectual Property Arbitrage: How Foreign Rules Affect Domestic Protections", The University of Chicago Law Review, vol. 71 (2004), pp. 223-238.

Samuelson, Pamela, Davis, Randall, Kapor, Mitchell D., Reichman, J.H.: "A Manifesto Concerning the Legal Protection of Computer Programs", Columbia Law Review 1994, pp. 2308-2431.

Schumpeter, Joseph: "The Theory of Economic Development", Harvard University Press 1934.

Scotchmer, Suzanne: "Standing on the Shoulders of Giants: Cumulative Research and the Patent Law", The Journal of Economic Perspectives 1991, pp. 29-41.

Sell, Susan K.: "Private Power, Public Law, The Globalization of Intellectual Property Rights", Cambridge University Press 2003.

Senftleben, Martin: "Overprotection and Protection Overlaps in Intellectual Property Law – The Need for Horizontal Fair Use Defence, (April 16, 2010). THE STRUCTURE OF INTELLECTUAL PROPERTY LAW: CAN ONE SIZE FIT ALL?," A. Kur/V. Mizaras (eds.), Cheltenham: Edward Elgar Publishing 2011. Available at SSRN: http://ssrn.com/abstract=1597123.

Shapiro, Carl and Varian, Hal R.: "Information Rules, A Strategic guide to the Networked Economy", Harvard Business School Press 1999.

Singer, Margarete & Stauder, Dieter (Eds.): "The European Patent Convention, A Commentary," third edition, Sweet and Maxwell 2003.

Stauder, Dieter: "The History of Art. 69(1) EPC and Art. 8(3) Strasbourg Convention on the Extent of Patent Protection", IIC 1992 pp. 311-328.
Stenvik, Are: "Protection for Equivalents Under Patent Law – Theories and Practise", IIC 2001, pp. 1-20.
Sterckx, Sigrid: "The Ethics of Patenting – Uneasy Justifications" in Peter Drahos (Ed.), Death of Patents, Lawtext Publishing Limited and Queen Mary Intellectual Property Research Institute 2005, pp. 175-211.
Sterling, J.A.L.: "World Copyright Law", Sweet & Maxwell 1999.
Strandburg, Katherine J.: "Evolving Innovation Paradigms and the Global Intellectual Property Regime", Connecticut Law Review 2009, pp. 861-920.
Strowel, Alain: "Droit d'auteur and Copyright : Between History and Nature", in Brad Sherman and Alain Strowel (Eds.) Of Authors and Origins, Essays on Copyright Law, Clarendon Press 1994, pp. 235-253.
Teubner, Gunther: "Legal Irritants: Good Faith in British Law or How Unifying Law Ends Up in New Divergences", The Modern Law Review 1998, pp. 11-32.
Tuori, Kaarlo: "Oikeuden ratio ja voluntas" WSOYpro 2007.
UNCTAD-ICTSD: "Resource Book on TRIPS and Development", Cambridge University Press 2005.
Välimäki, Mikko: "The Rise of Open Source Licensing, A Challenge to the Use of Intellectual Property in the Software Industry", Turre Publishing 2005.
van Gerven, Walter: "Comparative law in the texture of communitarization of national laws and Europeanization of Community law", Judicial Review in European Union law 2000, pp. 433-445.
Varian, Hal R.: "Intermediate Microeconomics, A Modern Approach", W.W. Norton & Company 2003.
von Hippel, Eric: "Democratizing Innovation", The MIT Press 2005.
Weber, Steven: "The Political Economy of Open Source", in Robert Latham and Saskia Sassen (Eds.), Digital Formations, IT and New Architectures in the Global Realm, Princeton University Press 2005, pp. 178-212.
Weston, Ray D.: "A Comparative Analysis of the Doctrine of Equivalents: Can European Approaches Solve an American Dilemma", IDEA: The Journal of Law and Technology 1998, pp. 35-79.
Zweigert, Konrad and Kötz, Hein: "Introduction to Comparative Law", Clarendon Press 1998.

## Case law and administrative decisions

**EU**

*EU Court of Justice*

238/87 AB Volvo v Erik Veng (UK) Ltd [1988] ECR 6211.
Joined cases C-241/91 P and C-242/91 P RTE and ITP v Commission [1995] ECR 1-743 ("Magill").
C-418/01 IMS Health GmbH & Co. OHG v NDC Health GmbH & Co. KG [2004] ECR I-5039.
C-5/08, Infopaq International A/S v Danske Dagblades Forening [2009] ECR 16.
C-393/09 Bezpečnostní softwarová asociace – Svaz softwarové ochrany v. Ministerstvo kultury [2010] ECR I 0000.
C-406/10, SAS Institute Inc. v World Programming Ltd, Judgment of the Court (Grand Chamber) of 2 May 2012, nyr.
C-406/10, SAS Institute Inc. v World Programming Ltd, Opinion of the Advocate General, delivered on 29 November 2011.
C-128/11, UsedSoft GmbH v Oracle International Corp., 3 July 2012, nyr.
C-414/11 Daiichi Sankyo Co. Ltd., Sanofi-Aventis Deutschland GmbH v DEMO Anonimos Viomikhaniki kai Emporiki Etairia Farmakon, 18 July 2013, nyr.
Joined Cases C-274/11 and C-295/11 Kingdom of Spain (C-274/11), Italian Republic (C-295/11) v Council of the European Union.
C-146/13 Kingdom of Spain v European Parliament and Council of the European Union.
C-147/13 Kingdom of Spain v Council of the European Union.

The Opinion of the Court (Full Court) of 8 March 2011, Opinion delivered pursuant to Article 218(11) TFEU - Draft agreement - Creation of a unified patent litigation system - European and Community Patents Court - Compatibility of the draft agreement with the Treaties, Opinion 1/09 ECR [2011] I-01137.

*The General Court*

T-201/04 *Microsoft* Corp. v Commission [2007] ECR II-3601.

*Commission decisions*

Microsoft [2004] COMP/C-3/37.792.

*European Patent Office*

IBM/Computer program product T 1173/97 (1998).
Controlling pension benefits system/PBS PATRNERSHIP T 0931/95 (2000).
Hitachi/Auction method T 258/03 (2004).
EPO Opinion of the Enlarged Board of Appeal of 12 May 2010 G 0003/08.

**National Courts**

*Germany*

Düsseldorf Court of Appeals (Oberlandesgericht) 21.11.1991 Case No. 2 U 27/89, translated in IIC 6/1993, pp. 838-245.

*U.K.*

Improver Corporation v Remington Consumer Products Ltd [1990] FSR 181.
Kirin-Amgen Inc and others (Appellants) v. Hoechst Marion Roussel Limited and others (Respondents). Kirin-Amgen Inc and others (Respondents) v. Hoechst Marion Roussel Limited and others (Appellants) (Conjoined Appeals) [2004] UKHL 46.
Navitaire Inc. v Easyjet Airline Company and Bulletproof Technologies Inc., [2004] EWHC 1725 (Ch).

*U.S.*

Diamond v. Diehr 450 U.S. 175 (1981).
Whelan Assocs., Inc., v. Jaslow Dental Lab., Inc., 797 F.2d 1222 (3d Cir. 1986).
Atari Games Corporation v. Nintendo of America, Inc. 975 F.2d 832, (Fed. Cir 1992).
Computer Assocs. Int'l, Inc. v. Altai, Inc., 982 F.2d. 693, 706 (2d Cir. 1992).
Sega Enterprises Ltd. V. Accolade Inc, 977 F.2d 1510 (9th Cir. 1992).
State Street Bank & Trust v. Signature Financial Group 149 F.3d 1368 (Fed. Cir. 1998).
In re Alappat 33 F.3d 1526 (Fed. Cir. 1994) (en blanc).

Sony Computer Entertainment, Inc. v. Connectix Corporation 203 F.3d 596 (9th Cir. 2000).
Lexmark Int'l, Inc. v. Static Control Components, Inc., 387 F.3d 522 (6th Cir. 2004).
Bilski v. Kappos 130 S. Ct 3218 (2010).

## Other Official Materials

Agreement on Trade-Related Aspects of Intellectual Property Rights, The TRIPS Agreement, Annex 1C of the Marrakesh Agreement Establishing the World Trade Organization, signed in Marrakesh, Morocco on 15 April 1994.
Berne Convention for the Protection of Literary and Artistic Works of September 9, 1886, completed at PARIS on May 4, 1896, revised at BERLIN on November 13, 1908, completed at BERNE on March 20, 1914, revised at ROME on June 2, 1928, at BRUSSELS on June 26, 1948, at STOCKHOLM on July 14, 1967, and at PARIS on July 24, 1971, and amended on September 28, 1979.
Council Directive 93/98/EEC of 29 October 1993 Harmonizing the Term of Protection of Copyright and Certain Related Rights, 1993 O.J. (L 290) 9.
Council of the European Union, Draft Agreement on a Unified Patent Court and draft Statute.
Council Regulation (EU) No 1260/2012 of implementing enhanced cooperation in the area of the creation of unitary patent protection with regard to the applicable translation arrangements.
Declaration on TRIPS and Public Health, WTO Ministerial Conference , Fourth Session, Doha, 9-14 November 2001, WT/MTN(01)/DEC/W/2.
Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on Legal Protection of Databases, 1996 O.J. (L 77) 20.
Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonization of certain aspects of copyright and related rights in the information society (OJ 2001 L 167, p. 10).
Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the Legal Protection of Computer Programs (Codified version) 2009, O.J. (L 111) 16. The codified version contains the content of Council Directive 91/250/EEC of 14 May 1991 on the Legal Protection of Computer Programs as amended, 1991, O.J. (L 122) 42.
Final Report of the National Commission on New Technology Uses of Copyrighted Works (CONTU), Library of Congress, Washington D.C. July 31 1978.
Finnish Government Bill 2005/92 vp.
Office of Technology Assessment, United States Congress, Finding a Balance: Computer Software, Intellectual Property and Challenge of Technological Change 5 (1992).
Regulation (EU) No 1257/2012 of the European parliament and of the Council of implementing enhanced cooperation in the area of the creation of unitary patent protection.
Report from the Commission to the Council, the European Parliament and the Economic and Social Committee on the Implementation and Effects of Directive 91/250/EEC on the Legal Protection of Computer Programs, p. 10 COM (2000) 199 final (Oct. 4, 2000).
The Anti-Counterfeiting Trade Agreement (ACTA).
The Universal Copyright Convention, adopted at Geneva in 1952.
WIPO Advisory Group of Experts on the Protection of Computer Programs, Geneva, March 8-12 1971, Copyright 1971 pp. 35-40.
WIPO Copyright Treaty adopted in Geneva on December 20, 1996.
WIPO Group of Experts on the Copyright Aspects of the Protection of Computer Software, Geneva February 25 to March 1 1985; Copyright 1985, pp. 146-149.
WIPO Model Provisions on the Protection of Computer Software, Copyright 1978 pp. 6-19; Draft Treaty for the Protection of Computer Software Geneva June 13-17, 1983.

# Abbreviations

| | |
|---|---|
| ACTA | Anti-Counterfeiting Trade Agreement |
| AG | Advocate General |
| BGH | Bundesgerichtshof; The Federal Court of Justice (Germany) |
| BIOS | basic input-output system |
| BPAI | Board of Patent Appeal and Interferences (the USPTO) |
| CFI | Court of First Instance (EU) |
| Cir. | Circuit |
| CJEU | Court of Justice of the European Union |
| CPC | Community Patent Convention |
| DMCA | Digital Millenium Copyright Act |
| ed./eds. | editor/editors |
| EC | European Community |
| ECR | European Court Reports |
| EEC | European Economic Community |
| e.g. | for example |
| EPC | European Patent Convention |
| EPO | European Patent Office |
| ETSI | European Telecommunications Standards Institute |
| EU | European Union |
| EWHC | High Court of Justice of England and Wales |
| Fed. | Federal |
| GUI | graphical user interface |
| HE | hallituksen esitys; Government Bill (Finland) |
| ibid. | ibidem/in the same |
| id. | ibidem/in the same |
| i.e. | in other words |
| ICT | information and communication technology |
| IP | intellectual property |
| IPR | intellectual property rights |
| KKO | korkein oikeus; the Supreme Court (Finland) |
| KM | komiteanmietintö; Committee Report (Finland) |
| Loc. cit. | in the place cited |

| | |
|---|---|
| NJA | Nytt Juridiskt Arkiv |
| nyr | not yet reported |
| O.J. | Official Journal of the European Union |
| Op. cit. | in the work cited |
| pmbl. | preamble |
| SOU | Statens offentliga utretningar, government report series (Sweden) |
| TN | tekijänoikeusneuvosto, Copyright Council (Finland) |
| TFEU | Treaty on the Functioning of the European Union |
| TRIPS | Trade-Related Aspects of Intellectual Property Rights |
| U.K. | the United Kingdom |
| U.S. | the United States |
| U.S.C. | the U.S. code |
| USPTO | Patent and Trademark Office of the United States |
| WIPO | World Intellectual Property Organization |
| WTO | World Trade Organization |

Article 1

# Harmonizing Copyright Rules for Computer Program Interface Protection

Ulla-Maija Mylly

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# HARMONIZING COPYRIGHT RULES FOR COMPUTER PROGRAM INTERFACE PROTECTION

*Ulla-Maija Mylly*[*]

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# HARMONIZING COPYRIGHT RULES FOR COMPUTER PROGRAM INTERFACE PROTECTION

*Ulla-Maija Mylly*

## I. INTRODUCTION

Information and communication technologies (ICT) are essentially built on software. Computer program interoperability elements, or interfaces, in turn are the points of connection that enable a program to communicate with other programs and devices.[1] Consequently, the protection mechanism of these interoperability elements has an impact on the development possibilities of software and hardware components, which together form a workable ICT system. This article addresses the question of copyright protection of computer program interfaces. As software markets are international by their nature, and as interoperability plays an important role in building platforms for the global information society, one would expect these issues to have been harmonized internationally.

Both the World Intellectual Property Organization (WIPO) Copyright Treaty from 1996[2] and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organization[3] require that computer programs be protected as literary works under the Berne Convention.[4] As the World Trade Organization has more than 150 members, copyright protection of computer programs has become global.

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[1] See the definition of interfaces and interoperability in the European Union's Directive on the legal protection of computer programs: "The parts of the program which provide for such interconnection and interaction between elements of software and hardware are generally known as 'interfaces'. This functional interconnection and interaction is generally known as 'interoperability'; such interoperability can be defined as the ability to exchange information and mutually to use the information which has been exchanged." Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the Legal Protection of Computer Programs (Codified version), pmbl., 2009 O.J. (L 111) 16. The codified version contains the content of Council Directive 91/250/EEC of 14 May 1991 on the Legal Protection of Computer Programs as amended, 1991 O.J. (L 122) 42 [hereinafter Software Directive].

[2] World Intellectual Prop. Org., Copyright Treaty, art. 4, Dec. 20, 1996, 36 I.L.M 65 (1997), *available at* http://www.wipo.int/treaties/en/ip/wct/trtdocs_wo033.html#P56_5626.

[3] Agreement on Trade-Related Aspects of Intellectual Property Rights, art. 10, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 108 Stat. 4809, 869 U.N.T.S. 299.

[4] Berne Convention for the Protection of Literary and Artistic Works, Sept. 9, 1886, 102 Stat. 2853, 828 U.N.T.S. 221 (completed at Paris on May 4, 1896, revised at Berlin on Nov. 13, 1908, completed at Berne on Mar. 20, 1914, revised at Rome on June 2, 1928, at Brussels on June 26, 1948, at Stockholm on July 14, 1967, and at Paris on July 24, 1971, and amended on Sept. 28, 1979).

Yet the international instruments form a very general level of harmonization. They only require some minimum level of protection for computer programs. They do not in any way address directly the question of interface protection, thus leaving broad discretion for states to regulate this subject matter.

In the European Union, more detailed harmonization of computer program protection was deemed necessary to support the development of the computer program industry. The national-level differences were thought to impair the proper functioning of computer program markets.[5] Hence, the primary justifications for harmonization by means of the European Software Directive were related to economic and industrial policy goals.[6] The purpose of the Software Directive was to make the scope of copyright protection for computer programs uniform within Europe. Moreover, the Directive was meant to resolve the question of interoperability.

There are, however, obstacles in the harmonization of laws.[7] At the international level, globalization has arguably brought fragmentation and, consequently, fragmented laws.[8] This seems to be true even at the European level, notwithstanding the harmonization efforts.[9] The differences at the national level show that, notwithstanding the aims of European harmonization, national interpretations tend to follow their own historical trajectories. This necessitates an evolutionary understanding of a legal change. The legal traditions related to copyright protection seem to be strongly path-dependent. The path-dependence of a nation's legal system can be explained by, among other reasons, its links to the nation's technological, economic, and cultural heritage.[10]

Furthermore, the legal system has dependencies, such as the requirement of coherence within itself. Coherence is achieved in part through the application of general principles of law that have connections to the deeper justifications underlying legal culture.[11] The deeper layers of law—legal culture and the deep structure of law—are not changed quickly or easily.

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[5] *See* Software Directive, *supra* note 1, pmbl.

[6] *See* Software Directive, *supra* note 1.

[7] *See* Gunther Teubner, *Legal Irritants: Good Faith in British Law or How Unifying Law Ends up in New Divergences*, 61 MOD. L. REV 11, 13 (1998).

[8] *Id.*

[9] *Id.*

[10] *See generally* DOUGLASS C. NORTH, UNDERSTANDING THE PROCESS OF ECONOMIC CHANGE (2005). Moreover, legal paradigms are connected to the respective scientific paradigms. Accordingly, scientific paradigms influence legal paradigms, but change is slow. *Cf.* UGO MATTEI, COMPARATIVE LAW AND ECONOMICS 25 (1997) ("Legal paradigms have always been successful in direct proportion to their degree of correspondence with leading scientific paradigms.").

[11] Kaaro TUORI, OIKEUDEN RATIO JA VOLUNTAS 123–24 (2007).

When the European Software Directive was enacted, the concept of originality, having connections to justifications of copyright protection, was intended to mean something specific for computer programs. Thus, in Europe, originality should now mean one thing for computer programs and possibly something else for other protectable subject matters.[12] The implementation of the Software Directive in the member states could imply that the coherence and consistency of the national copyright systems were jeopardized. It is thus understandable that national copyright systems could reject such changes. Consequently, at the European level, harmonization has not been reached smoothly.

However, it should be asked: what level of consistency should there be, if any, between the protection of computer programs and other works subject to copyright protection? Computer programs are by their nature distinct from other literary and artistic works. Their main distinctive feature is their technological nature. Hence, their protection has an impact on technological development. Before copyright was internationally accepted for computer program protection, some legal scholars recommended sui generis protection for computer programs.[13] The current situation resembles sui generis protection to some extent as copyright rules have been tailored to fit specific characteristics of computer program protection. However, it seems that the general justifications of copyright law continue to affect interpretations of software copyright law, thus leading to differences in protection and argumentation patterns. To go further, effective harmonization of software copyright law would require—it appears—either convergence of the underlying justifications of copyright law in general or conscious efforts to develop separately the underlying justifications of software copyright.

This Article analyzes possible explanations for differing interpretations in Europe and whether it would be possible to find a common basis for computer program protection. As computer program interface protection is

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[12] The levels of originality for databases and photographs were harmonized later. Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on Legal Protection of Databases, 1996 O.J. (L 77) 20; Council Directive 93/98/EEC of 29 October 1993 Harmonizing the Term of Protection of Copyright and Certain Related Rights, 1993 O.J. (L 290) 9. However, in Infopaq International A/S v. Danske Dagblades Forening, the court surprisingly claimed that copyright originality is generally harmonized by Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the Harmonization of Certain Aspects of Copyright and Related Rights in the Information Society. Case C-5/08, Infopaq Int'l A/S v. Danske Dagblades Forening, 2009 E.C.R. I-6569, *available at* 2009 WL 2143676. The court's interpretation seems overreaching.

[13] *See generally* Pamela Samuelson, Randall Davis, Mitchell D. Kapor, & J.H. Reichman, *A Manifesto Concerning the Legal Protection of Computer Programs*, 94 COLUM. L. REV. 2308 (1994) (arguing that laws existing at that time were inadequate to preserve software innovation and investment).

an internationally important question, this Article compares European regulation and case law with United States regulation and case law. As software markets are global by their nature, nation-states face similar problems when, within the room left for them by international instruments, they enact laws protecting computer programs. Likewise, domestic courts confront closely similar disputes awaiting resolution. Legal discourse at the global level has made legal borrowing easier.[14] In some cases, the final results seem to resemble each other, but this does not indicate that the responses are similar in all respects.

Even though one can trace a functional equivalence between two different ways of resolving a problem, this does not suggest that these methods of resolution will lead to similar outcomes in all cases. Nor does it connote that the responses have a similar impact on the development of computer program technologies. Utilizing a comparative approach, this Article also endeavors to analyze how methods used in deciding the level of interface protection differ and how the differences could be related to diverse justification grounds. These methods comprise the originality requirement and the idea–expression dichotomy, both of which define the line between protectable and nonprotectable subject matter in computer programs.

This Article's first substantive section discusses differences in the underlying justifications of copyright protection. These deeper justifications of national copyright laws condition and direct changes at the surface level of the law. The aim of this section is to develop an understanding of copyright traditions, which enables questioning the rationality of these tradition's possible influence on computer program protection.

The second substantive section describes the special characteristics of computer program protection and the justifications for a specific treatment. The section endeavors to discern the grounding logic for computer program protection and evaluates possibilities for (re)defining the main justification.

The third section discusses the present scope of copyright protection for computer program interfaces in the European Union and in the United States. It elaborates on how the originality concept and idea–expression dichotomy are utilized when separating nonprotectable elements from protectable ones in computer programs. The section discusses the differences between these methods and their underlying problems. The final section draws conclusions and proposes ways to develop interpretations for computer program interface protection (or nonprotection).

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[14] *See* Teubner, *supra* note 7, at 16.

## II. JUSTIFICATIONS FOR COPYRIGHT PROTECTION IN A COMPARATIVE PERSPECTIVE

This section analyzes the general justification logics underlying copyright protection. As computer programs are protected by copyright, these logics also currently play a role in computer program protection. After this section, this Article endeavors to question the suitability of these justification logics for computer program protection and to develop another possible justification for this area of copyright law.

Davies has discerned four main justifications for copyright, namely: (1) natural law; (2) just reward for author; (3) incentive for creation; and (4) public interest.[15] Reward and incentive justifications are mostly economic by their nature, while natural law and public interest have a different justification logic.[16] The natural-law theories concentrate on the individual creator and the protection of his or her interests, while the public-interest rationale considers the wider interests of society. Natural-law justification could imply an unlimited copyright term.[17]

Natural-law justification argues that the rights of an author emerge from the nature of things.[18] Authors express their personality in their works.[19] Authors should have a property right in the fruits of their mental labor.[20] However, labor is not enough for the entitlement of copyright; there is a requirement of personality, or, in other words, originality.[21] In its extreme, the creative process has been mystified and creators have been considered geniuses who produce clearly original literary property. On the other end, every man's literary productions represent the author's personality and are distinctive from others' works.[22] Unique personalities and the ways writers express their ideas in a manner peculiar to themselves have also formed an important part of the German Romantic literary theory.[23]

As known in the Continental European copyright tradition, the moral rights of authors are best explained by the natural-law justification.

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[15] *See* GILLIAN DAVIES, COPYRIGHT AND THE PUBLIC INTEREST 13 (2d ed. 2002).
[16] *Id.* at 13-17.
[17] Sam Ricketson, *The Copyright Term*, 23 INT'L REV. INTELL. PROP. & COMPETITION L. 753, 754–55 (1992).
[18] DAVIES, *supra* note 15, at 13–15.
[19] *Id.*
[20] *Id.*
[21] MARK ROSE, AUTHORS AND OWNERS: THE INVENTION OF COPYRIGHT 114 (1994).
[22] *Id.* at 126-29.
[23] In this theory the form of expression becomes essential and is separated from the ideas and content of a work. Mark Rose, *The Author as Proprietor*: Donaldson v. Becket *and the Genealogy of Modern Authorship*, *in* OF AUTHORS AND ORIGINS: ESSAYS ON COPYRIGHT LAW 51-52 (Brad Sherman & Alain Strowel eds., 1994).

Accordingly, moral rights emphasize the personal ties between a creator and a work.[24] The most important moral rights include the author's right to attribution, integrity, and divulgation.[25] The right to attribution, also called the paternity right, is the author's right to have his or her name attached to his or her work.[26] The author also has the right to choose to publish works anonymously.[27] The right to integrity gives protection against unauthorized publication, and the divulgation right gives the author control over the form and timing of the publication.[28] Authors' moral rights cannot be assigned, as economic rights can.[29] They belong to the human being who initially created the work.[30] This feature of moral rights further emphasizes the ties between the creator and the work created.

Closely connected to the natural-law justification principle is the reward principle, as both of these can be traced back to John Locke's ideas.[31] The reward principle calls for just reward for the exploitation of authors' works. Under this principle, authors' economic rights become important.[32] The incentive principle, in turn, emphasizes the reward's instrumental side, using the reward as a stimulus for creativity.[33] Copyright protection is given for the purpose of granting incentives for authors to create new works.[34] This argument implies that without copyright protection there would be no works.[35] These two principles form the economic foundation for copyright protection. The difference between the two is that the reward principle concentrates on the author, while the incentive principle considers wider interests, such as cultural and technological development.

The fourth principle emphasizes the usefulness of copyright for the general public. This principle is stipulated even in the U.S. Constitution, which provides that "[t]he Congress shall have Power . . . [t]o promote the

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[24] Daniel Burkitt, *Copyrighting Culture–The History and Cultural Specificity of the Western Model of Copyright*, 2 INT'L PROP. Q. 146, 162 (2001).

[25] Ricketson, *supra* note 17, at 771.

[26] J.A.L. STERLING LL.B., WORLD COPYRIGHT LAW: PROTECTION OF AUTHORS' WORKS, PERFORMANCES, PHONOGRAMS, FILMS, VIDEO, BROADCASTS AND PUBLISHED EDITIONS IN NATIONAL, INTERNATIONAL AND REGIONAL LAW 282 (Sweet & Maxwell 1998).

[27] *Id.*

[28] *Id.* at 282-83.

[29] *Id.* at 281.

[30] *Id.* at 281-83.

[31] Natural-law justifications could be traced to Immanuel Kant's writings as well. *See, e.g.*, *id.* at 43.

[32] However, the reward principle does not suggest how the reward system is put into practice. It is not necessarily done through property rights, but the reward system could be implemented through some other means. Edwin C. Hettinger, *Justifying Intellectual Property*, *in* INTELLECTUAL PROPERTY 127 (Peter Drahos ed., 1999).

[33] DAVIES, *supra* note 15, at 15.

[34] *Id.*

[35] *Id.*

Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."[36] Hence, in the United States, the promotion of science is the primary justification for intellectual property rights. Moreover, exclusive rights are granted for limited time periods. This is because limitations on monopoly are deemed necessary. The public-interest principle further requires the dissemination of works.[37] Even though these four main justifications are interlinked with each other, and are present in the copyright systems of different nations, they are valued and emphasized differently.[38]

Nevertheless, it has been argued that there is a difference between justifications in civil-law and common-law countries. The claim is that the natural-law justification is a feature of the civil-law tradition, whereas the public interest and economic justifications belong more closely to the common-law tradition.[39] The common-law tradition is claimed to be more utilitarian: rights are given if they are useful for the general public.[40] This instrumentalism has been used to explain why economics has played a more important role in copyright cases in the United States than in civil-law countries.[41]

The picture is not, however, that straightforward. Natural-law justification has historically played an important role in England and the United States. Burkitt, however, articulates that the enactment of the U.S. Constitution and the Supreme Court's 1834 decision in *Wheaton v. Peters*[42] stressed the utilitarian nature of the U.S. copyright system and made public interest the dominant justification.[43] The public-interest justification also plays an important role in recent U.S. copyright case law. For example, in the 1991 *Feist* decision, the United States Supreme Court stated that "[t]he primary objective of copyright is not to reward the labor of authors, but 'to

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[36] U.S. CONST. art. I, § 8, cl. 8.

[37] DAVIES, *supra* note 15, at 16.

[38] *Id.* at 17. The presence of principles mentioned here may also be traced in human rights conventions. *E.g.*, Universal Declaration of Human Rights, G.A. Res. 217A, at 76, U.N.GAOR, 3d Sess., 1st plen. mtg., U.N. Doc. A/810 (Dec. 10, 1948), *available at* http://www.un-documents.net/a3r217.htm ("Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits. Everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.").

[39] Davies, *supra* note 13, at 17.

[40] PAUL GOLDSTEIN, INTERNATIONAL COPYRIGHT: PRINCIPLES, LAW, AND PRACTICE 3 (2001).

[41] But even in the United States, economics has played merely a role in computer program cases and in cases of first impression. Pamela Samuelson, *Economic and Constitutional Influences on Copyright Law in the United States,* 23 EUR. INTELL. PROP. REV. 409, 410 (2001).

[42] *See generally* Wheaton v. Peters, 33 U.S. (8 Pet.) 591 (1834).

[43] Burkitt, *supra* note 24, at 154–55.

promote the Progress of Science and useful Arts.' To this end copyright assures authors the right to their original expression, but encourages others to build freely upon the ideas and information conveyed by a work."[44] From the public-interest justification logic's point of view, the promotion of useful arts is the ultimate reason for granting copyright. Therefore, leaving ideas and information without protection for others to utilize and develop plays an important role in the United States. At the same time, this doctrine limits the monopoly power provided by copyright protection.

In England, the nature of copyright and the effect of the Statute of Queen Anne, 1710, were hotly discussed at that early date—the conflict was between the natural-law justification and the public-interest justification for copyright. In 1769, *Millar v. Taylor*,[45] the issue was decided in favor of the natural-law justification, and common-law copyright was declared to be perpetual, notwithstanding the statutory limitations provided by the Statute of Queen Anne.[46] This decision was, however, soon overturned in 1774 by *Donaldson v. Beckett*.[47] In this latter case, the court clarified that a copyright for published works was created by the Statute of Queen Anne, and there was no perpetual natural right for such works.[48] Hence, the limited rights for such works were created merely by legislation.[49]

In Germany, the primary justification for copyright has been natural law.[50] A work reflects its author's personality, therefore, works should be protected by property rights.[51] Most copyright norms in continental Europe have also been said to have their basis in natural law.[52] The natural-law justification is often claimed to stem historically from the French Revolution.[53] Even though there are doubts today whether the natural-law justification played such a significant role in the early days of the French authors' rights system, author-centrism has become a characteristic feature of the French legal culture through moral rights, which emphasize personal ties

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[44] Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., Inc., 499 U.S. 340, 349–50 (1991) (quoting U.S. CONST. art. I, § 8, cl. 8.).

[45] Millar v. Taylor, (1769) 98 Eng. Rep. 201 (K.B.).

[46] *Id.*

[47] Donaldson v. Beckett, (1774) 1 Eng. Rep. 837 (H.L.).

[48] *Id.*

[49] Alain Strowel, *Droit d'auteur and Copyright: Between History and Nature*, *in* OF AUTHORS AND ORIGINS: ESSAYS ON COPYRIGHT LAW 242, 242 (Brad Sherman & Alain Strowel eds., 1994).

[50] DAVIES, *supra* note 15, at 184.

[51] *Id.*

[52] GERHARD SCHRICKER, URHEBERRECHT: KOMMENTAR, 2., neubearbeitete Auflage, 7, C.H. Beck'sche Verlagsbuchhandlung 1999.

[53] *See* Burkitt, *supra* note 24, at 159.

between the author and the work.[54] Finland and Sweden share similarities with the German copyright tradition.[55] In Sweden, the term of copyright was unlimited, which showed a strong natural law rationale.[56]

The following section describes the initial reasons for the harmonization of computer program protection in Europe. Furthermore, the section discusses the role that traditional justification logics should play in protecting such functional, technical works as computer programs. The analysis also elaborates on why computer program interfaces are justifiably treated as a specific subject matter.

## III. JUSTIFICATIONS OF COPYRIGHT PROTECTION FOR COMPUTER PROGRAMS IN THE EUROPEAN UNION

Computer programs differ from other copyrightable subject matter in the sense that the text is not most important, instead the functions created by means of literal expression—by computer program code—are most important. Computer programs are functional works by their nature and belong in the area of technology. Moreover, computer program creation is far from the mystified process of artistic creation where geniuses create something out of nothing.[57] In fact, computer programmers employ a wide library of ready-made modules. Specifically, computer program creation is greatly limited due to technological requirements.

Moreover, computer programs are a specific type of technology characterized by cumulative development. Cumulative development denotes that technological advances follow earlier advances and build upon them; the knowledge accumulates on earlier knowledge. Most innovations within the software industry are cumulative by nature.[58] Software can also be characterized as a system product. A system product integrates several components which must work together in order for a desired output to take place. Hence, interoperability is an essential feature in such products.[59] Consequently, computer program interfaces are in a key position within

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[54] *Id.* at 158-62.

[55] *See* T.M. KIVIMÄKI, TEKIJÄNOIKEUS 68 (Werner Söderström Osakeyhtiö 1948) (discussing the essence of work and citing German legal literature broadly).

[56] *Id.* at 47.

[57] Also, in other areas of creative activity it is now more widely acknowledged that creativity is, to a great extent, a social phenomenon, and every work builds on already existing materials and works. *See, e.g.*, Hettinger, *supra* note 32, at 124.

[58] Samuelson et al., *supra* note 13, at 2331-32.

[59] Richard N. Langlois, *Technological Standards, Innovation, and Essential Facilities: Toward a Schumpeterian Post-Chicago Approach*, *in* DYNAMIC COMPETITION AND PUBLIC POLICY: TECHNOLOGY, INNOVATION, AND ANTITRUST ISSUES 193, 209 (Jerry Ellig ed., 2001).

computer program technologies. They may form bottlenecks for future development of relevant technologies. These unique features must be taken into consideration when analyzing the protection of computer programs.

In the European Union the reasons for the harmonization of copyright protection of computer programs were economic by their nature. The concern was that differences in the protection would have a negative influence on the software markets within the European Union.[60] It was also emphasized that computer programs are vital for the industrial development of the European Union.[61] These concerns in the Software Directive's preamble show emphasis on the economic rationale of copyright. This might indicate that one aim of the Directive was to make the utilitarian approach prevalent in this area of copyright law.[62] First, in the Directive there is no sign of natural-law justification. For example, the rights granted for the programmer include only economic rights. Moral rights are not mentioned in the Directive. This implies that natural-law justification has limited significance with regard to computer programs. In practice, moral rights have had a limited role in computer program protection, even in countries where they are otherwise emphasized. For example, the original creator of a computer program is rarely mentioned in a program copy. Additionally, if computer programs are created under an employment agreement, the ensuing rights are directly transferred to the employer in accordance with the Directive. This also implies that ties between the creator and a work are diminished.

The aim of the European Software Directive was to protect computer programs by copyright in every member state. Moreover, both the threshold for obtaining protection and the scope of protection were intended to become uniform.[63] In most member states the threshold of originality had to be lowered: the high threshold applied in some member states was no longer permitted.[64] This change connoted that, in the aggregate, the scope of protectable subject matter under copyright became broader in Europe. In

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[60] Software Directive, *supra* note 1, pmbl.

[61] *Id.*

[62] For a similar line of reasoning relating to Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the Harmonization of Certain Aspects of Copyright and Related Rights in the Information Society, see Kamiel J. Koelman, *Copyright Law & Economics in the EU Copyright Directive: Is the Droit d'Auteur Passé?*, 35 INT'L REV. INTELL. PROP. & COMPETITION L. 603, 603-06 (2004).

[63] Software Directive, *supra* note 1, pmbl. The harmonization of copyright laws within the European Union has been targeted initially for only those matters that were seen vital to European competitiveness. GUY TRITTON, INTELLECTUAL PROPERTY IN EUROPE 487 (3d ed. 2008).

[64] *Report from the Commission to the Council, the European Parliament and the Economic and Social Committee on the Implementation and Effects of Directive 91/250/EEC on the Legal Protection of Computer Programs*, at 6, 8, COM (2000) 199 final (Oct. 4, 2000).

the United States, originality is currently a threshold criterion for copyright eligibility. There, too, the originality test is fairly easy to reach, even though it today differs upwards from the traditional common law originality.

Generally, however, copyright is considered a weaker protection than patent.[65] When the Directive on copyright protection for computer programs was being prepared in Europe, the possibilities to strike a balance between competition and fair protection through copyright protection were taken into account.[66] Also, in Finland, when the legislative act on copyright protection for computer programs was considered, copyright protection was, on the one hand, thought to be flexible enough to allow competition in the software markets while on the other hand, thought to provide sufficient incentives for the development of computer programs.[67] The idea–expression dichotomy was thought to serve this end.[68] Additionally, competition aspects were taken into account in the Directive's interoperability exceptions.[69]

If the economic justification logic mentioned in the preamble to the Software Directive is followed, one should notice that different strands of economic thought hold a different view on innovations and what is necessary for such development. Under the prospect theory—which belongs to the mainstream (neoclassical) economics—broad intellectual property rights are deemed necessary for sufficient incentives to exist and development to take place.[70] In European harmonization, economic arguments are often used single-sidedly to justify stronger protection.[71] Thus, harmonization has generally meant more protection.[72]

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[65] This could provide a good basis for copyright to enable technological development. However, Lemley has recognized that, in fact, the copyright doctrine does not have sufficient mechanisms for providing incentives for those who have improved copyrighted works. Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 TEX. L. REV. 989, 1013, 1076-77 (1997).

[66] TRITTON, *supra* note 63, at 490.

[67] Government Bill HE 161/1990, at 16-17. The Finnish legislation is based on the above-mentioned European Directive, but Finland implemented the Directive before its accession to the European Union (European Community at that time).

[68] *Id.*

[69] These exceptions are analyzed in Ulla-Maija Mylly, *An Evolutionary Economics Perspective on Computer Program Interoperability and Copyright*, 49 INT'L REV. INTELL. PROP. & COMPETITION L 284 (2010) .

[70] *See* Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265, 266 (1977).

[71] In fact, even in discussions concerning natural-law theories and intellectual-property rights, there is normally one angle that dominates the discussion while other angles are rarely discussed. For example, Locke required that after acquisition of property rights, there should be enough left for commons. Hettinger, *supra* note 32, at 36–37. However, the use of natural-law theories normally relates to arguing for stronger property rights. *See* Hettinger, *supra* note 32, at 129–31 (discussing the conditions Locke set for property rights and interpretations of these conditions for intellectual property).

[72] TRITTON, *supra* note 63, at 488.

In evolutionary economics, narrow intellectual-property protection is recommended in situations where an intellectual-property holder of a key element could control the development of a variety of systems. Evolutionary economics recommends diversified competition so that technological changes can take place.[73] There should be a multiplicity of firms trying alternative ways of doing things in order for new technological paradigms to emerge.[74] Because computer program interfaces may become bottlenecks for the development of information and communication technologies, the concern should be taken seriously. Considering the aims of the Software Directive, this kind of justification seems to constitute at least one part of a computer program copyright system. Copyright is assumed to provide flexible protection while at the same time enabling competition within the industry. Therefore, this line of justification could form an important part of copyright protection for computer programs. The following section analyzes the current scope of protection for computer program interfaces and its possible problems.

## IV. SCOPE OF COPYRIGHT PROTECTION FOR COMPUTER PROGRAM INTERFACES

There are no specific rules regarding the eligibility of computer program interfaces for copyright protection; instead, general copyright requirements for computer programs need to be applied. Originality thus becomes an essential concept in defining which interfaces receive protection. Hence, because requirements for interface protection have been lowered in the European Union, the scope of protection may become broader.

There are, however, rules and doctrines other than the originality test that also define the scope of protection for interoperability elements, namely, the idea–expression dichotomy. The Software Directive explicitly refers to the idea–expression dichotomy in relation to interface protection. The Directive provides that "[i]deas and principles which underlie any element of a computer program, including those which underlie its interfaces, are not protected by copyright under this Directive."[75] It is therefore this Article that should be looked at more closely for interface protection. In the United States, the idea–expression dichotomy has also been utilized when leaving

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[73] Robert P. Merges & Richard R. Nelson, *On Limiting or Encouraging Rivalry in Technical Progress: The Effect of Patent Scope Decisions*, 25 J. ECON. BEHAV. & ORG., 1, 5-6, 20-21 (1994).

[74] Giovanni Dosi, *Technological Paradigms and Technological Trajectories: A Suggested Interpretation of the Determinants and Directions of Technical Change*, 11 RES. POL'Y 147, 157 (1982).

[75] Software Directive, *supra* note 1, art. 1.2.

computer program interfaces without protection.[76] In the case of computer programs, "principles" could be understood as referring to programming principles and rules. Ideas and principles cannot receive protection, and thus there are many elements within computer programs that do not merit protection.

If a work is sufficiently original, others are not entitled to make copies of the work (or at least the original parts of the work). By its relatively low standard for originality, copyright gives incentives for the creation of new computer programs. However, it is still possible that certain elements within a copyrighted work can be utilized by others. The elements that represent the idea of a work belong to the public domain. Thus, the scope of protection is narrowed by preventing monopoly rights for those ideas and principles behind a computer program. This enables competition within the industry. The concept of originality and idea–expression dichotomy can be seen as linked to each other. When the threshold for protection is low, i.e., protection is given easily, the scope of protection should normally be narrow. For example, in the United States, before *Feist*,[77] when functional works qualified more easily for protection, the copyright protection for those works was thin.[78] This connotes that if copyright protection is easily achievable, the idea–expression dichotomy should be utilized in preventing strong monopoly rights and in enabling competition. Moreover, exceptions enabling access to interoperability information can be seen as securing an arena for a multiplicity of firms to operate within the software markets and provide a variety of products.[79] The following section more closely analyzes the European and the U.S. legislation and their interpretations in the case law.

### *A. Originality*

The TRIPS Agreement requires that computer programs be protected as literary works under the Berne Convention.[80] The protection covers both source code and object code.[81] The TRIPS Agreement does not itself describe other requirements for protection.[82] The WIPO Copyright Treaty

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[76] In this Article, even though it would be occasionally more correct to refer to principles, for example, when discussing the nonprotection of some computer program elements, the concept of ideas and the idea–expression dichotomy will, for the sake of simplicity, be used.

[77] Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., Inc., 499 U.S. 340 (1991).

[78] Jane C. Ginsburg, *Creation and Commercial Value: Copyright Protection of Works of Information*, 90 COLUM. L. REV. 1865, 1876-77 (1990).

[79] These exceptions are discussed in Mylly, *supra* note 69.

[80] TRIPS Agreement, *supra* note 3, art. 10.

[81] *Id.*

[82] *See id.*

has a similarly general approach to the issue.[83] The Berne Convention requires that literary and artistic "works" be protected, but the text does not define the term.[84] In the Convention text, the term "original work" is used but the context only refers to a situation where original works are distinguished from copied works.[85] In the Convention, the term "intellectual creations" is applied, and this has been interpreted in many national laws to mean that works must possess some creativity.[86] Consequently, at the international level the harmonization of the threshold for protection is very general.[87]

The Software Directive provides that "[a] computer program shall be protected if it is original in the sense that it is the author's own intellectual creation. No other criteria shall be applied to determine its eligibility for protection."[88] Before the Software Directive, the criteria for obtaining copyright protection was very low in England where sufficient "skill and labor" was enough for copyright protection.[89] The originality requirement of common-law countries referred only to a condition stating that the work needs to originate from the author and cannot be copied from another.[90]

At the other end of the spectrum was Germany, where a very strict criterion was applied. To receive protection, a solution in a computer program needed to be clearly above the average programmer's solution.[91] The initial application area for the high creativity standard in Germany was applied art.[92] The justification for a higher criterion was that design protection was additionally available.[93] If copyright protection was not reached, the works were protected by design right.[94] However, this higher creativity criterion started to spread into other copyrighted works, and the

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[83] WIPO Copyright Treaty, *supra* note 2, art. 4.

[84] Berne Convention, *supra* note 4.

[85] *Id.*

[86] WORLD INTELLECTUAL PROP. ORG., GUIDE TO THE BERNE CONVENTION FOR THE PROTECTION OF LITERARY AND ARTISTIC WORKS (PARIS ACT 1971) 17 (1978).

[87] International human rights conventions do not set minimum requirements for protection nor do they indicate that protection of an author's right should take place through an intellectual property regime. Tuomas Mylly, *Intellectual Property and Fundamental Rights: Do They Interoperate?*, *in* INTELLECTUAL PROPERTY BEYOND RIGHTS, 185, 199 (Niklas Bruun ed., 2005).

[88] Software Directive, *supra* note 1, art. 1.3.

[89] MARJUT SALOKANNEL, OWNWERSHIP OF RIGHTS IN AUDIOVISUAL PRODUCTIONS: A COMPARATIVE STUDY 43-44, 63 (1997).

[90] TRITTON, *supra* note 63, at 489.

[91] Gerhard Schricker, *Farewell to the "Level of Creativity" (Schopfungshohe) in German Copyright Law?*, 26 INT'L REV. INTELL. PROP. & COMPETITION L 41, 41-44 (1995).

[92] *Id.*

[93] *Id.*

[94] *Id.*

strictest standard was used in relation to computer programs.[95] The German requirement of a "level of creativity" also spread to the Nordic countries.[96] This history of the "level of creativity" in Germany demonstrates the difficulties in having different originality standards for different classes of copyrightable works. The legal system aims at achieving consistency by applying the "level of creativity" standard in a similar way to every situation.

Even though the aim of the Software Directive was to reach a compromise between German and English approaches, some authors were skeptical about whether one uniform criterion could be achieved in Europe.[97] Legal concepts are tightly linked to legal traditions.[98] In copyright tradition, the concept of originality has historically been tightly connected to the author's personality and thus to the natural-law justification.[99] If the historical background of a norm or concept is not recognized, the past is given more power over current interpretations.[100] As already stated, the respective weights of different copyright justifications vary from one country to another. This impacts how the originality concept is construed in a country. Consequently, changing the originality concept is a difficult task. However, the Directive's aim was to harmonize originality. Yet this cannot be efficiently accomplished without the harmonization of the underlying justifications and disparate legal traditions.

The intention was only to harmonize the originality criterion for computer programs and to keep the old originality criterion valid at that moment for other copyrighted works.[101] When the legal system, or more narrowly the copyright regulation, within a country is interpreted from the perspective of coherence, it becomes obvious that it is difficult to change the concept of originality to mean one thing for computer programs and something else for other types of works.[102] This does not change the fact that literary works, the category to which computer programs belong, have easily qualified for copyright protection when it has possibly been more difficult for other types of works. This connotes that the nature of a work influences the

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[95] *Id.*

[96] PIRKKO-LIISA HAARMANN, TEKIJÄNOIKEUS JA LÄHIOIKEUDET 62 (2006).

[97] Gunnar W.G. Karnell, *European Originality: A Copyright Chimera*, 42 SCANDINAVIAN STUD. IN L., 73, 74 (2002), *available at* http://www.scandinavianlaw.se/pdf/42-5.pdf.

[98] BRAD SHERMAN & LIONEL BENTLEY, THE MAKING OF MODERN INTELLECTUAL PROPERTY LAW 2 (1999).

[99] ROSE, *supra* note 17, at 114.

[100] SHERMAN & BENTLY, *supra* note 98, at 2.

[101] The European Software Directive actually contains some elements of sui generis protection, as copyright rules designed for computer programs differ from other classes of works in many respects.

[102] *See* Schricker, *supra* note 91, at 46 (arguing that the principle of equal treatment of all categories of work would require use of a similar criterion).

protection to some extent. Originality is judged in the context of what is original in the respective art form.[103] However, the concept of originality and how it is construed also impacts what is required for protection.

The new criterion of the Software Directive called for lowering the requirements for protection in twelve member states and lifting the requirements in the remaining three member states at the time.[104] Germany has explicitly incorporated the new originality definition in its statutory law.[105] Its case law has also been said to be in line with the new standard.[106] The case referred to in this context is the "Accounting Program" (*Buchhaltungsprogramm*) case,[107] which has been said to confirm the new, lower originality standard incorporated in law.[108] However, in this case the Federal Court of Justice actually stated only that less strict criteria than before should be used when analyzing the threshold for protection.[109] Lower courts had already confirmed that the computer program in question received copyright protection, even though they had applied the old, higher criteria.[110] Therefore, the Account Program case did not demonstrate how German courts would apply the new criteria, even though it made evident that the new criterion is duly recognized.[111] In a later court case, the court stated that complex software is assumed to be original enough unless proved to be banal or to have been created by borrowing from other programmers.[112] At least this case indicates a clear lowering of the earlier standard.

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[103] *See* Per Jonas Nordell, *The Notion of Originality–Redundant or Not?* 42 SCANDINAVIAN STUD. L. 97, 103 (2002) (discussing how originality is dependent on the type of work), *available at* http://www.scandinavianlaw.se/pdf/42-7.pdf. *But see id.* at 100 (arguing that lower originality for some types of works has an impact on the originality for other works).

[104] Software Directive, *supra* note 1.

[105] *Report from the Commission to the Council*, *supra* note 57, at 8.

[106] *Id.*

[107] Bundesgerichtshof [BGH] [Federal Court of Justice] July 14, 1993, Case No. I ZR 47/91, "Accounting Program," (Buchhaltungsprogram) (Ger.) *translated in* 26 INT'L REV. INTELL. PROP. & COMPETITION L. 127 (1995) [hereinafter *Accounting Program*].

[108] *See, e.g.*, Andreas Raubenheimer, *Implementation of the EC Software Directive in Germany–Special Provisions for Protection of Computer Programs,* 27 INT'L REV. INTELL. PROP. & COMPETITION L 609, 617–18 (1996).

[109] *Accounting Program*, *supra* note 107, at 127.

[110] *Id.*

[111] *See also* Michael Lehmann, Case Comment, *Germany: "Accounting Program" (Buchhaltungsprogram)*, 26 INT'L REV. INTELL. PROP. & COMPETITION L. 127, 133–34 (1995) (commenting that the case was only the "first step in the right direction"). He also proposed that in the future there should be a two-stage examination considering whether a program is one's "own intellectual creation," i.e., not plagiarized, and whether it exhibits some modest individuality. *Id.* at 133.

[112] Übertratung von Nutzungsrechten an Computerprogram nach Insolvenz, Bundesgerichtshof [BGH][Federal Court of Justice], Mar. 3, 2005, Oberlandesgericht Hamm [OLG Hamm] I ZR 111/02 (Fash 2000), GRUR 860-863 (2005).

In England, the originality requirement has not been incorporated into the law, even though the requirement of "skill and labor" differs fundamentally from the concept in the Software Directive. This negligence in incorporation was feared to result in too broad a protection for computer programs in England.[113] The new requirement imposed by the Directive means not only efforts, but also some personal and intellectual contribution.[114] In a recent English case, there was a question as to whether the command code names used in the user interface were eligible for copyright protection.[115] The claim was based on non-literal copying of the source code of the computer program.[116] The court did not discuss the new originality criterion required by the Software Directive, but used sufficient skill and labor as a threshold criterion.[117] However, these elements of the computer program were not even protectable as literary works under this lower criterion.[118] The reasoning of the case indicates that the originality criterion required by the Software Directive is not applied by courts in England.[119]

In Finland, the new originality standard called for lowering the threshold of protection as traditionally interpreted. However, when the requirements of the Software Directive were implemented, the legislation was not changed. The interpretation adopted was that the Finnish legislation was already in compliance with the Directive. The Government Bill stated that the purpose of the Directive is to assure that a similar originality criterion is applied to computer programs as is applied to other works. Hence, it would not be possible to set a higher threshold criterion for computer programs than for other works.[120]

There is no express incorporation of the originality criterion in the Finnish Copyright Act. The Copyright Act only provides that copyright protection will be given to a person who has created a literary or artistic

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[113] *Report from the Commission to the Council*, *supra* note 57, at 10. *See also* Davies, *supra* note 15, at 345-46 (observing that before the harmonization through copyright directives civil-law countries other than Germany provided a middle-ground in respect to the originality criterion).

[114] 22 HUGH LADDIE ET AL., THE MODERN LAW OF COPYRIGHT AND DESIGNS 1615 (3d ed., Butterworths 2000).

[115] Navitaire Inc. v. Easyjet Airline Company Bulletproof Technologies Inc., [2004] EWHC 1725 (Ch), § 3.

[116] *Id.* § 47.

[117] *Id.* § 78.

[118] *Id.* § 80.

[119] However, it is not very clear whether the command names were analyzed as part of a computer program or as some other class of literary work. As different literary works obtain copyright protection by different threshold criterion, it would be reasonable to make a clear distinction between different classes of works. The case shows the difficulties which arise when only some aspects of copyright laws are harmonized.

[120] Government Bill HE 211/1992, at 3.

work. The words "created" and "work" have traditionally been interpreted as requiring that a copyrighted work is the result of creative and original input.[121] The situation in Sweden is, in this respect, very similar to that in Finland. The Swedish Copyright Act provides a similar provision for copyright eligibility, and its interpretation has corresponded with the Finnish interpretations.[122]

As the laws in Finland and Sweden do not include a specific originality standard, it is possible to take the Directive's requirements into account in case law. However, it is a clear misunderstanding in the Finnish Government Bill that no change in the originality requirement was required. In academic literature, it has been interpreted that originality in the Software Directive referred to "common law" originality.[123] In Swedish academic literature, the originality requirement has been understood to mean that the traditional work threshold or the level of creativity (*verkshöjd*) was no longer allowed.[124] However, the purpose of the Directive was also to lift the standard in common-law countries. The new harmonized criterion was intended to be a compromise between the different criteria applied in Europe. Hence, the aim was not to lower the Finnish or Swedish threshold criteria to correspond with the traditional common-law level, nor to keep the traditional test.

In one Finnish Supreme Court case, the appellate court declared that off-the-shelf software have traditionally passed the "level of creativity" requirement and been copyrightable.[125] The court neither referred to the Software Directive's originality requirement nor analyzed the originality requirement in a more detailed manner, but took for granted that the programs were protectable (this issue was not under dispute at the Supreme Court level).[126]

There have been some cases at the appellate court level in Finland after the implementation of the Software Directive in which the originality requirement played a bigger role. In a case from the Vaasa Court of Appeal, decided in May 2005, the court began its analysis by specifically referring to the originality requirement of the Software Directive.[127] Then the court

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[121] Government Bill HE 161/1990, at 50; Committee Report KM 8/1987, at 177.

[122] *See, e.g.*, Statens offentliga Utredningar [SOU] 1956:25 [government report series] (Swed.).

[123] HAARMANN, *supra* note 96, at 62.

[124] MOGENS KOKTVEDGAARD & MARIANNE LEVIN, LÄROBOK I IMMATERIALRÄTT 82, Norsteds juridik (2004). *See also* HAARMANN, *supra* note 96, at 62 (Finland).

[125] KKO 2003:88.

[126] *Id.* The Swedish Supreme Court has also taken the approach that computer program games which are sold at the market are presumed to be copyright protected. NJA 2000:87.

[127] Vaasa [Court of Appeal] May 17, 2005, R 03/1245, § 28.

reasoned that originality is manifested in the programmer's selections between alternative programming solutions.[128] Therefore, if there is only one programming solution available, then the program does not exhibit originality.[129] Copyright protection is given neither to trivial programs, consisting of a series of self-evident procedures for a person skilled in the art, nor to commonly used solutions.[130] The court also stated that a commonly used criterion for originality is that no one else is independently able to reach a similar solution.[131] Thus, for originality, it is not enough that a program is independently created, but it also has to exhibit the programmer's personal creativity in solving programming tasks in a manner that justifies giving an exclusive right.[132] This was seen to correspond with the general aim of giving protection to original programs without unnecessarily restricting functional and efficient competition.[133]

In this case, the court concluded that the differences in programmers' solutions related to unimportant details.[134] In this programming environment there was no room (regarding certain functions) for a programmer to independently create an original program. Therefore, the programs could not be original creations,[135] and the possibility of achieving an independent and original programming solution was very restricted. The essential functional parts of the alternative solutions in the analyzed programs were similar, and these factors were determined from the programming task.[136] The court concluded that neither the programs nor their parts were protected as original computer programs.[137] It did not matter how much time and resources were invested in their creation.[138] The Finnish Copyright Council, which provides recommendations and guidance

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[128] *Id.* § 30.
[129] *Id.*
[130] *Id. See also* Committee Report KM 8/1987, at 177.
[131] Vaasa [Court of Appeal] May 17, 2005, R 03/1245, § 28.
[132] *Id.* at § 29.
[133] *Id.*
[134] Some parts of the program were essentially built on MicroScada's (a third party program's) source code with minor changes, such as alarm delay. *Id.* § 31.
[135] The reasons for this were that the MicroScada application developer used the programming language SCII; it required data transfer between the monitoring application and substations; and the monitoring application, as a part of waterworks process and for the simplicity of steered equipment, among others, required certain technological solutions. These technological solutions enabled receiving information, monitoring, controlling, and managing processes in waterworks. *Id.* §§ 31–32.
[136] *Id.*
[137] *Id.*
[138] *Id.*

on copyright issues, had in its earlier decision assessed that the programs were eligible for copyright protection.[139]

The requirement of originality, based on the criterion that no one else should be independently able to reach a similar solution, had been criticized in academic discussion in Europe even before the creation of the Software Directive.[140] But more importantly, this use of the originality concept by the Finnish Appellate Court and the Copyright Council[141] does not follow the Software Directive's aim to lower the Finnish originality requirement.[142] Indeed, the criterion used in Finland seems to be even higher than the standard used in Germany before the implementation of the Software Directive. In Germany, a programming solution only needed to be above an average programmer's solution to obtain protection. Moreover, if two programmers have to create a program for a simple function, it is probable that they end up with similar or nearly similar solutions.[143] This connotes that independent double-creation is more probable in the case of computer programs than with some other classes of works. Therefore, the requirement that no one else could reach a similar solution is not a functional criterion in terms of computer programs, even though it might work with other types of copyrightable subject matter. This kind of threshold for protection requires

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[139] TN 2003:10. The expert used by the Copyright Council reasoned that the programming task required hours or days of work. *Id.*

[140] *See, e.g.*, HAARMANN, *supra* note 96, at 63; MARIANNE LEVIN, FORMSKYDD 298 (1984) (discussing the consequences of using this high standard in applied art); Schricker, *supra* note 83, at 46 (Even though German courts use the strict criterion, the explanatory report of the German Copyright Act of 1965 explicitly rejects the requirement of "creation of individual character.").

[141] There are also some cases from the Finnish Copyright Council where this problematic originality test has been used. In one older advisory opinion of the Copyright Council, the question was whether a new addition (module) to an existing computer program was original enough to be entitled to copyright protection. TN 1996:3. The Council expressed that the programming solution was reached mostly with the assistance of a manual and by using the properties of a computer program. *Id.* The selection of fields and their specifications "did not show such creativity and originality that no one else would be able to reach the same solution by using the same computer program for resolving a similar problem." The programming solution was mostly dictated by the end result of the program and thus showed merely a mechanical resolution of the problem. *Id.* Protection was not granted. *Id.* Furthermore, the Copyright Council has utilized the problematic criterion in other computer program protection cases. *See, e.g.*, TN 2005:7; TN 2003:10. In TN 2005:7, a party explicitly asked whether for originality it is enough that a program originates from an author, and how the work threshold is to be understood in the case of computer programs. TN 2005:7. The Council referred to the Software Directive's criterion, but it nevertheless used the above-mentioned problematic criterion that if no one else is able to reach a similar solution, the work qualifies for protection. *Id.* It thus seems that the Finnish Copyright Council, in its way of reasoning cases, has not fully recognized the Directive's purpose to lower the originality standard. Notwithstanding the reasoning, it seems that protection is given fairly easily.

[142] *But see* Karnell, *supra* note 97, at 79–80 (arguing that the criterion of independent double creation would still be allowed notwithstanding the new originality requirement). This would mean that if two works are similar, there is no original creation and no copyright protection.

[143] DIANE ROWLAND & ELIZABETH MACDONALD, INFORMATION TECHNOLOGY LAW 29 (2d ed. 2000).

very high individuality and resembles natural-law tradition. However, not even in France is it presently required that computer programs have an imprint of the author's personality.[144]

The Finnish court's concern in the May 2005 case was to protect original expression without unduly restricting competition.[145] There were many factors that arguably justified, from a competition viewpoint, a refusal to grant copyright protection. Extrinsic factors limited the availability of different programming solutions, some of which can be defined as interoperability requirements. Two such factors were the simplicity of steered equipment and the requirement of data transfer between substations and monitoring applications. However, the aims of the Software Directive were to lower the originality standard and to bring computer programs widely under copyright protection. This was thought to foster the development of the software industry.

The Software Directive recognizes that, in addition to the originality threshold, the idea–expression dichotomy demarcates the protectable from the nonprotectable. The elements in the May 2005 case that did not qualify for copyright protection under the originality criterion could have been excluded from protection by using the idea–expression dichotomy. It is actually this doctrine, stated in the preparatory materials for the Finnish Copyright Act, that enables flexible protection for computer programs without necessarily restricting competition.[146]

In the May 2005 case, it would have been possible to state that some features of the analyzed computer programs were due to extrinsic factors and thus merely an expression of the underlying ideas or principles. There were also factors which indicated that the programs had been created independently.[147] Under these circumstances it would still have been possible to conclude that there was no copyright infringement even though the court had decided that the analyzed programs were copyrightable in their entirety under the originality criterion. The final result would have provided a narrow scope of protection, more closely following the harmonized originality criterion in which personality should no longer play a role. This conclusion would also have allowed for the existence of competing programs with similar functionality.

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[144] STERLING, *supra* note 26, at 47 (explaining that in France, the requirement that a work must reflect an author's personality has been abandoned as a threshold criterion for computer programs).

[145] *See* Vaasa [Court of Appeal] May 17, 2005, R 03/1245, §§ 28-30.

[146] Government Bill HE 161/1990, at 16-17.

[147] *See* Vaasa [Court of Appeal] May 17, 2005, R 03/1245.

There is another case from the Helsinki Court of Appeal, decided in June 2006, with closely similar facts.[148] In this case, too, the question was whether, in the given programming environment, there was enough room for a programmer to create an original program. The function of the program was to connect the operations of different parts of a manufacturing line for bakery products and to monitor the production line.[149] Based on the evidence available in the case, the appellate court reasoned that there were different alternatives available to a programmer, and the programming solution was not completely dictated by the result.[150] The appellate court took into account the low originality requirement in the Software Directive and concluded that computer programs easily reach copyright protection.[151] The court held that the computer program was sufficiently original to be eligible for copyright protection.[152] In this decision, the problematic originality test was not used; instead, the lower originality test was duly recognized. The Supreme Court of Finland retained the appellate court's decision on this issue.[153] However, in this case there were also factors indicating that the program included elements which were possibly not protectable due to the Software Directive's idea–expression dichotomy. The expert witness, who was heard by the district court, reasoned that embedded software technical requirements make it highly possible that two programmers will reach very similar solutions with only minor differences. Programming languages also provide a limited number of control structures, which lead to the use of similar solutions. In these kinds of situations, it may be possible to reason that a program in its entirety is sufficiently original. However, the elements based on technical requirements, stemming from the fact that the program is embedded software with limitations in its control structures, could be nonprotectable because of the idea–expression dichotomy. These elements could be used in other programs without copyright infringement. This question, however, did not play an important role in the case.

In Finland, another appellate court case decided in 1999 relates to computer program interoperability.[154] In this case, the similarities in two computer programs were, among other things, due to the following factors: (1) the user interface was the same; (2) the programs were aimed at fulfilling

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[148] Helsinki [Court of Appeal] June 20, 2004, S 04/1824.
[149] *Id.*
[150] *Id.*
[151] *Id.*
[152] *Id.*
[153] KKO 2008:45.
[154] Helsinki [Court of Appeal] Dec. 22, 1999, R 99/661.

the same purpose; (3) the structure of the used terminal determined how certain elements were implemented; and (4) banking and communications standards determined the function of certain storage areas.[155] The court concluded that the claimant had not proved that the defendants had copied such elements that were sufficiently original to reach copyright protection.[156] The originality bar was not reached in the implementation of these features and protection was not given. Again, nonprotection was reached by utilization of the originality test and computer program interfaces were basically left without protection. In this case, too, it would have been possible, to some extent, to use the idea–expression dichotomy instead of the originality criterion and to conclude that there was no infringement.

Finland has long been close to the German tradition, in which copyright is regarded as an individual right of the author to his or her work. A copyrighted work reflects the author's personality. In Finland especially, the Copyright Council seems to reason cases so that the required originality is high. The concept of originality is construed to mean that no one else could be able to reach a similar solution. This kind of reasoning is understandable when thinking of the natural-law justification under which a work is viewed as having an imprint of the author's personality. One could argue that traditional justifications within copyright systems have an impact on the argumentation of copyright cases. This may also have an impact on the final results of the cases. Notwithstanding the problematic reasoning, it seems that the originality test is quite easily met in Finland, giving the impression that the argumentation logic and the results of the cases do not meet. The utilized concept of originality does not correspond to the ease with which protection is granted.

Even though there should now be a uniform originality concept for computer programs in the European Union, courts and other relevant authorities in some member states have not fully recognized the requirement of the new criterion. Some seem to follow their traditional reasoning trajectories. Reading the preamble to the Software Directive, one could claim that there were certain aims of harmonizing the originality level within the EU.[157] In the preamble, it is articulated that computer programs are vital for industrial development of the EU.[158] This can be understood to mean that the intention was to take economic justification more into account.

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[155] *Id.*
[156] *Id.*
[157] Software Directive, *supra* note 1, pmbl.
[158] *Id.*

This may also mean that the copyright rules for computer programs should be closer to the common-law system.

In the United States, an evolution of the copyright doctrines determining protectable subject matter has also taken place. The traditional "sweat of the brow" criterion was explicitly abandoned in 1991 by the U.S. Supreme Court case, *Feist Publications, Inc. v. Rural Telephone Service Co.*[159] In the older case law, originality meant that a work originated from the author. In *Feist*, the Supreme Court declared that a work needed to show at least "some minimal level of creativity" in order to be original and eligible for copyright protection.[160] Some other common-law countries have also started to require more from originality than was traditionally required.[161] It is no longer sufficient that a work originates from the author.[162]

The case *Lexmark International, Inc. v. Static Control Components, Inc.*,[163] concerned an authentication sequence between Lexmark laser printer toner cartridges and Lexmark printers.[164] One issue was the copyright protection of the Toner Loading Program.[165] The microchips of the Static Control Components contained exact copies of Lexmark's Toner Loading Programs. The court of appeals found that the district court failed to consider the *scenes a faire* and the merger doctrines properly, as well as the originality requirement, in its analysis on copyright protection of the Toner Loading Program.[166] The compatibility reasons, combined with the fact that the Toner Loading Program was used as a lock-out code, the changing of which was testified to be "computationally impossible," justified the copying of the program.[167] Hence, it was not realistic to require independent programming under these circumstances.

Originality is becoming a more important part of the reasoning utilized in the United States, along with the idea–expression dichotomy. Some have argued that the *Feist* case has brought the originality criterion closer to the European standard and that one could find cases from the United States that provide useful guidelines for deciding similar cases in Europe.[168] At the same

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[159] Feist Publ'ns, Inc. v. Rural Tel. Serv. Co. Inc, 499 U.S. 340, 359-60 (1991).
[160] *Id.* at 358.
[161] WILLIAM CORNISH & DAVID LLEWELYN, INTELLECTUAL PROPERTY: PATENTS, COPYRIGHT, TRADEMARKS AND ALLIED RIGHTS 424 (2007).
[162] *Id.*
[163] Lexmark Int'l, Inc. v. Static Control Components, Inc., 387 F.3d 522 (6th Cir. 2004).
[164] *Id.* at 533–43.
[165] *Id.* at 544.
[166] *Id.* at 537–41.
[167] *Id.* at 555.
[168] Estelle Derclaye, *Software Copyright Protection: Can Europe Learn from American Case Law?*, 22 EUR. INTELL.

time, there have been changes in the European copyright system that brought European copyright protection of computer programs closer to the American tradition. One of the changes is the harmonization of the originality concept, so that a lower level of creativity or individuality is required for copyright protection.

### *B. Idea–Expression Dichotomy*

The idea–expression dichotomy means that protection is only given for expression and ideas are free for others to use and develop. This is how the copyright is thought to pursue economic balance so that incentives for the creation of works do not overly limit the public domain.[169] Although copyright protection does not cover the work as a whole, this distinction prevents wholesale copying.

Even though some have questioned whether this dichotomy provides any useful guidance regarding the distinction between protectable and nonprotectable,[170] the dichotomy is referred to in several international copyright instruments and in case law. The TRIPS Agreement and the WIPO Copyright Treaty provide the following: "Copyright protection shall extend to expression and not to ideas, procedures, methods of operation or mathematical concepts as such."[171] Similarly, the Software Directive provides that "ideas and principles which underlie any element of a computer program, including those which underlie its interfaces, are not protected by copyright under this Directive."[172]

In earlier English cases, it was stated that the idea–expression dichotomy was not a recognized principle in England.[173] However, in more recent computer program cases, this principle has gained a footing due to the harmonization of laws by the TRIPS Agreement and by the EU Directives. The TRIPS Agreement and the Software Directive were referred to as applicable legislation in *Nova Productions Ltd v Mazooma Games Ltd*,[174] which concerned computer games based on the game of pool. Several elements in the implementation of competing computer games related to the idea of the games, and the use of such elements did not constitute a copyright

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PROP. REV. 7, 16 (2000).

[169] Leslie A. Kurtz, *Speaking to the Ghost: Idea and Expression in Copyright*, 47 U. MIAMI L. REV. 1221, 1223–24 (1993).

[170] LADDIE ET AL., *supra* note 114, at 97.

[171] TRIPS, *supra* note 3, art. 9.2; WIPO, *supra* note 2, art. 2.

[172] Software Directive, *supra* note 1, art. 1.2.

[173] DAVID BAINBRIDGE, SOFTWARE COPYRIGHT LAW, 105–08 (1999).

[174] Nova Prods. Ltd. v Mazooma Games Ltd. [2007] EWCA Civ 219.

infringement.[175] These features were the theme of the pool games, such as the ideas of using cue moves round ball under rotary controller, synchronizing cue with power meter, a row of sighting dots, and using values near or in pockets.[176] In *Navitaire Inc.*, the "business logic" of the program was considered to be merely an idea, which did not qualify for protection.[177]

Even though in the Finnish preparatory materials for copyright law the idea–expression dichotomy was thought to serve well the purpose of flexible protection of computer programs, while at the same allowing functioning competition in computer program markets, this dichotomy has not been utilized in computer program cases. As described above, in some computer program cases this method probably would have served well in defining the line between protectable and nonprotectable. However, the focus in Finland is on the originality criterion. There is one interesting case regarding the idea–expression dichotomy from the appellate court level in Finland, but the case concerned course materials and not computer programs.[178] In that case, the court reasoned that copyright does not protect a work's subject matter, theme, conclusions, principles, used method, or facts, even if they have been created independently.[179] Copyright does not prevent the use of these in subsequent works. In this case, the expressions in two works were different from each other even though the above mentioned nonprotectable parts were, to a great extent, similar. However, the use of these parts did not constitute a copyright infringement. This reasoning could serve as a good model for similar reasoning that could be utilized in computer program cases.

The United States Copyright Act provides that "[i]n no case does protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle or discovery, regardless of the form in which it is described."[180] The seminal case in the United States applying the idea–expression dichotomy[181] is *Baker v. Selden*.[182] The case concerned copyright protection for a book in which a bookkeeping system was described.[183] The book included examples utilizing a new

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[175] *Id.*
[176] *Id.* §§ 9–10.
[177] Navitaire Inc. v. Easyjet Airline Co. [2004] EWHC 1725 (Ch), § 130.
[178] Kouvola [Court of Appeal] Dec. 31, 1998, R97/713.
[179] *Id.*
[180] Copyright Act, 17 U.S.C. § 102(b) (2006).
[181] Here the author refers to the idea–expression dichotomy even in situations where nonprotection refers to these other nonprotectable elements.
[182] Baker v. Selden, 101 U.S. 99 (1879).
[183] *Id.* at 99–100.

accounting system.[184] The copyright protection did not cover the system described in the book.[185] In the *Feist* decision, the Supreme Court stated that "'no author may copyright facts or ideas.'"[186] These two seminal copyright cases are referred to in many computer program cases.

In *Computer Associates International, Inc. v. Altai, Inc.*,[187] the court used a three-step procedure to separate protectable expression from nonprotectable elements in a computer program. This procedure is called the abstraction-filtration-comparison method. In the abstraction phase, the court separated different levels of abstraction in the computer program. In theory, the abstraction phase of the procedure resembles reverse engineering. At the lowest level of abstraction, a program is viewed in its entirety, including its instructions. At the highest level of abstraction, only the ultimate idea of a computer program remains. On each level of abstraction, the court filters out the nonprotectable elements of a computer program. These elements are: (1) ideas; (2) elements dictated by considerations of efficiency so as to be necessarily incidental to that idea—the merger doctrine; (3) elements, required by factors external to the program itself—the *scenes a faire*; and (4) elements taken from the public domain.[188]

Samuelson views the merger doctrine as the means through which courts can introduce economic consideration into interpretations of copyright law. In certain cases, to avoid giving a monopoly on ideas, courts have given the thinnest possible protection for otherwise protectable expression.[189] In *Computer Associates*, the court reasoned that because efficiency is an industry-wide goal, there may only be a limited number of efficient implementations for any given program task.[190] Therefore, independent double-creation is possible. In these situations, similarity between two programs does not suggest that copying took place, thus, there is no copyright infringement.[191] The court concluded that elements dictated by efficiency should be filtered out before the similarity comparison.[192] Here the court used the merger doctrine to filter out the nonprotectable expression.[193] When a program

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[184] *Id.* at 100–01.
[185] *Id.*
[186] Feist Publ'ns, Inc. v. Rural Tel. Serv. Co. Inc., 499 U.S. 340, 350 (1991) (quoting Harper & Row, Publishers, Inc. v. Nation Enters., 471 U.S. 539, 547 (1985)).
[187] Computer Assocs. Int'l, Inc. v. Altai, Inc., 982 F.2d. 693, 706 (2d Cir. 1992).
[188] *Id.* at 707.
[189] Samuelson, *supra* note 41, at 413.
[190] *Computer Assocs.*, 982 F.2d at 708.
[191] *Id.*
[192] *Id.*
[193] *Id.* at 709.

implements a solution that is the most efficient, one could easily argue that the idea and expression have merged.[194]

The doctrine of scenes a faire, which has been widely used in the United States, means that one cannot describe a certain historical era without employing a standard stock of elements belonging to that time. For example, in novels, certain elements of a story necessarily follow from the idea of the story. Therefore, the use of these stocks does not constitute a copyright infringement.[195] In Computer Associates, the court used the traditional scenes a faire doctrine to filter out elements in computer programs which should not be given copyright protection.[196] The court concluded that many elements within a computer program are circumscribed by extrinsic factors that limit the programmer's design choices.[197] The court defined such elements limiting programmers' solutions as:

> (1) the mechanical specifications of the computer on which a particular program is intended to run; (2) compatibility requirements of other programs with which a program is designed to operate in conjunction; (3) computer manufacturers' design standards; (4) demands of the industry being serviced; and (5) widely accepted programming practices within the computer industry.[198]

Elements meeting these requirements (1-4 relate to interfaces) were excluded from copyright protection.[199]

Additionally, the court provided that elements of a computer program belong to the public domain if the expression is commonplace or standard in a computer industry.[200] The court took into account the policy considerations behind copyright. It reasoned, in accordance with the Supreme Court's Feist decision, that the purpose of copyright is not to reward industrious persons, but to advance public welfare.[201] The court also responded to the academic criticism that an earlier case, Whelan Associates, Inc. v. Jaslow Dental Laboratory, Inc.,[202] had faced.[203] In the Whelan case the court explained that behind a computer program there is only one general

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[194] Steven R. Englund, *Idea, Process, or Protected Expression?: Determining the Scope of Copyright Protection of the Structure of Computer Programs*, 88 MICH. L. REV. 866, 903 (1990).
[195] *Computer Assocs.*, 982 F.2d. at 709.
[196] *Id.*
[197] *Id.*
[198] *Id.* at 709-10.
[199] *Id.*
[200] *Id.* at 714 (citing Brown Bag Software v. Symantec Corp., 960 F.2d 1465, 1473 (9th Cir. 1992)).
[201] *Id.* at 711–12.
[202] Whelan Assocs., Inc., v. Jaslow Dental Lab., Inc., 797 F.2d 1222 (3d Cir. 1986).
[203] *Computer Assocs.*, 982 F.2d at 709.

idea. The court's reasoning would make computer program interfaces, to some extent, protectable. In Computer Associates, however, the court left interfaces without protection and recognized that each subroutine in a computer program may have an idea of its own.[204] Hence, there are many nonprotectable elements behind one computer program.

### *C. Comparison of the Idea–Expression Dichotomy and Originality*

The originality requirement and the idea–expression dichotomy are seen as the two methods by which the protectable is separated from the nonprotectable. However, it is not insignificant how these methods are used and which one is selected for determining that there is no protection. If a work (or its module) is not sufficiently original, it means that one is free to copy that work. If a work is sufficiently original, wholesale copying is not allowed. In these situations a work could still include many elements which others are free to use.

In the United States, if certain elements of a computer program are necessary to implement the idea of a program, these elements are, in accordance with the *scenes a faire* and merger doctrine, not protectable. Many elements within a computer program are circumscribed by extrinsic factors, which limit the programmer's design choices. If there is only one way to express an idea, then the idea and the expression have merged, and this kind of expression is not protectable due to the merger doctrine. In Finland, it has been stated in the preparatory materials for copyright law that if there is only one programming solution available for a problem and this solution, dictated by extrinsic factors, is reached mechanically, the program does not exhibit the programmer's originality and thus the threshold of originality is not reached.[205]

It seems that if extrinsic factors limit the choices available for a programmer in Finland, the reached solution is not considered original and thus not eligible for copyright protection because the element illustrates no creativity. The end result seems to be, on its face, similar to that reached in the United States: interoperability elements (specifications) are not protected. However, in Finland, the absence of protection has been based on the originality criterion; whereas, in the United States *scenes a faire* and the merger doctrine seem to be used instead. One could conclude that the originality criterion in Finland has served as a functional equivalent of the idea–expression dichotomy used in the United States when extrinsic factors

[204] *Id.* at 705, 715.
[205] Committee Report KM 8/1987 at 177.

limit programming choices so that copyright protection cannot be obtained. However, in very rare cases there is only one solution available for a programmer. At least in cases where there is some room for independent creation it is more proper, in Finland, to use the idea–expression dichotomy rather than the originality criterion because European harmonization has made it increasingly difficult to demand a high level of originality.

The originality criterion should be formulated on a new basis for computer programs in the European Union to follow the Directive's aim. However, with a lower originality criterion, there is a threat that protection is occasionally given for elements that do not merit protection. This threat can be mitigated by utilizing the idea–expression dichotomy alongside the originality criterion. United States case law regarding computer programs could serve as a model for how copyright protection can also be limited through the idea–expression dichotomy. The case law demonstrates that efficiency considerations and interoperability requirements can be taken into account in the interpretations. The Software Directive enables this kind of approach through its explicit Articles regarding the idea–expression dichotomy. This change would make the European copyright protection of computer programs resemble the United States copyright system. By utilizing this approach, narrow protection is given while still allowing competition and diversified development of software technologies. This kind of approach can be argued to be in accordance with the perspective anchored in evolutionary economics, which holds that an intellectual property owner should not receive a broad monopoly right for elements necessary to the development of new programs.

## V. CONCLUDING REMARKS

Copyright protection for computer programs has aimed at harmonization. However, it seems that the harmonization of laws has faced natural obstacles. Even though the actual legal texts have been harmonized within the EU, the national interpretations follow the trajectories anchored in domestic legal cultures and traditions. Legal concepts carry cultural and historical meanings that cannot be changed easily. The concepts may live a life of their own. Their impact or justification logics are typically not openly discussed by the courts using and developing them.

The copyright rules for computer programs in the United States and Europe attempt to balance the protection interest with the facilitation of competition through rules, which enables computer program interfaces to be left without copyright protection. As interoperability information holds a key position in the software industry, these rules are of paramount

importance. From the evolutionary economics perspective, there should not be strong monopoly rights for bottle-neck technologies, and possible intellectual-property rights should only provide narrow protection for such elements in a system technology. If intellectual-property protection is too strong, the norms are inefficient because all technological possibilities will not become utilized. The copyright rules only provide narrow protection for computer program interfaces. Consequently, current copyright rules defining protectable elements in computer programs could allow technological progress to take place.

However, some change in national interpretations in the European Union may be required. Especially when the lower originality standard is duly recognized, the doctrine of idea–expression dichotomy should be utilized to its fullest extent. The utilization of the idea–expression dichotomy serves the purpose of leaving the ideas and principles behind the interfaces without copyright protection. Through this approach, strong monopoly rights for otherwise easily achieved protection are prevented. This Article has sought to demonstrate that effective harmonization or convergence of interpretations cannot be achieved without distinguishing the justifications underlying copyright protection of computer programs from other objects of protection. This could enable the development of software copyright law transnationally, taking into account the specific features of computer programs.

Article 2

# An Evolutionary Economics Perspective on Computer Program Interoperability and Copyright

Ulla-Maija Mylly

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# An Evolutionary Economics Perspective on Computer Program Interoperability and Copyright



## *Introduction*

**Software forms an essential element of information and communication technologies (ICT).[1] Computer program interoperability elements, or interfaces, in turn are parts of a computer program, which enable a program to communicate with other programs and devices.[2] Interfaces are the points of connection that enable a software component to become a part of a larger ICT system. This connotes that the control mechanism of these elements has an impact on who are able to take part in the technological development of programs and devices forming a relevant information and communication system. As these systems establish important platforms for the information society, the question of interoperability in building such systems becomes internationally a significant one. How this issue is resolved has an impact on the possibilities for technological development and innovation in the global information society.[3] Moreover, how software is regulated has consequences for the democratic structures of a society. This is because software technolo-**

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1 Thomas Vesting, "The Autonomy of Law and Formation of Network Standards", 5(6) German Law Journal 641–642 (2004).

2 *See* definition in the Council Directive 1991/250/EEC of May 1991 on the legal protection of computer programs, "Preamble".

3 The term innovation refers *e.g.* to new products, new ways of producing as well as new organizational structures. *See* Joseph A. Schumpeter, "Capitalism, Socialism and Democracy" 84 and 132 (4th ed., George Allen & Unwin Ltd., 1954). Hence, innovation not only refers to patentable inventions. In this article the term "innovation" is used to encompass both patentable inventions and new copyrightable computer program features. As computer programs are protectable both under copyright and patent regimes, both influence the technological development and innovation possibilities within the software industry.

**gies can be used as private means for regulating human behavior, e.g. by preventing access to various resources.**[4]

The control mechanism used in restraining access to interfaces is generally intellectual property rights. If intellectual property rights give an intellectual property right holder an absolute right to prevent access to these elements, intellectual property rules empower someone to control, and possibly block, technological development in the relevant system technology. The recent discussion in this area of law has mainly focused on software patents. It has been questioned whether software patents are impeding interoperability. These concerns are certainly accurate. However, it has been recognized that even copyright rules are creating obstacles for interoperability.[5] Nevertheless, there has not been so much discussion of copyright and interoperability lately.[6] This is probably the case because copyright rules are, on the surface, sound from the perspectives of interoperability. Copyright norms allow leaving critical interface information out of protection and enable access to this non-protectable information. However, the *Microsoft* case from the European Court of First Instance[7] demonstrates that access to interface information through a copyright-based right for reverse engineering[8] is not sufficient for ensuring interoperability. In this case, it became clear that copyright rules are insufficient, but rather competition law needs to be employed in tackling the problem. However, competition law is not fully equipped for resolving problems created by intellectual property norms. It is e.g. a very slow instrument and disrupts intellectual monopolies only in very exceptional cases.

The argument of this article is that problems which were demonstrated in the *Microsoft* case and which were explained to have an impact on technological development should be addressed already in intellectual property norms. This is because the ultimate aim of intellectual property norms is to enhance technological development.[9] More specifically, it can no longer be

4 *See*, for example, Lawrence Lessig, "Reading the Constitution in Cyberspace", 45 Emory Law Journal 896–897 and 899 (1996). *See also* on the objective of non-discriminatory Internet "Tunis agenda for the Information Society", Secs. 29–31, WSIS-05/TUNIS/DOC/6(Rev. 1)-E 18 November 2005, available at http://www.itu.int/wsis/docs2/tunis/off/6rev1.html.

5 Pamela Samuelson, "Are Patents on Interfaces Impeding Interoperability", available at ssrn.com/abstract=1323838.

6 There has been discussion relating to technological protection measures and how these influence on interoperability. However, even though these measures have a connection to copyright protection they are not purely copyright rights.

7 CFI, 17 September 2007, case T-201/04 (*Microsoft*).

8 The technique of reverse engineering is a method where a machine-readable object code of a computer program is transferred back to a source code level. The source code of a computer program is human readable. However, the technique is imperfect since all the information in the original source code cannot be recovered by this method as the object code does not include all the information.

9 *Also* Weiser has argued that competition concerns should be taken into account in intellectual property rules. Philip Weiser, "The Internet, Innovation and Intellectual Property


(Contd. on page 286)

taken for granted that copyright rules are not impeding interoperability. It seems likely that the current copyright rules are not satisfactory for interoperability purposes and the norms therefore affect the progress of software technologies in a non-optimal way. The focus of this article will be on the impact of copyright rules on interoperability and, consequently, the impact of these norms on the technological development of software technologies. The legal questions addressed will concern the copyright rules defining access to computer program interoperability information, i.e. the right to conduct reverse engineering, in particular.[10] I will analyze the problem areas in these rules. The measuring stick for analysis will mainly be based on evolutionary economics' understanding of technological development.

At present, the standard justification of intellectual property protection is that it provides necessary incentives for technological development.[11] The incentives in a form of intellectual property protection are thought to be necessary for the promotion of technological development. However, different strands of economic thought hold different views on how technological progress takes place and what is essential for this development. In legal discourse, however, the mainstream understanding of the economics of intellectual property is rooted in neoclassical economics. Even if neoclassical economics is now often complemented with neo-institutional economics, the mainstream economics thus formed does not provide adequate tools for comprehending the impact of intellectual property rights on innovation. In this article, the economic analysis on copyright norms governing computer program interoperability will be complemented with the perspective of evolutionary economics.

In evolutionary economics, innovations are seen as key features for long-term economic development. This focus should make this economic line of thought especially ample for intellectual property law issues. The focal point in both is innovation. The evolutionary approach implies that there is a multiplicity of firms willing to take risks involved in finding new innovations.[12] The key question from the perspective of evolutionary economics is whether the legal norms enable a sufficient amount of competition and a

(Contd. from page 285)
Policy", 2003 Columbia Law Review 538. However, he suggests that intellectual property rules should be tailored so that when a de facto standard arises, intellectual property rules should enable access to interface information. Before that, interfaces should be proprietary. His concern is, like that of many others, to provide sufficient incentives for platform developers. *Ibid*, at 540.

10 The impact of technological protection measures and contract law in preventing access will not be discussed in this article. This problem area will be addressed in another article by the author.

11 *See*, for example, Stanley M. Besen & Leo J. Raskind, "An Introduction to the Law and Economics of Intellectual Property", 5(1) Journal of Economic Perspectives 5 (1991).

12 Giovanni Dosi, "Technological paradigms and technological trajectories, A suggested interpretation of the determinants and directions of technical change", 1982 Research Policy 157.

variety of systems to evolve. The present article endeavors to detect possible shortcomings in the relevant laws and their interpretations from this perspective. It will also propose alternative interpretations based on evolutionary economics.

Firstly, the article gives a general picture of which line of economic arguments normally forms the basis for policy considerations for intellectual property norms. This mainstream treatment, which views incentives as the main argument for protection, will be contrasted with the understanding of evolutionary economics. The analysis further covers the crucial points on the transaction cost theory. Finally the discussion on economics moves on to reason why evolutionary economics is deemed a fruitful perspective for analyzing intellectual property rules for software interoperability. After this the evolutionary economics perspectives for innovation activity which are regarded relevant for interoperability will be elaborated. The section of the article covering economics of innovation and creation concludes with the author's understanding of what kind of policy implications evolutionary economics have for sketching intellectual property norms for interoperability purposes.

The next section will be devoted to copyright rules affecting access to interoperability elements. The discussion will proceed predominantly on the level of European law. As the question of interoperability is internationally relevant, the comparative methodology is utilized by comparing the European rules to the rules applied in the United States.[13] The U.S. case law will be used in analyzing how the fair use norms allowing reverse engineering function in practice. U.S. case law will also be used as factual material in analyzing potential problems in European rules, which have not been demonstrated in the European case law. Relevant parts of the *Microsoft* case from the CFI will be used for illustrating the shortcomings of copyright law. Finally, the article refers to the problem areas of law. When one considers the functioning of copyright rules, which regulate computer program interoperability from the perspective of evolutionary economics, one can detect certain drawbacks which demand a change in legal rules.

## *Economics of Innovation and Creation: From Prospect Theory to Evolutionary Economics*

### Introduction

The basic economic argument for the necessity of intellectual property protection has been that information is a non-excludable public good. Without protection, the ones who have made efforts to produce the information cannot prevent others from utilizing it. By establishing intellectual property

13 The comparative methodology utilized in this article is a functional comparison. For further information on comparative methodology, *see* Konrad Zweigert & Hein Kötz, "An Introduction to Comparative Law" 33–47 (Claredon Press, 1998).

protection, the information good is made excludable. It is argued that without protection there are no incentives for producing information goods.[14] Information is also inexhaustible or non-rivalrous, connoting that the use by one person does not diminish another's possibilities to use the information. Intellectual property protection would thus solve the public good problem of information goods.[15]

Intellectual property protection provides the otherwise lacking incentives to innovate and hence enhances technological progress. Provision of incentives leads to technological advances, which in turn promote consumer welfare. Without incentives, one may assume that innovations decrease to the detriment of consumer welfare.[16] Hence, innovations are assumed to benefit everyone.[17] This necessary incentive mechanism can be defined as the primary economic purpose of copyright.[18]

Protection is nevertheless justified only to the extent incentives and satisfactory rewards for innovation and new creation are necessary. If innovation does not depend on this kind of reward, then there is no need for intellectual property protection in the first place.[19] There are also other forms of incentives, namely lead time and economics of scale, which may also provide an adequate appropriability and reward mechanism. In evolutionary economics theory, economic reward is not even regarded as the only motivation for innovation or creation, but some motivation is believed to lie on the psychological satisfaction received from the "joy of creating", for example.[20] These other forms of incentives seem to have more bearing in the evolutionary economics theory than in mainstream economics.[21] The first fundamental question here is whether incentives in a form of intellectual property protection are necessary for technological development to take place and how strong a protection is needed. This question is important both in mainstream

14 François Lévêque & Yann Ménière, "The Economics of Patent and Copyright" 4–5 (The Berkeley Electronic Press, 2004), available at http://www.bepress.com/leveque/.

15 Wendy J. Gordon, "Fair Use as Market Failure: A Structural and Economic Analysis of the *Betamax* Case and Its Predecessors", 1982 Columbia Law Review 1610–1611.

16 François Lévêque, "Innovation, Leveraging and Essential Facilities: Interoperability Licensing in the EU *Microsoft* Case", 107, in: François Lévêque & Howard Shelanski (eds.), "Antitrust, Patents and Copyright" 103–126 (Edward Elgar Publishing Inc., 2005).

17 Guido Calabresi, "Pointless of Pareto: Carrying Coase Further", 1991 The Yale Law Journal 1227.

18 Ruth Towse, "Economics and copyright reform: aspects of the EC Directive", 2005 Telematics and Informatics 12.

19 Besen & Raskind, *supra* note 11, at 6.

20 Joseph A. Schumpeter, "The Theory of Economic Development: An Inquiry Into Profits, Capital, Credit, Interest and the Business Cycle" 93–94 (Harvard University Press, 1968). This joy of creating could explain why the open source movement has a significant amount of players who are not expecting monetary reward from their efforts to improve the code.

21 Giovanni Dosi, "Sources, Procedures and Microeconomic Effects of Innovation", Vol. XXVI Journal of Economic Literature 1139 (1988).

economics and in evolutionary economics, but the answers differ to some extent.

The prospect theory, which may be classified under neoclassical economics,[22] focuses on patent rights. The proponents of the theory argue that the innovator should get a broad monopoly (intellectual property) right at an early stage of product development.[23] According to Edmund Kitch, the patent holder cultivates the patent prospect most efficiently. He or she can most capably manage the technological progress related to the invention and use contracts to license out the parts of the prospect that are more efficiently manageable by other firms. But the patent holder also needs to have the necessary time to properly develop the prospect without the need to worry about competitors. Under this theory, a monopoly is considered more efficient than rivalry, since under monopoly, wastes of competition can be avoided through efficient monopoly management. Underlying this argument is the assumption that inventing is like mining or fishing from a restricted pool. If there are too many actors in the pool, it is just a waste of resources.[24] This problem has been characterized as the tragedy of the commons, but its traditional area of application has been truly restricted resources such as pasture.[25] Therefore, it is questionable whether the tragedy of the commons is a useful concept in information goods at all.[26]

Under evolutionary economics, in turn, it has been questioned whether it is feasible, within industries characterized by cumulative or system technologies, that the intellectual property owner would possess all the relevant information and could foresee all the possibilities of future inventing. Computer programs are characterized by their systemic nature and the cumulative development of their technologies. The latter means that technological advances follow earlier advances and build on top of them: the knowledge cumulates on earlier knowledge. This effect can also be referred to as technology-specific learning.[27] Most innovations within the software indus-

22 Compare, however, with Elad Harison, "Intellectual Property Rights, Innovation and Software Technologies: The Economics of Monopoly Rights and Knowledge Disclosure" 25 (Edward Elgar, 2008).

23 Since computer programs are protected by patent and copyright, the general discussion related to optimal patent scope is shortly taken into account here as well. After all, both types of protection should aim at advancing the technological development of programs, when relating to computer programs.

24 Edmund Kitch, "The Nature and Function of the Patent System", 1977 The Journal of Law and Economics 267–279.

25 For a traditional description of the problem, *see* Garrett Harding, "The Tragedy of Commons", 1968 Science 1243–1248.

26 In fact, it has been noticed that intellectual property rights can lead to a situation where resources are underused due to exclusive power created by intellectual property rights. This could happen especially when intellectual property rights are fragmented to many right holders. Rebecca Eisenberg, "Can Patents Deter Innovation", 1998 Science 698–701.

27 Richard R. Nelson, "Recent Evolutionary Theorizing About Economic Change" 1995 Journal Of Economic Literature 74.

try are cumulative by their nature.[28] Software can also be characterized as a system product. A system product integrates several components that must work together in order for a desired output to take place. Hence, interoperability, which enables components to work together, becomes an essential feature in system products.[29] Computer program interfaces are in a key position within computer program technologies as they may form bottlenecks for future development of relevant technologies.

Within system technologies, it is possible that one inventor holds an intellectual property, which is a vital element for a variety of systems: the intellectual property owner of such an element would be able to block the progress of different systems. Broad intellectual property protection would not in these situations serve the most efficient outcome. Accordingly, Merges and Nelson believe that a competitive climate is preferable for technological progress within these kinds of technologies. Competition would enable finding a variety of technological solutions, which had remained dormant in a monopoly situation. Hence, they favor a narrow scope of intellectual property protection in such situations.[30] This should not, however, extensively decrease the pioneers' incentives.[31] More generally, evolutionary economics recommends that there should be a multiplicity of firms willing to take the risks involved in experimenting with new ways of doing things.[32] In monopoly situations, technological possibilities are underused, which is not efficient for technological development.[33] Firms willing to take the risks involved in alternative innovations and approaches are generally new firms rather than established organizations.[34] There is today some empirical evidence available to support this claim.[35]

Another traditional economic objective for intellectual property protection is to facilitate trade.[36] Intellectual property laws purport to define the legal rights precisely and thus lower the cost involved in the related contracting. This function of protection is thought to make the system of intellectual

28 Pamela Samuelson, Randall Davis, Mitchell Kapor & J.H. Reichman, "A Manifesto Concerning the Legal Protection of Computer Program", 1994 Columbia Law Review 2331–2332.

29 Richard N. Langois, "Standards, Innovation, Essential Facilities", 209, in: Jerry Ellig (ed.), "Dynamic Competition and Public Policy" 193–228 (Cambridge University Press 2001).

30 Robert P. Merges & Richard R. Nelson, "On limiting or encouraging rivalry in technical process: The effect of patent scope decisions", 1994 Journal of Economic Behavior & Organization 5–6 and 20–21.

31 Robert P. Merges & Richard R. Nelson, "On The Complex Economics of Patent Scope", 1990 Columbia Law Review 844.

32 Dosi, *supra* note 12, at 157.

33 Merges & Nelson, *supra* note 31, at 873.

34 Schumpeter, *supra* note 20, at 66.

35 Brett M. Frischmann & Mark A. Lemley, "Spillovers", 2007 Columbia Law Review footnote 69.

36 Lévêque & Ménière, *supra* note 14, at 4.

property rights efficient.[37] However, under the transaction cost theory one may assume that technological contracts are not easily achieved.[38] This leads to a situation where the follow-on inventors or creators are not efficiently able to take part in the technological progress and further development of computer programs,[39] unless copyright rules enable, without burdensome contracting, the efficient development of the underlying copyrighted technologies. Even though licensing is an option, it does not, in fact, always take place.[40]

More specifically, a deficiency of the neoclassical prospect theory from the perspective of evolutionary economics is its assumption that the owner of the intellectual property right would license whenever it is most efficient from the perspective of economic welfare.[41] Merges and Nelson stress that competition for improvements in innovations most likely outweighs the monopoly gains in managing the innovation.[42] Strong intellectual property rights may slow down technological development in cumulative technologies, since licensing of earlier technologies, possible platform technologies, may be burdensome.[43] There are known obstacles in the way for efficient licensing to take place, generally related to transaction costs. The strategic holdout is one form of transaction costs, as already pointed out by the classic article of Calabresi and Melamed.[44] Based on these arguments it is questionable whether efficiency can be achieved by allowing a monopoly (strong intellectual property) holder to manage the path of technological development through licensing.

The following chapter will discuss more broadly those aspects of evolutionary economics, which are relevant in comprehending its contributions for the understanding of innovation, creation and intellectual property law. It will be elaborated why strong intellectual property protection for computer program interfaces is detrimental to technological development. Subse-

37 Kitch, supra note 24, at 278.

38 For general information on transaction cost, *see* Ronald Coase, "The Problem of Social Cost", 1960 Journal of Law and Economics 1–23.

39 Suzanne Scotchmer, "Standing on the Shoulders of Giants: Cumulative Research and Patent Law", 1991 The Journal of Economic Perspectives 29–41.

40 Merges & Nelson, *supra* note 30, at 21.

41 Merges & Nelson, *supra* note 30, at 4–6.

42 Merges & Nelson, *supra* note 31, at 844.

43 Richard R. Nelson, "Intellectual Property Protection for Cumulative Systems Technology", 1994 Columbia Law Review 2676.

44 Guido Calabresi & Douglas A. Melamed, "Property Rules, Liability Rules and Inalienability: One View of the Cathedral", 1972 Harvard Law Review 1119. Lemley and Weiser have put forward an argument that if there is a possibility that with injunctive relief one can also prevent the use of non-infringing materials, then property rule is not the most efficient solution, but creates a possibility to holdout. Mark A. Lemley & Phil Weiser, "Should Property Rules or Liability Rules Govern Information", 2007 Texas Law Review 784, available on ssrn.com/abstract=977778, at 783–841.

quently, evolutionary economics will be utilized to reevaluate the copyright rules regulating access to computer program interoperability information.

**Evolutionary Economics, Innovation and Creation**

There are various strands of evolutionary economics, the common element among them being the belief that innovations constitute the key factor for long-term economic growth.[45] Mainstream economics tends to see each technical development event in isolation from the general technological development. A more advanced analysis takes into account the first and the second generation of innovation and aims to resolve how to provide incentives for both of these generations.[46] To elaborate even further, technological development can be understood as an evolutionary process whereby all events in the progress of a particular technology are not viewed in isolation from each other, but more as particulars of a total process.[47] The analysis is more holistic compared to the traditional approach. The units of analysis in evolutionary economics can, in addition to individual firms, be populations of firms and even the economic system(s) as a whole.[48]

In evolutionary theory the focus may, for example, be on the question of how major technological changes occur. Major technological changes are those having an impact on how, for example, communication, transportation or other societal functions are satisfied. These changes normally involve technical changes, changes in user practices, infrastructure and culture. Due to the links to different levels of society and culture, technological transitions do not take place easily. In accordance with the evolutionary understanding, each level linked to these changes has to adapt or otherwise react to a new technology. One concrete and simple example of required changes in technology would be that a new technology needs a new maintenance network and possibly a new distribution system. When existing systems and networks are linked to the old technology, it is difficult to introduce a new technology and attract players to satisfy the above-mentioned functions for a new technology.[49] Prevailing technological paradigms have also ties to institutional and social functions within a society, which also need to be adapted when technological paradigms change.[50]

45 Jan Fagerberg, "Schumpeter and the revival of evolutionary economics: an appraisal of the literature", 2003 Journal of Evolutionary Economics 150–151.

46 Scotchmer, *supra* note 39.

47 Håkan Håkansson, "Product Development in Networks" 84–87, in: Håkan Håkansson (ed.), "Industrial Technological Development: A Network Approach", (Croom Helm, 1987).

48 Ross Brennan, "Evolutionary Economics and the markets-as-networks approach", 2006 Industrial Marketing Management 834.

49 Frank W. Geels, "Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study", 2002 Research Policy 1257–1258.

50 Carlota Perez, "Structural change and assimilation of new technologies in the economic and social systems", 1–13, available at http://www.carlotaperez.org/papers/scass%20v04.pdf.

In evolutionary economics, the basic assumption is that models based on equilibrium do not provide useful information.[51] Even neoclassical models nowadays recognize that equilibrium is more a motivator than ever a reached position. However, dynamic evolutionary analysis requires analysis on the movement of factors or *investigation of the reasons* for the current state of affairs.[52] When analyzing paradigm changes in technology, *the sources of these changes* have been understood to be driven by two possible motors. One explanation for the changes is that scientific advances make new innovations possible. This motor for change is called a "technology-push". Another explanation for changes has been that consumers or users require new innovations and products. This approach is called a "demand-pull".[53] Both of these approaches in their respective extreme forms have problems. If technological changes are understood to be driven purely by demand-pull, one should assume that the demanded technology is easily found and available. It is just a matter of taking it out of the "technological possibilities box". Consumers would be able to foresee these technological possibilities. It is apparent that this interpretation comes very close to the neoclassical understanding of innovation, whereby innovating activity is just fishing from a restricted pool, where not only possibilities, but even the outcomes of the innovating activity are known. This analysis might allow incremental innovation, which would take place inside a technological paradigm.[54]

However, the demand-pull analysis neglects to search and analyze the reasons and motors for changes for new paradigms, which require more radical innovations. It also neglects to consider the risks and uncertainty related to the innovating activity. Uncertainty necessarily influences the processes, so that outcomes of innovating activity cannot be known beforehand.[55] One consequence of this uncertainty is that decision-making concerning, for example, R&D is inevitably taking place under the conditions of bounded rationality.[56] This uncertainty is a factor, which clearly makes evolutionary models different from those of the neoclassical school of thought. Even in neoclassical models, where equilibrium is considered capable of moving, actors are generally treated as if they knew where to go.[57]

On the other hand, if the motor of innovation is seen to be based on scientific advances only, one has failed to understand the role of economic factors in

51 Fagerberg, *supra* note 45, at 129.

52 Nelson, *supra* note 27, at 49 and 56.

53 *See*, for example, Jan van den Ende & Wilfred Dolfsma, "Technology-push, demand-pull and the shaping of technological paradigms – Patterns in the development of computing technology", 2005 Journal of Evolutionary Economics 83–99.

54 Dosi, *supra* note 12, at 147–150.

55 Dosi, *supra* note 12, at 150–151.

56 Richard R. Nelson & Sydney G Winter, "An Evolutionary Theory of Economic Change" 249–250 (The Belknap Press of Harvard University Press, 1982).

57 Nelson, *supra* note 27, at 68.

defining the direction of technological progress. Markets have a role in giving feedback to scientific advances and also in selecting the desired technological outcomes. The interplay of technology-push and demand-pull would give a more accurate picture of technological progress than concentration on only one of these explanations.[58] If innovation is understood to be driven by a combination of these powers, such dynamic processes should be taken into consideration when tailoring the intellectual property legislation.

The availability of alternatives makes the necessary process (for technological advance) of trial-error-correction possible.[59] However, analysis on innovation activity has shown that there are obstacles in finding new solutions and variety. Technological advances taking place within a technological paradigm are due to engineers' activity in finding answers to defined (by paradigm) questions.[60] Routines and prevailing understandings of the current technological paradigms serve as an obstacle for accepting new ideas.[61] An example of this is that engineers tend to follow the same trajectory and hence go to the same direction in their research and development efforts. This implies that innovation is possible, but since it is done within the prevailing trajectory, it is incremental.[62] Advancements which follow the line of one trajectory serve as an obstacle for progress for other developmental possibilities.[63]

In addition to innovation, imitation is important for economic development in the Schumpeterian theory. Schumpeter argued that interaction between innovation and imitation spurs growth in the technological sector. Hence, in the aftermath of major innovations, growth within the sector and the connected sectors tends to be high for a certain period of time.[64] This spur explains the building up of a technological trajectory. The interaction between innovation and imitation also ties firms to larger communities, since one firm's research activities have an impact on other firms' actions. While firms have technological trajectories of their own, once one of these technologies attracts more income, this firm will grow. Subsequently, the successful technology will be imitated by other firms. This leads to wider use of the relevant technology and growth within the sector.[65] Markets tend to tip

58 Dosi, *supra* note 12, at 147–151. Moreover, in some sectors markets are not the only forces that have an impact on selection. In certain areas the public policies, for example, in providing monetary resources, may be a more powerful factor than markets. One example of this is medical technologies, Nelson, *supra* note 27, at 66.

59 Dosi, *supra* note 12, at 156.

60 Dosi, *supra* note 12, at 152.

61 Schumpeter, *supra* note 20, at 84–85.

62 Geels, *supra* note 49, at 1259–1260.

63 Nelson, *supra* note 27, at 64.

64 Joseph A. Schumpeter, "Business cycles. A theoretical, historical and statistical analysis of the capitalist process" 131, Vol. 2 (McGraw-Hill, 1939).

65 However, in cases where there is already a dominant technology in use, the source of economic growth is not so much due to diffusion of improved technology. Nelson, *supra* note 27, at 69–72.

towards the successful technology and the industry structure becomes concentrated.[66]

A requirement of selection naturally means that it is possible to choose between different alternatives. A multiplicity of firms provides a multiplicity of solutions. A multiplicity of firms is important, as firms try to base their innovating activity to their past success and learning. Due to this, firms tend to follow their own narrower technological trajectories. Their search for new solutions relates closely to the areas of their current activities. Hence, development is in this respect largely firm specific.[67] Firms follow their own routines in making decisions on where to focus their research and development. The routines are a result of their learning. However, the rationality of the routines is considered to be bounded. This distinguishes the theories about evolutionary routines and decision-making from the neoclassical theories of growth.[68] Due to technological development being firm-specific, major changes in technology are unlikely if there is only one player on the scene. Institutional factors, norms in particular, have great importance in providing an environment where it is possible to reach a variety of competing solutions emanating from a variety of entities. These factors may have an impact on the speed of technological changes.[69]

When the paradigm changes, engineers basically need to start the search for answers from a scratch.[70] As engineers have also learned from their past activities, new paradigms make engineers' earlier experience to a great extent obsolete. This explains the difficulties in moving from one paradigm to a new one. Once the new paradigm gains enough users and support, resistance towards other ways of doing things will be built up again.[71] Due to technological trajectories, new radical innovations have difficulties in receiving support and building maintenance systems. Hence, radical innovations are often developed in niches, where special needs are not satisfied with other products. Niches provide a place where innovations can be improved through the necessary trial-error-correction process. Additionally, the required social networks for acceptance as well as maintenance and supply systems can be built during this time. Once a technology is more mature and has built up a required network it can be offered to other user groups outside the niche as well. An obvious example of this is the development of many products initially for military purposes.[72]

66 Franco Malerba, Richard Nelson, Luigi Orsenigo & Sidney Winter, "Demand, innovation, and the dynamics of market structure: The role of experimental users and diverse preferences", 2007 Journal of Evolutionary Economics 372.

67 Dosi, *supra* note 21, at 1130–1131.

68 Nelson, *supra* note 27, at 69–70.

69 Dosi, *supra* note 12, at 160.

70 Dosi, *supra* note 12, at 154.

71 Gerhard O. Mench, "Stalemate in Technology, Innovations overcome depression" 203–215 (Ballinger Publishing Company, 1979).

72 Geels, *supra* note 49, at 1261.

Another way to attract new users for new innovations is the use of experimental users.[73] Experimental users and/or customers whose needs have not been satisfied with current technology can serve as a pathway for new technology to obtain a sufficient base of users. With this user base, the technology can be developed further to reach the threshold requirements of the markets. The new technology challenges the old one, and dominant firms need to respond. If dominant firms are successful in adopting the new technology, they may survive despite the technology change. The lot of new firms, in turn, depends on the size of the base of experimental users that were attracted by their technology in the first place. If the size is adequate, they may survive even if the old firms are capable of adopting the new technology. Otherwise new firms will exit the markets. Hence, new emerging firms are required for the introduction and adoption of radical technologies. Moreover, they need to obtain enough customers in order to challenge the old technology and to be able to turn the development into the new direction.[74] New technology developments in niches and among experimental users seem to support the understanding that the interplay between scientific advances and the feedback mechanism of the markets is essential. It is probable that in many situations new firms find a way to experiment their products in the markets in order to develop their products. However, in some situations intellectual property norms may be needed to provide such an environment for a trial-error-correction process.

Network effects are specific phenomena causing problems in changing from one technology to a new one. Network effects mean that the value of a product increases when a larger group of people uses the same or an *interoperable* product. Increased value is due to users' possibility to communicate with a larger user-base and to have access to a broader range of interoperable equipment and software. Network effects are especially strong in information technologies and hence in the software markets.[75] A potential problem caused by network effects is the accumulation of market power into one technology or product provider. This can ultimately lead to the creation of a monopoly.[76] When network effects are present, entrant firms have specific problems in searching, for example, a sufficiently large base of experimental users for a new technology. Without interoperability, there are strong barriers to entry.

73 A closely related phenomenon is user-generated innovation, where users design products for their own needs. This mode of innovation is more popular in information products, i.e. software. For general information, *see* Eric von Hippel, "Democratizing Innovation" (MIT Press, 2005).

74 Malerba, Nelson, Orsenigo & Winter, *supra* note 66.

75 Carl Shapiro & Hal R. Varian, "Information Rules, a Strategic Guide to the Network Economy" 174–182 (Harvard Business School Press, 1999).

76 Michael L. Katz & Carl Shapiro, "Antitrust in Software Markets", 33, in: Jeffrey A. Eisenach & Thomas M. Lenard (eds.), "Competition, Innovation and the Microsoft Monopoly: Antitrust in the Digital Marketplace" 29–81 (Kluwer Academic Publishers, 1999).

A closely related phenomenon to network effects is lock-in caused by switching costs. In a lock-in situation, a consumer does not switch to a new product even if the new product is superior to the old one. Switching costs originate, for example, from a consumer's difficulties to use files that have been created with another computer program, as well as from the learning costs involved with a new computer program.[77] Lock-in is a negative factor when benefits from the use of a new technology would be greater than switching costs, but a consumer still does not change to a new technology.[78] Negative lock-in may create remarkable barriers to a market entry.[79] In the *Microsoft* case it was demonstrated that users considered many features of competing products superior to Microsoft's products, but due to lack of interoperability with Microsoft's products they did not choose the competing products.[80] If interoperability would be facilitated by law, network effects would not necessarily lead to lock-ins on the markets.[81] However, with technical interoperability, one does not eliminate all lock-in effects, e.g. learning costs related to a new technology. This connotes that there are still some barriers to market-entry and a possibility to lock-in; however, by technological interoperability, both of these can be decreased.

Different technological eras may require different sets of rules if rules are assumed to provide some efficiency for the system. The current era of information technologies may require different legal treatment than some earlier technologies.[82] An evolutionary approach to intellectual property differs from the mainstream approach in some important respects. The mainstream approach concentrates on the provision of incentives in the form of exclusive rights. The concern may also be how to provide adequate incentives for both first- and second-generation works.[83] Under the prospect theory, broad intellectual property rights are deemed necessary for sufficient incentives to exist and development to take place. The emphasis is on the exclusive right to bar others from the prospect. In evolutionary theory in turn, the variety of incentives taken into account is broader. Hence, provided that some other incentive exists, intellectual property

77 *Id.*, at 34.

78 Stan Liebowitz & Stephen E. Margolis, "Network Effects and the *Microsoft* Case", 161, in: Jerry Ellig (ed.), "Dynamic Competition and Public Policy" 160–192 (Cambridge University Press, 2001).

79 Katz & Shapiro, *supra* note 76, at 34. For actual problems relating to network effects, lock-in and barriers to entry within the software industry, *see* case COMP/C-3/37.792 *Microsoft*, Commission Decision of 24 March 2004, recitals 448–464.

80 CFI, 17 September 2007, case T-201/04 (*Microsoft*) recitals 650–652.

81 Shapiro & Varian, *supra* note 76, at 184–185, 233. For a report on the importance to decrease lock-in effects when aiming at lowering market concentration, *see* Franco Malerba, Richard Nelson, Luigi Orsenigo & Sidney Winter, "Competition and industrial policies in a 'history friendly' model of evolution of the computer industry", 2001 International Journal of Industrial Organization 637.

82 Nelson, *supra* note 27, at 80.

83 *See* for example Scotchmer, *supra* note 39.

protection – or even any economic reward – is not always necessary for innovation to take place. Secondly and more importantly, narrow intellectual property protection is recommended in situations where an intellectual property holder of a key element could control the development of a variety of systems. Evolutionary economics deems a competitive situation better for technological changes to take place. There should be a multiplicity of firms trying alternative ways of doing things in order for new technological paradigms to emerge. This approach also supports the understanding of innovation activity and technological development as a process that involves a variety of players. In this approach the focus is no longer on isolated innovation and its incentives but rather on the development possibilities for an overall system and supportive legal norms for such development. In institutional economics, it has been recognized that revision of legal entitlements should be considered to be due to problems caused by fragmentation of intellectual property rights. This problem creates bottlenecks for technological development. Therefore, legal rules should create fewer conflicting entitlements.[84]

This article argues that computer program interoperability may help in moving to new technological paradigms within the software industry. Due to interoperability, the whole technological environment does not need to be changed at once. It was emphasized above that technological change does not take place easily, as a certain technology is linked with various functions, which require changes alongside with the main technology. With interoperability, new solutions can be introduced more easily into the existing platforms. This would allow smoother transformations into new technological alternatives, be they incremental or radical.[85] For example, in the European *Microsoft* case it was demonstrated that by withholding interoperability information Microsoft limited the possibility for a paradigmatic change to take place within the software industry. The change in question was a move towards a more server-based model where a personal computer would no longer be of such great importance.[86] In the case it was established that the technological development was hindered to the detriment of consumers.[87] The case demonstrates how important interoperability is in technological development.

84 Robert P. Merges, "Intellectual Property Rights and New Institutional Economics", 2000 Vanderbilt Law Review 1863–1684.

85 Compare with Tuomi who has argued that in the era of the World Wide Web there might no longer exist technological paradigms in a normal sense but these technologies would provide a wide array of new opportunities which can be employed without exhausting the old ones. Ilkka Tuomi, "Networks of Innovation" 51 (Oxford University Press, 2002).

86 CFI, 17 September 2007, case T-201/04 (*Microsoft*) recital 1345 referring to COMP/C-3/37.792 *Microsoft*, Commission Decision of 24 March 2004, recital 1065 and further to recital 770.

87 CFI, 17 September 2007, case T-201/04 (*Microsoft*) recitals 653 and 665.

It has often been assumed that variety should be provided through a variety of different competing standards.[88] System competition potentially promotes technological progress.[89] This assumption may work against interoperability. However, within the software industry where network effects are generally present it might be highly difficult or even impossible to introduce viably competing standards for the markets. Providing interoperable products for an existing network might thus be the only commercially viable solution.[90] This relates to a problem called two-level entry. It means that without access to interoperability information a firm wishing to provide application software would also need to provide a platform and attract a sufficiently large customer base to use both the competing platform and the application.[91] This may be too high a requirement for viable competition to take place. Moreover, Langlois has argued that variety can be provided through a variety of interoperable modules. Especially when a product is a system product, connoting that economics of scale are available due to packaging a system, it is cheaper to provide variety through a variety of modules.[92]

Even paradigmatic changes are possible within one system, as according to evolutionary theory one cannot foresee all the possibilities of future inventing. Furthermore, one paradigm is not the same as one system. Hence, allowing access to interoperability elements does not mean that we are locked into a certain path of development. Neither does allowing interoperability mean that everyone is forced to use certain technology or to do everything similarly. Access to interoperability elements only connotes a possibility to interface one's own technology with existing platforms. Moreover, if competitors wish to have a competitive advantage, they need to incorporate their own innovative features in their main products.[93] Neither does interfacing suggest that there would no longer be competition among different systems, as this competition is still available if markets wish to have it.

Access to interoperability elements enables new firms to enter the market, which is an important factor for the development of new technology under

88 Richard N. Langlois, "Standards, Innovation, Essential Facilities", 216, in: Jerry Ellig (ed.), "Dynamic competition and public policy" 193–228 (Cambridge University Press, 2001).

89 Harald Gruber & Frank Verboven, "The evolution of markets under entry and standards regulation – the case of mobile telecommunications", 2001 International Journal of Industrial Organization 1121.

90 *See* case COMP/C-3/37.792 *Microsoft*, Commission Decision of 24 March 2004, recital 453.

91 Pamela Samuelson & Suzanne Scotchmer, "The Law and Economics of Reverse Engineering", 2002 Yale Law Journal 1618.

92 Langois, *supra* note 88, at 193–228. In one system the network effects and scale of economics would be available faster. Gruber & Verboven, *supra* note 89, at 1193. However, this article does not argue that we should be part of one system only.

93 CFI, 17 September 2007, case T-201/04 (*Microsoft*) recital 655–658.

evolutionary economics' understanding of technological progress. It is, accordingly, important that there is a broad variety of firms in order for there to exist a broader base for trial-error-correction with regard to different technological possibilities. New firms provide a sufficient competitive pressure for technological changes even in situations where new firms do not survive for long. Moreover, with interoperability it may be easier to attract a larger group of experimental users and thus to provide a sufficient competitive pressure for a change in a situation where network effects are present.[94] The aspect of experimental users also supports the understanding that both technology-push and demand-pull are required for technological changes to take place. Hence, from the perspective of evolutionary economics, access to computer program interoperability elements is important for technological development to take place. The rest of this article will focus on how copyright law treats computer program interoperability and whether these rules allow a variety of technological solutions to evolve in an economically efficient way.

## *Scope of Copyright Protection for Computer Program Interfaces*

### Two Faces of Copyright Protection

In intellectual property norms the emphasis has been on property rules that underline the intellectual property holder's right to exclude others from using or developing the innovation. From this perspective intellectual property is seen like any other property and not as government granted privilege.[95] Moreover, strong intellectual property protection has been claimed to have formed a goal for European harmonization.[96] The trend is similarly apparent at the international level. The latest international developments in intellectual property and copyright protection indicate that there has been an expansion of both subject matter and scope of protection. For example, the scope of copyright protection has been extended. Moreover, the international implementation of the WIPO copyright treaty of 1996 has granted the holder of a copyright stronger protection through legal protection of technological protection measures. These trends seem to lean on the neo-classical theory line of thoughts.

The eligibility for copyright protection on the one hand, and the scope of interface protection on the other are the first questions in defining whether and how strongly computer program interfaces are to be protected. The European Software Directive provides (Art. 1.3) that "A computer program shall be protected if it is original in the sense that it is an author's own

94 For information about the difficulties to find users for a new operating system when there is already a de facto standard available, *see* case COMP/C-3/37.792 *Microsoft*, Commission Decision of 24 March 2004, recital 453.

95 Lemley & Weiser, *supra* note 44, at 783–784.

96 Guy Tritton et al., "Intellectual property in Europe" 488 (Sweet & Maxwell, 2008).

intellectual creation. No other criteria shall be applied to determine its eligibility for protection." The Directive's requirement not only means efforts but some personal and intellectual contribution.[97] In the U.S. originality is nowadays also a threshold criterion for copyright eligibility.[98] Both in Europe and in the U.S., copyright protection for computer programs is fairly easy to achieve. Therefore, many computer programs are copyrightable. The new originality criteria introduced in the European Software Directive actually meant that in most European countries the threshold for protection was lowered and therefore a larger number of computer programs became protectable.[99] The relaxation of the eligibility criteria in Europe follows the general trend in intellectual property by expanding the protectable subject matter.

On the other hand, copyright has been considered to provide weaker protection than patent protection. As a copyright protects only expression, it allows various implementations for the same purpose without a problem of infringement. For computer programs this means that the actual program code as it is implemented is protected but not the functions themselves. Hence, copyright is flexible in a sense that it does not provide strong exclusionary power for a copyright holder but allows competition. This feature of copyright may provide a good breeding ground for implementing interpretations in accordance with the understanding of evolutionary economics. When the Directive on copyright protection for computer programs was being prepared in Europe, the possibilities to strike a balance between fair protection and competition through copyright protection were taken into account.[100] Also in Finland, when the legislative act on copyright protection for computer programs was considered, copyright protection was, on the one hand, thought to be flexible enough to allow competition in the software markets while at the same time it was, on the other hand, thought to provide sufficient incentives for the development of computer programs. Copyright's idea-expression dichotomy was thought to serve this end.[101]

The Software Directive explicitly refers to the idea-expression dichotomy in the case of interface (non-)protection. The Directive provides in Article 1.2 that "ideas and principles which underlie any element of a computer program, including those which underlie its interfaces, are not protected by copyright under this Directive." Also in the U.S. the idea-expression dichot-

97 Hugh Laddie, Peter Prescott, Mary Vitoria, Adrian Speck & Lane Lindsay, "The Modern Law of Copyright and Designs" 1615 (Butterworths, 2000).

98 *Feist Publications, Inc. v. Rural Telephone Service Co.Inc*, 499 U.S. (SC 1991).

99 Report from the Commission to the Council, the European Parliament and the Economic and Social Committee on the implementation and effects of Directive 91/250/EEC on the legal protection of computer programs, COM/2000/0199 final, chapter III.

100 Tritton, *supra* note 96, at 490.

101 Government Proposal HE 161/1990, at 16–17. The Finnish legislation is based on the above-mentioned European Software Directive, but Finland implemented the Directive before its accession to the European Union (European Community at the time).

omy has been utilized when leaving computer program interface specifications (information) out of protection.[102] Interface specification is the technical information that sets the requirements for the communication taking place between two computer programs. In many cases interface specification may be implemented in various ways and these implementations may receive copyright protection. Hence, copyright-based incentives are present when there is room for variety. However, the technical information itself is not protectable under copyright. Moreover, when there is only one possible way to implement an interface specification, this implementation is not copyrightable.

Both in Europe and in the U.S., computer program interface information can be left without copyright protection through idea-expression dichotomy.[103] This indicates that a narrow scope of copyright protection can be achieved for a bottleneck technology. It is, however, equally important that access to this non-protectable information is enabled. In the following, the European and the U.S. legislation regulating access to non-copyrightable interface elements through reverse engineering will be analyzed more thoroughly.

**Copyright Rules on Reverse Engineering**

The property rule for copyright connotes that third parties are excluded from copying copyrighted computer programs. The right of copying belongs solely to the copyright holder. However, the technique of reverse engineering requires copying of both non-protectable and protectable elements in computer programs. Further, without the use of this technique the non-protectable interface information cannot be accessed. How should the access have been (or will in the future be) enabled? If we followed the property rule logic in this issue, it would be under the copyright holder's good will to authorize the access to the information through this technique or to license this information. However, there are alternatives for the property rule that have been utilized in intellectual property laws. One alternative is the liability rule. The liability rule provides access to the protectable subject matter without consent, however, with a liability for a monetary compensation for a copyright holder. An additional alternative is the zero-price liability rule, which ensures access without compensation.[104]

The fair-use exception in the United States and exceptions in the European Software Directive aim at providing access to non-protectable interoperability information through the techniques of reverse engineering. To the extent interfaces are not protected by copyright, competitors are free to use the discovered interoperability information in new computer programs. If copy-

102 *Computer Associates International, Inc v. Altai, Inc.* 982 F.2d. 693 (2nd Cir. 1992), at 707.

103 The analysis on the originality threshold and the idea-expression dichotomy in computer programs will be covered in more detail in a separate article by the author.

104 Lemley & Weiser, *supra* note 44, at 786.

right doctrines did not authorize access to these non-protectable elements, the copyright protection of computer programs would create a holdout problem. Copyright holders would be able to receive protection beyond the actual protectable elements of computer programs. These interoperability exceptions provide in principle a zero-price liability rule in accessing interface information. However, the technique of reverse engineering does not entail a fully free access because the use of the technique can be both expensive and time-consuming.[105]

Samuelson and Scotchmer have argued that the right to reverse engineer is an economically sound solution if reverse engineering is burdensome enough and subsequent reimplementation of a product does not take place too easily. They emphasize that the original creator should receive sufficient incentives in a form of lead time. Moreover, they have argued that the incentives for developing platform software are adequate due to difficulties in reverse engineering interoperability information.[106] In the following it will be analyzed how copyright rules on reverse engineering software function in practice. The analysis covers the legal rules defining both the access to interface information and the use of the information in order to get an overall understanding of the current legal situation created by copyright rules.

In the U.S. there is no specific authorization for software reverse engineering. Instead, one seeking a defense for reverse engineering should look into the general fair use doctrine of the Copyright Act. The Copyright Act provides four factors that are to be considered when deciding whether a particular use can be fair use. These factors are: (1) the purpose and character of the use, e.g. whether such use is of a commercial nature or for non-profit educational purposes; (2) the nature of the copyrighted work; (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and (4) the effect of the use upon the potential market for or value of the copyrighted work.

From the European perspective, the fair use analysis has been seen as an unpredictable way of regulating, for example, reverse engineering cases. However, the fair use doctrine has the advantage of being flexible and of taking into account, for example, technical changes. It also brings economic reasoning into copyright law, which can also be seen in the case law dealing with the right to reverse engineer computer programs.[107] Moreover, flexible and decentralized decision-making done by courts is potentially more efficient than application of rigid rules.[108]

105 Weiser, *supra* note 9, at 548.

106 Samuelson & Scotchmer, *supra* note 91, at 1579 and 1625.

107 Pamela Samuelson, "Economic and Constitutional Influences on Copyright Law in the United States", 2001 European Intellectual Property Review 413–414.

108 Ugo Mattei, "Comparative Law and Economics" 15 (The University of Michigan Press 1997).

In Europe the Software Directive provides explicit rules for reverse engineering. Article 6 of the Software Directive authorizes decompilation for interoperability purposes. For decompilation to be permitted, it has to be indispensable for obtaining the information necessary to achieve the interoperability of an independently created computer program with other programs. The Article does not permit the information obtained through decompilation to be used for other purposes. Accordingly, one is not allowed to decompile a program to discover the ideas behind it and then use these ideas to make a competing program, if the ideas discovered by means of decompilation are unrelated to interoperability.[109] The information may not even be given to others, except when necessary for the interoperability of the independently created computer program. The Article requires independent programming. Hence, after the interoperability information is gathered, a programmer needs to conduct programming work anew. Basically, this underlies the copyright principle that ideas are not protected, but can be used in subsequent works. This Article also prevents wholesale copying of the interfaces when there is room for different implementations. This requirement connotes that incentives in a form of copyright protection are not corroded even though competition is made possible.

There have been some cases in the U.S. which have dealt with the fair use doctrine for the purpose of finding a defense for reverse engineering.[110] Here only the *Sega* case[111] is introduced more thoroughly. In the *Sega* case a court needed to analyze, for the first time, whether intermediate copying would be an infringement of copyright. The cases of first impression are often cases where economic reasoning plays a more important role than in cases which are in the area of settled case law.[112] Therefore, this case illustrates well how fair use requirements are interpreted for interoperability purposes.

109 Thomas C. Vinje, "The EC Software Directive and the Question of Interoperability", 1992 Nordiskt Immateriellt Rättskydd 84. Access to other ideas is regulated in Art. 5(3), which provides that "the person having a right to use a copy of a computer program shall be entitled, without the authorization of the right holder, to observe, study or test the functioning of the program in order to determine the ideas and principles which underlie any element of the program if he does so while performing any of the acts of loading, displaying, running, transmitting or storing the program which he is entitled to do." Under this Article one is entitled to use ideas for other purposes than interoperability; however, it restricts the methods one is allowed to apply in discerning the ideas. Therefore, ideas do receive some protection under the European software copyright regime.

110 *See*, for example, *Atari Games Corporation v. Nintendo of America, Inc.* 975 F.2d 832, (Fed. Cir 1992); *DSC Communications Corporation v. DGI Technologies, Inc.*, 898 F. Supp. 1183 (N.D. Tex. 1995), aff'd, 81 F.3d 597 (5th Cir. 1996); *DSC Communications Corporation v. Pulse Communications, Inc.*, 976 F. Supp. 359 (E.D. Va. 1997), aff'd in part, rev'd in part, and vacated in part 170 F.3d 1354 (Fed. Cir 1999); and *Sony Computer Entertainment, Inc. v. Connectix Corporation* 203 F.3d 596 (9th Cir. 2000).

111 *Sega Enterprises Ltd. v. Accolade Inc*, 977 F.2d 1510 (9th Cir. 1992).

112 Samuelson, *supra* note 107, at 410.

The court held that intermediate copying done in the course of reverse engineering may violate copyright as such, even though the end product itself would not. This part of the reasoning emphasizes the exclusive rights of a copyright holder. The question of proper incentives was also indirectly raised in the *Sega* case. Sega argued that considerable time, effort, and money was used for the development of the products in question. However, the court cited the *Feist* decision[113] and concluded that the sweat of the brow doctrine in copyright is no longer applicable. The fair use factor, "*the nature of the copyrighted work*", connotes that the level of protection is not the same for all copyrighted works. It means that for some types of work the actual level of protection is very low. Protection is not given for the ideas or functional features of the work. The court made reference to the case *Computer Associates*[114] and concluded that many aspects of computer programs are not protected by copyright. Since the work in the *Sega* case incorporated elements that did not obtain copyright protection, public access needed to be secured.[115]

The court continued its reasoning by explaining that the ideas and functional elements of certain parts of computer programs (or certain kinds of programs) are not visible to humans while the program is operating, and thus access to the ideas behind those parts of the program cannot be realized other than through dissembling the object code. As an example of such elements, the court gave interface procedures and operating systems.[116] The court recognized that disassembly was necessary to get access to the functional compatibility requirements in the console. Disassembly requires copying of a copyrighted work. The court reasoned that "If disassembly of copyrighted object code is per se an unfair use, the owner of the copyright gains a de facto monopoly over the functional aspects of his work – aspects that were expressly denied copyright protection by Congress."[117] To conclude, at this point both the Software Directive and the fair use doctrine allow access to interface information through reverse engineering even though this requires copying of a copyrighted work.

Article 6.2 of the Software Directive requires that the information obtained through decompilation is not " ... (c) to be used for the development, production or marketing of a computer program substantially similar in its expression, or for any other act which infringes copyright." The provision is important, since it allows functional similarity between the original program and the new one. However, one is not allowed to make programs with

113 *Feist*, *supra* note 98.

114 *Computer Associates*, *supra* note 102.

115 *Sega*, *supra* note 111, at 1524–1527.

116 *Sega*, *supra* note 111, at 1519–1520. However, the court also considered that the ideas and functional aspects behind some computer programs are detectable without disassembly if the operation of the program is visible to the user. As an example of such programs the court gave word processing programs. *Ibid*.

117 *Sega*, *supra* note 111, at 1526.

substantial similarity in expression with the original one.[118] This requirement underlines that copyright based rewards and incentives have not vanished. This requirement of non-infringement also highlights the demand for independent programming work. Nevertheless, one is entitled to use the ideas and principles behind the program. There may be situations where interfaces cannot be implemented in many ways. In these situations similarity in expression does not constitute a copyright infringement. Taking into account the idea-expression dichotomy, which ensures that copyright protection does not create a bottleneck problem for interfaces, the requirement of non-infringement can, also from evolutionary perspective, be seen as a sound demand. The purpose is to find new technologies and to improve technologies.

One is entitled to use the information obtained through decompilation for making a product, which either competes with the original program or attaches to the original program.[119] Before the Software Directive was accepted, some authors suspected that accepting decompilation would corrode incentives to innovate. In particular, it was thought that second-comers would be able to produce cheaper products or even clones with much lower development costs.[120] This argument was also raised in the *Microsoft* case, but the court held that in order for competitors to gain any competitive advantage they need to implement some innovative features in a new product.[121] Moreover, if one takes into account the aforementioned Article, which requires independent programming, it becomes quite clear that the right of reverse engineering under the Directive cannot be used for making clones. Hence, access to interface specifications does not even corrode incentives for innovations. Also Art. 4(b) of the Software Directive, which prohibits translation or adaption of a program, supports this conclusion.[122]

These issues are connected to the U.S. fair use doctrine's factor *purpose and the character of the use*. This has not only been seen as a question of whether the use is commercial, but also whether the use is in line with the purposes of copyright law. There are three factors which are to be taken into account in this analysis: (1) whether the use is transformative; (2) whether the use is commercial; and (3) whether the alleged infringer's conduct is proper.[123]

118 Vinje, *supra* note 109, at 87.

119 EC Commission's Twentieth Report on Competition Policy, CM-60-91-410, Office for Official Publications of the European Communities. Luxembourg 1991, at 67.

120 William T. Lake, "Seeking Compatibility or Avoiding Development Costs? A Reply on Software Copyright in the EC", 1989 European Intellectual Property Review 434.

121 CFI, 17 September 2007, case T-201/04 (*Microsoft*) recitals 655–658.

122 Erik Richard Kroker, "The Computer Directive and the Balance of Rights", 1997 European Intellectual Property Review 250.

123 Seungwoo Son, "Can Black Dot (Shrinkwrap) Licenses Override Federal Reverse Engineering Rights?: The Relationship between Copyright, Contract, and Antitrust Laws", 2004 Tulane Journal of Technology and Intellectual Property 93.

In the *Sega* case it was argued that since copying was done in order to bring a competing product into the market, the finding of fair use would be precluded. The court determined that the purpose of the competitor's direct use of the program code was to study the compatibility requirements (functional requirements which do not obtain copyright protection) to be able to change its programs, some of which had been created earlier, so that they could be played on the console. The competitor was not able to access this information other than through disassembly. The court ruled that the use was only intermediate and thus the commercial use was indirect. The court concluded that the copying was done merely for a non-exploitative purpose and the commercial character did not weigh that much.[124]

The *Sega* court also took into account the fact that the conduct led to the availability of independently created new products compatible with the console. This benefited the public. "It is precisely this growth in creative expression, based on the dissemination of other creative works and the unprotected ideas contained in those works, that the Copyright Act was intended to promote."[125] Here one could also find the economic reasoning behind the conclusion.[126] Fair use is justified if through decompilation, one brings something new onto the market. This facilitates competition in innovations and can also be seen as a justified requirement from an evolutionary economics' viewpoint.

The fourth statutory fair use factor is effect on the potential market for the copyrighted work. This factor has a close relationship with the first factor. The *Sega* court defined the relevant markets so that markets included video games that were compatible with the console. The success of such games depends on how users experience the game features. The competitor did not copy any such elements. When there is a new entrant on the market, this naturally affects the market. Trying to exclude legitimate competitors from entering the market would be against the basic principle of promoting creative expression. Thus, some economical loss does not prevent the finding of fair use.[127] Hence, both the European Software Directive and the U.S. fair use doctrine allow interface information to be used for designing competing computer programs. The availability of new competing products is an important factor from an evolutionary perspective, as it promotes technological development.

To conclude, currently both in Europe and in the U.S. reverse engineering of a computer program is allowed for the purpose of getting access to interoperability information. In the U.S. it was emphasized that public access to elements which are not protectable under copyright needs to be secured. By this reasoning the court restricted the impact of a property rule so that it

124 *Sega*, *supra* note 111, at 1522–1523.
125 *Ibid*., at 1523.
126 Samuelson, *supra* note 107, at 414.
127 *Sega*, *supra* note 111, at 1523–1524.

would not cause a holdout problem for the parts of a computer program that are not protectable. Therefore, functional, non-protectable interoperability information can be accessed and utilized in subsequent independent transformative works. The requirements for the use of interface information are well grounded. The purpose is not to allow copying of the end product but to find new technological development possibilities within the software industry by use of non-protectable bottleneck information. Moreover, the requirement of independent programming work gives lead time for the first mover.

However, if we look at the European Software Directive more closely, one possible problem is that the Directive permits decompilation only for the purposes of achieving software-to-software interoperability and not software-to-hardware interoperability. As sometimes both hardware and software implementations are technologically feasible solutions, the distinction in the Directive between hardware and software interoperability is not a sound solution. It may have an undesired impact on how certain technological elements are implemented, and the chosen solutions may not be the most efficient ones. This, in turn, may have an impact on technological progress. The European Commission has recognized the argument that, in practice, the possibilities for achieving interoperability may be too restrictive under the Software Directive. However, the Commission has claimed that it had not received any documentation of case law or other evidence that restrictions are causing problems in practice. Therefore, it has not considered that legislative action should be taken to correct possible problems. For the future, as information networks develop further, the Commission has earlier admitted that the situation has to be followed.[128] The Commission has just recently launched its new initiative to create an "internet of things" for developing connections between computers and other machines and physical objects. Interoperability is one of the objectives included in the Commission's action plan. The means by which the Commission envisages to reach this aim is standardization.[129] However, if the aim truly is to connect devises and software, the Commission should also revise the interoperability article in the Directive to make it correspond with the objective in the action plan.

There is an interesting case from the U.S. that demonstrates that there can be problems in making a distinction between hardware and software implementations. In the *Sony v. Connectix*[130] case, a competitor had reverse engineered the basic input-output system (BIOS) of a Sony game. The BIOS is a firmware, meaning that it operated the respective hardware, in this case a game console. A competitor identified the interoperability elements of this

128 Commission staff working paper on the review of the EC legal framework in the field of copyright and related rights, SEC (2004) 995, at 9.

129 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee of the Regions, Internet of Things COM(2009) 278 final.

130 *Sony Computer Entertainment Inc. v. Connectix Corporation* 203 F.3d 596 (9th Cir. 2000).

firmware and then made Sony's games interoperable in a different hardware environment, namely on a computer. The games had earlier been playable on Sony's game console only. In this specific case the competitor did use a software emulator between Sony's games and a computer. Therefore, in this case reverse engineering probably would have been allowed even under the strictest interpretation of the Software Directive, because the interface elements were detected to achieve the interoperability of an independently created computer program *with other programs*. However, the literal interpretations of the Software Directive might have prevented some other ways of seeking interoperability with new hardware environments.

Under the Software Directive, firmware is considered as software. Taking this into account, software-to-software interoperability may provide a sufficient basis for achieving interoperability in many of those cases where computers and other hardware components are involved. This is due to the fact that hardware often includes basic firmware. Moreover, in the preamble to the Software Directive it has been pointed out that "an objective of this exception [decompilation] is to make it possible to connect all components of a computer system, including those of different manufacturers, so that they can work together". This has been interpreted to suggest that decompilation for software-to-hardware interoperability must be allowed under the Software Directive, even though the textual interpretation of the Articles does not seem to make this possible.[131] An interpretation allowing decompilation for hardware-to-software interoperability would not make an ungrounded distinction between the two forms of interoperability or prevent some development possibilities. The fair use doctrine is broader in its applicability as it is not restricted to software-to-software interoperability.[132] This proves how flexible rules can be more efficient in practice.

Article 6 sets additional conditions for decompilation.[133] Article 6.1 requires that "the information necessary to achieve interoperability has not previously been readily available to the persons referred to in subparagraph (a)". This requirement has been interpreted differently by different authors. Some have suggested that this condition requires the person to turn to the right holder first and request the interoperability information. The reasoning behind this kind of argumentation has been that it balances the rights between the right holder of an original program and the developer of a new program. The new developer needs to receive access to the interface information, but on the other hand the creator of the original program needs to have

131 Jonathan Band & Masanobu Katoh, "Interfaces on Trial: Intellectual Property and Interoperability in the Global Software Industry" 248 (Westview Press, 1995).

132 The Digital Millennium Copyright Act, however, restricts the fair use doctrine and incorporates an exception for interoperability which unfortunately resembles the articles of the European Software Directive closely. *See* DMCA 1201(f)(1)(A). The legal protection of technological protection measures is not dealt with in this article.

133 All of the requirements are not covered in this article thoroughly as they do not cause problems for actual protection or possibilities to achieve interoperability.

the possibility to publish the necessary information freely. As decompilation is a time-consuming and expensive process, asking information directly from the right holder might be an appealing option for new developers.[134] Notwithstanding the possible benefit derived by the competitor from not having to employ a reverse engineering technique, this line of interpretation tends to favor the right holders, as it emphasizes that it is up to them to decide whether they wish to publish the information or allow reverse engineering.

Some authors have argued that it is not necessary to turn to the right holder before decompilation. According to this reasoning, decompilation is only prohibited if the interoperability information has been published earlier. These views are usually based on the interpretation of the words "readily available" in Art. 6 of the Software Directive.[135] The situation in practice is that many software companies publish interface information. This is due to the fact that enhancing interoperability makes a product more attractive to a consumer.[136] This relates to network effects, meaning that if there are more interoperable products available for a product, the product is more valuable to a consumer. It is also possible that the Software Directive's provisions encourage publishing interface information to some extent. Under the U.S. fair use doctrine the competitors are only allowed to conduct reverse engineering in situations where reverse engineering is the only means to get access to the interface information. In the U.S. the situation is probably quite similar to that in Europe if the interface information has been published. Then there is no need for decompilation for interoperability purposes. However, in the U.S. this technique may be available for other purposes as well.

Article 6.1. of the Directive requires further that "(c) these acts are confined to the parts of the original program which are necessary to achieve interoperability." This requirement is in practice an unrealistic one if it is considered to suggest that a competitor should know in advance where the relevant information lies in the program code. However, if this is not known, as is usually the case, the requirement can be interpreted as allowing reverse engineering, which covers the whole program.

This question has also been analyzed in U.S. case law. It was considered under the fair use factor "the amount and substantiality of the portion used in relation to the copyrighted work as a whole". In the *Sega* case the competitor copied the whole program while conducting reverse engineering. But since the final use was limited, this factor did not carry much weight. The court concluded that "where disassembly is the only way to gain access to the ideas and functional elements embodied in a copyrighted computer

134 *See e.g.* Kroker, *supra* note 122, at 249–250.

135 *See e.g.* Andreas Raubenheimer, "Implementation of the EC Software Directive in Germany – Special Provisions for Protection of Computer Programs", 1996 International Review of Industrial Property and Copyright Law 636. Contract law issues are not covered in this article.

136 CFI, 17 September 2007, case T-201/04 (*Microsoft*) recital 702.

program and where there is a legitimate reason for seeking such access, disassembly is a fair use of the copyrighted work, as a matter of law."[137]

The requirements set for the use of interface information seem to be quite sound from an evolutionary economics perspective. A possible deficiency in the European Directive is making a distinction between different kinds of interoperability.[138] Some other limitations of the European Software Directive's interoperability provisions were discussed in connection with the *Microsoft* case. In this competition law case it became clear that competitors are not always able to discover the information for sufficient interoperability by means of reverse engineering.[139] The technique is imperfect since all the information in the original source code cannot be recovered by this method as the object code does not include all the information. Moreover, reverse engineering is a technically and commercially uncertain method as it is very difficult to employ.[140] On top of this, resources are wasted due to the technical difficulty and time-consuming nature of the technique.[141] Furthermore, after a competitor has detected the interoperability information, it is possible that the copyright holder of the original computer program changes interfaces and thereby blocks the efforts to achieve interoperability.[142] Consequently, in some situations it is possible for a copyright holder to keep control of interoperability information. Therefore, notwithstanding the zero-price liability rules, there still exists a possibility for a strategic hold-out – and Microsoft has used this opportunity. The CFI obliged Microsoft to reveal interface information on the basis of competition law.[143] This obligation was based on Microsoft's abuse of its dominant position. As all software companies do not hold a dominant position, competition law does not enable access to interoperability information in every situation. Moreover, competition law is a very slow instrument in providing access, as can be seen

137 *Sega, supra* note 111, at 1526–1528.

138 CFI, 17 September 2007, case T-201/04 and COMP/C-3/37.792, Commission Decision of 24 March 2004.

139 CFI, 17 September 2007, case T-201/04 recital 435.

140 COMP/C-3/37.792, Commission Decision of 24 March 2004 recitals 685–686.

141 Samuelson & Scotchmer, *supra* note 91, at 1625.

142 COMP/C-3/37.792, Commission Decision of 24 March 2004 recital 686. In one reverse engineering case from the U.S., future compatibility was an issue as well. In the case *Atari Games Corp. v. Nintendo of America Inc.*, 975 F.2d 832 (Fed. Cir. 1992) a competing program included elements which were not necessary for the functioning of the program. The competitor argued that these instructions were necessary for future compatibility. However, the court decided that speculations over future events do not justify the use of unnecessary elements, at 845. This conclusion has been criticized on the basis that future compatibility should be treated similarly to present compatibility. Richard H. Stern, "Reverse Engineering for Future Compatibility", 1994 European Intellectual Property Review 179–180.

143 In this article it is not possible to provide a thorough analysis on the case on the basis of competition law. Only the main shortcomings of competition law in providing interoperability are described here.

from the case. The case was pending for about nine years.[144] Consumers may already have suffered and competitors have exhausted themselves before the competition law measure takes effect.[145] This is the situation especially in the markets where network effects are present, because the competition takes place at an early stage for the market and not on the market. In these specific markets the winner typically takes it all or nearly all.[146]

It has been argued that the right to reverse engineer is an economically sound solution if reverse engineering is difficult and time-consuming enough to provide sufficient lead time for the developer of the original product.[147] The current situation seems to overly protect the first comer's lead time, since the technique does not even enable access in every situation. This connotes that the first comer may gain a durable market power. Moreover, there is another feature in copyright that provides a lead time. Even though interface information is not protected by copyright, copyright still protects other elements in the program. This connotes that a competitor who has discerned the non-protectable interface information, through reverse engineering or otherwise, still needs to conduct independent programming work in order to bring a non-infringing program into the markets. This is required by the copyright rules described above. The implementation work related to independent programming takes time and gives a competitive advantage to the first mover. The first mover therefore receives the incentives in the form of copyright protection which guarantees a lead time connected to the implementation phase. The question thus arises whether copyright holders need several means and double rewards for safeguarding their development efforts. Is there a need for a lead time based on the time it takes for competitors to reverse engineer the non-protectable interoperability information? If this is required, there will be a large number of incentives for a computer program creator. However, increasing the number of rewards does not entail more innovations.[148] Even though there is a need for a minimum degree of appropriability mechanism, after this more rewards do not produce more investments in research and development.[149] There is no need for double reward-

144 The procedure began on 10 December 1998, and the decision of the CFI came on 17 September 2007.

145 Dan Wielsch, "Competition Policy for Information Platform Technology", 2004 European Competition Law Review 106.

146 Shapiro & Varian, *supra* note 75, at 177. However, Liebowitz and Margolis have emphasized that network effects cannot be separated from economics of scale and instant scalability. Together, these phenomena can lead to a situation where the winner takes it all. Hence the reason does not necessarily lie on the network externalities; Liebowitz & Margolis, *supra* note 78, at 163.

147 Samuelson & Scotchmer, *supra* note 91, at 1586 and 1622.

148 Frischmann & Lemley, *supra* note 35, at 276.

149 Giovanni Dosi, Luigi Marengo & Corrado Pasquali, "How much should society fuel the greed of innovators?: On the relations between appropriability, opportunities and rates of innovation", 2006 Research Policy 1111.

ing the creator. Therefore the obstacles in accessing interface information could be removed.

Beside intellectual property protection, the theory of evolutionary economics provides an analysis on other incentives as well. The scope of analysis for incentives is therefore broader than in very traditional approaches. In the *Microsoft* case the Commission emphasized that firms already have other incentives available for reaching interoperability.[150] Firms basically need to make their computer programs function in the technical environment for which their programs are designed. Without interoperability, programs will not operate. Therefore, it is also questionable whether incentives in a form of intellectual property protection are needed for interoperability elements.

In fact, because of the requirement of independent programming, copyright does not protect interface implementations strongly. Independent programming is also required for interfaces when there is room for alternative implementation. When there is only one possible way to implement an interface, this is not copyright protected. Therefore, copyright-based incentives would not even be exhausted if interface information was made available. Consequently, the copyright regime is in principle flexible in providing both incentives and, at the same time, making technological competition available.

Moreover, Lévêque has stated that the overall incentives of all players in the market might increase in a situation where interface information is made available.[151] One can conclude that if the incentive analysis does not concentrate on one firm only, but takes the overall incentives into account more broadly, all together the incentives for technological development might be superior in situations where interface information is available for all players.[152] Moreover, the competitive pressure in these situations may increase even pioneer's own incentives for innovative activity.[153] Additionally, the resources wasted due to reverse engineering could be used more efficiently in society. Even these resources could be channeled into developing new technologies, which should be the ultimate aim of intellectual property norms.

The copyright rules and doctrines enable interoperability to some extent. The critical interface information can be left without protection. Moreover, the fair use doctrine as currently interpreted, as well as the Software Directive's interoperability exceptions, aim to provide a basis for accessing interoperability information. The requirement regarding the purposes for which the interface information can be used seems to be sound from the evolution-

150 *Microsoft* COMP/C-3/37.792, recitals 727–729.

151 Lévêque, *supra* note 16, at 109.

152 The overall analysis where Microsoft's incentives would be compared to competitor's incentives was not applied by the CFI. The CFI did analyze these incentives under two separate test CFI 17 September 2007 case T-201/04 recital 659.

153 *Microsoft* COMP/C-3/37.792, recital 725.

ary economics' perspective. Competitors are directed in doing their own development work, which enhances technological development. U.S. case law also suggests that under the fair use doctrine, competing firms have in many cases been able to access the necessary interoperability information and provide new products for software markets. However, the European *Microsoft* case proves that there are limitations in the use of the reverse engineering method, which are similarly in place under the respective European and U.S. rules. Even though the aim has been to secure access to interface information, this is not the case in all situations. It appears that copyright rules should be tailored to enable access to sufficient interface information more readily in order to enable other firms to provide competitive pressure in a timely manner in the software industry. Copyright protection of some elements underlying the program and the lead time thus created should be considered as the copyright-based sufficient incentive needed in the software markets.

## *Concluding Remarks*

The copyright rules for computer programs in the U.S. and Europe seem, on the surface, to provide a good foundation for the software industry to evolve. The rules attempt to facilitate competition through provisions and doctrines enabling computer program interoperability. The computer program interfaces can be left without copyright protection, and the rules also seek to provide access to interoperability information. Competitors are allowed to uncover interoperability information and to make new competing products that interoperate with the existing computer system.

As interoperability information holds a key position in the software industry, these rules are of paramount importance. From the perspective of evolutionary economics, there should not be strong monopoly rights for bottleneck technologies, rather possible intellectual property rights should only provide narrow protection for such elements in a system technology. The reason for this is that one actor should not alone decide a direction for future innovations in system or cumulative technologies. Due to bounded rationality, one actor is unable to fully see all the possibilities of innovation. If intellectual property protection, and the protection of the interfaces in particular, are strong, the legal rules are inefficient since all technological possibilities will not be utilized. The legal rules need to enable a broader scope of the trial-error-correction procedure. Access to interoperability information lowers the barriers for new firms to enter into software markets. From the perspective of evolutionary economics, the existence of new firms is of paramount importance for radical innovations to take place. It is the new entrant firms with a sufficient amount of new technology users that provide a competitive pressure for technological paradigms to change.

The current copyright rules are a somewhat satisfactory starting point for technological changes to take place within the software industry. However, some change in interpretations and some modifications of rules are required.

One possible deficiency is if European interoperability exceptions are interpreted to only allow software-to-software interoperability. This might not allow wide enough technological variety for the development. Moreover, this distinction does follow the Commission's new agenda for the development of the "internet of things". But more particularly, in the case of complex software, the technique of reverse engineering does not provide a viable means for achieving interoperability. Due to these difficulties, there are barriers to entry and competition within the industry. This connotes that paradigmatic changes within the industry (and information society) may be prevented. Hence, it seems that the result is not in line with the aims of the copyright rules in enabling, at the same time, both flexible and sufficient protection and competition within the industry. The copyright rules could provide a better breeding ground for future development by allowing access to non-protectable interoperability information more readily and without the wasted costs of reverse engineering. The objective of intellectual property rules is to enhance technological development, and copyright law should itself enable this without recourse to competition law. Copyright laws could for example set an obligation for software developers to disclose the interoperability information. There are alternative ways to design such an obligation. For example, there could be an automatic obligation to disclose for all developers. Another possibility would be to set an obligation to disclose after a product has reached a certain market share on the markets. A third option would be to establish such an obligation based on request of information. Moreover, it should be decided whether the information is to be compensated or not and whether such potential compensation would reflect the transaction costs only, or also other potential costs. Obviously, all such alternatives may entail several problems. Moreover, patent laws should be developed simultaneously so as not to enable the frustration of such positive effects generated through copyright norms. Yet, like the problems of patent laws related to interoperability, the detailed elaboration of such future copyright rules remains outside the scope of this article and hence a matter for another discussion.

Article 3

# What ever happened to patent bargain? Prospect theory and software patentability

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# What ever happened to patent bargain? Prospect theory and software patentability

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## 1. Introduction

*1.1 Contract theory or prospect theory?* Contract theory and prospect theory both belong to the family of utilitarian justifications for the patent institute. It is characteristic of utilitarian justification that property rights are created by states for the purpose of wealth maximization.[2] The utilitarian justification is often referred to as economic or consequentialist justification. This justification can be divided into two arguments. Patents 1) give incentives to innovate and 2) provide an incentive to disclose technological information. The latter argument is connected to the construction of a *social contract* underlying patents. According to this proposition, *a patent is a bargain* between society and the innovator. The innovator receives a state-conferred monopoly for his innovation and the society benefits from the dissemination of new technologies in return.[3] Hence, the *disclosure requirement* of patent law has an essential role in the patent bargain by ensuring the dissemination of technological information. Fostering information sharing has been identified as one of the main purposes of the patent law institution. Moreover, efficient dissemination of technological information enables technological competition and hence technological rivalry and progress based on the patent information. The contract theory has also been referred to as the disclosure theory of patent law.[4]

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[2] See e.g. *Margaret Jane Radin*, Property Evolving in Cyberspace, pp. 509–510, Journal of Law and Commerce 1996, pp. 509–526.

[3] See e.g. *Sigrid Sterckx*, The Ethics of Patenting – Uneasy Justifications, pp. 193 and 198–199, in Peter Drahos (ed.), Death of Patents, Queen Mary Intellectual Property Institute and Lawtext Publishing Limited 2005, pp. 175–211.

[4] See *Joachim Weyand – Heiko Haase*, Patenting Computer Programs: New Challenges, p. 655, IIC 2005 pp. 647–663. Even according to John Locke a property is based on convention. However, Locke's theory is still normally understood as providing a proof that private property is a natural right. *Sterckx*, *supra* note 3, at 179. Some, however, see an incentive to disclosure as a subordinate to incentive to innovate. Behind this argument is the patent system's function as solving the public good dilemma. It is assumed that most patented innovations are self-revealing and therefore disclosure is inevitable. See *Alan Devlin*, The Misunderstood Function of Disclosure in Patent Law, Harvard Journal of Law and Technology (2010), pp. 401–446. In this approach the incentive to innovate is emphasized over other justifications.

Even though the contract theory has an important role in patent law justifications and policy discussions, it is not the only influential theory. Edmund Kitch's *prospect theory* has had a role in patent policy formation as well. The widely known implication of prospect theory for patent policy is the recommendation of a broad scope of patent protection, intended to increase incentives to innovate. However, there have been doubts whether the prospect theory is a fruitful approach with regard to software patenting.[5] The critics have instead recommended a narrow scope of protection for software technologies. One basis for this approach has been the specific characteristics of software creation, rather based on incremental and widely dispersed improvements than individual breakthroughs.[6]

These criticisms have been sound. The research so far has also identified the patent law doctrines affecting the scope of patent protection. However, while the criticism towards prospect theory has been apparent, the research has mainly focused on analyzing a traditional scope of protection, namely, the question of how *strong* patent rights should be granted. The doctrine of equivalents and exceptions from patent exclusivity have formed the core questions analyzed from this perspective.[7] However, the policy implications of prospect theory do not stop on these questions. The patentability issue and disclosure requirements are at least equally important issues affecting the practical scope of patent protection. There has been some research on these scope of protection questions stemming from the criticism towards prospect theory.[8] However, the analysis has often jumped directly on the question how to achieve a narrow scope of protection for software technologies. This has taken place in spite of the fact that in his influential theory Kitch recommended something specific for patentability criteria and disclosure requirement. Yet these aspects of prospect theory have not been placed under systematic analysis. This article seeks for its part to

[5] Notwithstanding this line of arguments, some have argued that prospect theory serves well some industries, such as pharmaceuticals. *Dan L. Burk & Mark A Lemley*, Policy Levers in Patent Law, p. 75 University of California at Berkeley, School of Law, Public law & Legal Theory Research Paper Series Research Paper No. 135 and University of Minnesota Law School, Public Law & Legal Theory Research Paper Series, Research Paper No. 03-11, available at http://ssrn.com/abstract=431360.

[6] The starting point for this line of criticism is the classic article *Robert P. Merges – Richard R. Nelson*, On The Complex Economics of Patent Scope, Columbia Law Review 1990, pp. 839–916.

[7] See e.g. *Julie E. Cohen – Mark A. Lemley*, Patent Scope and Innovation in the Software Industry, California Law Review 2001, pp. 1–57. A similar line of focus not only directed at patents or software context. *Mark A Lemley*, The Economics of Improvement in Intellectual Property Law, Texas Law Review (1997), pp. 989–1084.

[8] The impact of disclosure requirement on the scope of software patent protection (in the U.S.) has been analyzed in *Robert P. Merges*, Software and Patent Scope: A Report from the Middle Innings, Texas Law Review vol. 85 (2007), pp. 1627–1676. The impact of patentability criteria and disclosure requirements (in the U.S.) on the scope of software patents has been analyzed in *Dan L. Burk and Mark A Lemley*, Designing Optimal Software Patents, Stanford Law School Public Law & Legal Theory Working Paper Series, Research Paper No. 108 and University of Minnesota Law School Legal Studies Research Paper Series Research Paper No. 05-11 (2005), pp. 81–108 available at http://ssrn.com/abstract=692044.

fill this gap in existing research. It forms a critical analysis of more detailed implications of prospect theory for these two questions and compares these implications with current software patentability practices. Even though there is a strong inter-relationship between different doctrines of patent laws affecting the scope of protection, this article only analyzes patentability and disclosure. These define the scope of protection at the stage of patent grant.

The analysis concentrates on the evolution of software patentability in Europe and the United States. The European patent grant doctrines have not previously been in focus from this perspective. Furthermore, it will be elaborated what the society in general has received in return under the patent law disclosure within this technological area.[9] The article seeks to elaborate whether the current patent grant doctrines and interpretations of the disclosure obligations in the area of software technologies lean towards the prospect theory to the prejudice of contract theory. The article argues that this indeed is the case. The aim of the article is also to evaluate such developments critically by addressing both the possible practical consequences and presumptions of the theory.

*1.2 Implications of prospect theory on patentability and disclosure?* As indicated, prospect theory addresses the patentability criteria. It basically argues that one does not need to be particularly concerned whether an invention is worth a long-term patent monopoly. Even though Kitch explained that prospect theory does not try to replace reward theory generally, Kitch argued that it is not necessary to require from patentable inventions that there exists something worth rewarding. The question to be asked would rather be whether the technological information should be investigated more. For patentability, it would be sufficient that the technological information introduced is substantially novel.[10] Such a patentability test disregards the requirement of non-obviousness, which is considered to be the actual threshold criterion for patentability. Novelty test is somewhat easy to pass and accomplish. Yet this criterion does not guarantee that the patent monopoly brings sufficient benefits for the society. Moreover, it is questionable whether incentives are required for the inducement of only new information. Hence, it has been argued that the monopoly should be given when there is something to reward. Based on these arguments it has been argued that prospect theory cannot in this respect substitute for the reward justification logic in the patent system.[11]

Accepting the aforementioned propositions of the prospect theory would mean the expansion of patent eligible inventions. This threshold is closely connected to the question of patentable subject matter. Protectable subject matter

[9] As the focus is on evolution of these doctrines, only the main lines of doctrinal developments are described by illustrative cases.

[10] *Edmund W. Kitch*, The Nature and Function of the Patent System, pp. 266 and 284, The Journal of Law and Economics 1971, pp. 265–290.

[11] *John F. Duffy*, Rethinking the Prospect Theory of Patents, pp. 502–503, The University of Chicago Law Review (2004), pp. 439–510.

has actually expanded in modern patent systems.[12] It is apparent that the expansion of patentable subject matter has likewise taken place within software industries. A few decades ago software was not considered as patentable subject matter, but rather a combination of abstract ideas and mathematical methods. Notwithstanding the considerable academic resistance towards software patents some time ago, the number of granted software patents today is extensive.[13] From the early days of accepting software patents until today's situation, the criteria of software patent grant has evolved, leading to the expansion of software patents. This has taken place notwithstanding the arguments that relaxing the patentability does not necessarily promote innovation in industries where the innovation rate is rapid anyway.[14]

The expansion of patentable subject matter has been claimed to stem from the presumptions of protectability and patentability, which are said to form the leading principles of modern patent law.[15] The question arises: how can these principles have such a footing in modern patent law? The prospect theory may, after all, have had some impact on patent policy and principle formation, notwithstanding its controversial nature and disputed adequacy. In fact, it has been argued that if patent law is analyzed from the law-and-economics perspective, the prospect theory is a standard part of such analysis.[16] Hence, it can be presumed that prospect theory has an important status in patent law analysis.

This article started with the postulation that disclosure is the other side of the patent bargain. As it seems that the patentability criterion is relaxed, the other side of the bargain could perhaps justify the current functioning of the patent system. After the patentable subject matter has expanded, there should similarly be more disclosed information available of patented software technologies. Yet it seems that in software patenting the disclosure obligation does not function in this way.[17]

[12] *Margaret Llewelyn*, Schrodinger's Cat: An Observation on Modern Patent Law, pp. 11 and 16, in *Peter Drahos*, Death of Patents, Queen Mary Intellectual Property Institute and Lawtext Publishing Limited 2005, pp. 10–66.

[13] For the U.S. it has been noted that after the Federal Circuit case State Street Bank & Trust Company v. Signature Financial Group, Inc. 149 F.3d 1368 (Fed. Cir. 1998) software patents have become prevalent. See e.g. *Merges*, *supra* note 8, at 1628. In Europe EPO had granted more than 20,000 patents by the year 2002. See information from Proposal for the directive of the European Parliament and of Council on the patentability of computer-implemented inventions, COM/2002/0092 – COD 2002/0047 final.

[14] *Robert M. Hunt*, You Can Patent That? Are Patents on Computer Programs and Business Methods Good for the New Economy?, pp. 11–12, Business Review (Q1 2001), pp. 5–15, available at http://www.philadelphiafed.org/research-and-data/publications/business-review/2001/q1/brq101bh.pdf (16.12.2010).

[15] *Llewelyn*, *supra* note 12, at 11 and 16. For example, it is (in the U.S.) the task of the Patent Office to give reasons why a patent is not issued. *Mark A. Lemley and Carl Shapiro*, Probalistic Patents, p. 78, Journal of Economic Perspectives (2005), pp. 75–98.

[16] *Duffy*, *supra* note 11, at 441.

[17] In the area of software technologies there has been extensive criticism claiming that patent applicants are not obligated to reveal sufficient information. See e.g. *Dan L. Burk – Mark A Lemley*, Is Patent Law Technology Specific?, p. 9 (2002) University of California at Berkeley, School of

Yet, such critics are neither specific for this era nor for software patents. In economic literature, concerns whether the patent law disclosure functions adequately were expressed already at the time of emergence of the prospect theory. The concern was that the patent applicant could receive both a patent monopoly and secrecy due to failures in disclosing the invention in a manner that others are able to understand. Prospect theory explains this failure to be due to the fact that at the time an invention is disclosed, a commercial product does not yet exist. It emphasizes that the aim of the patent law disclosure is only to set the legal limits for patent claims and not to reveal commercially relevant information. The latter is related to the proposition that patent rights should be granted at an early stage of the innovation process. Furthermore, the prospect theory teaches that the dissemination of the patentable information does not need to take place through the patent law disclosure, but patent holder will later disseminate the necessary information voluntarily by himself. Hence, Kitch argued that enhancing the patent law disclosure only increases the costs and complexity of the system without the equivalent benefit of generating more meaningful information.[18]

Thus, prospect theory advices to grant patents based on the novelty of the information, to maintain patents valid and not to worry about the sufficiency of the disclosed information in the patent prosecution. This article argues against such recommendations. Many core principles of patent law reflect other theoretical grounds, for example the patent bargain theory. Although prospect theory and contract theory both belong to the family of utilitarian justifications of intellectual property, these two theoretical justifications for patent law emphasize different aspects in the patent system and hence lead to different understanding and outcomes. Natural rights and distributive justice (i.e. reward theory) form other known justification theories for the patent system. They may also have various implications on patent laws and policies.[19] The interpretations of the patent system depend on the theoretical perspective emphasized. Despite such multiplicity of underlying theories, this article focuses on contract theory and prospect theory both belonging to the utilitarian school of thought. Next the article moves on to discuss the current patent law interpretations and their possible connections to the criticized prospect theory.

## 2. Patentability of software in practice

*2.1 Importance of patentability decisions and international setting.* The patentability question has been identified as one important factor in patent institute defining the scope of patent protection. From the perspective of the patent system functioning in practice it is chronologically the first point where policy makers and those interpreting the patent laws need to choose between a broad and narrow

Law, Public law & Legal Theory Research Paper Series Research Paper No. 106 and University of Minnesota Law School, Public Law & Legal Theory Research Paper Series, Research Paper No. 02-14, available at http://ssrn.com/abstract_id=349761.

[18] *Kitch*, *supra* note 10, at 287–288.

[19] *Sterckx*, *supra* note 3, at 178–193.

scope of protection. This issue can further be divided into two sub-questions. The first question to be answered is what is included in the *patentable subject matter* and what is excluded from such protection. The second question deals with the more delicate criteria defining the line between protectable and non-protectable inventions. These two questions are closely linked to each other in patent laws, as they define the patent eligible area together. The prospect theory does not address the subject matter issue specifically; however, on general level the theory recommends a broad scope of protection for *technological information*. Moreover, the theory does not set any explicit limits for patentable subject matter. For *patentability criteria* the prospect theory gives a more detailed policy recommendation by articulating that substantial novelty is a sufficient criterion for patentability. In the following these two questions are generally analyzed so that the subject matter discussion will be first elaborated, and then the analysis moves on to the discussion of other patentability criteria.

Both the United States and all European countries are signatories to the Paris Convention which sets a requirement of the protection of patents.[20] However, it neither clarifies the criteria for patentability nor patentable subject matter.[21] On the other hand, the TRIPS agreement of the World Trade Organization (WTO) seeks to regulate patentability and patentable subject matter.[22] Under Article 27 TRIPS, patents shall be available for any inventions, in all fields of technology, whether products or processes, provided that they are new, involve an inventive step and are capable of industrial application. Moreover, this Article explicitly includes a non-discrimination principle with regard to the field of technology. The Article sets some possibilities for exclusions from patentability, but these do not refer to computer programs.[23] Therefore, it has been argued that nations need to some extent recognize computer-implemented inventions if they are to obey their TRIPS obligations.[24] TRIPS hence assumes a broad concept of patentability. This approach to patentability has been said to form a guiding principle of patent law of the United States, too.[25] It has been argued

[20] Paris Convention for the Protection of Industrial Property of March 20, 1883, as revised at Brussels on December 14, 1900, at Washington on June 2, 1911, at The Hague on November 6, 1925, at London on June 2, 1934, at Lisbon on October 31, 1958, and at Stockholm on July 14, 1967, and as amended on September 28, 1979.

[21] *Thomas Cottier – Pierre Véron (Eds.)*, Concise International and European IP Law, TRIPS, Paris Convention, European Enforcement and Transfer of Technology, p. 180, Kluwer Law International 2008.

[22] Agreement on Trade-Related Aspects of Intellectual Property Rights, The TRIPS Agreement, Annex 1C of the Marrakesh Agreement Establishing the World Trade Organization, signed in Marrakesh, Morocco on 15 April 1994.

[23] Under article 27 (2) members may exclude protection for reasons of ordre public and morality. Additionally Article 27 (3) includes an exhaustive list of possible exclusions, but computer programs are not included or indicated here either.

[24] *Jerome Reichman*, Universal Minimum Standards of Intellectual Property Protection under the TRIPS Component of the WTO Agreement, p. 40, in *Carlos M. Correa & Abdulqavi A. Yusuf (Eds.)*, Intellectual Property and International Trade, The TRIPS Agreement, Kluwer Law International 2008 pp. 23–82.

[25] See e.g. *Thomas Cottier – Pierre Véron*, *supra* note 21, at 86.

that the Constitution of the United States does not provide any limits for patentable subject matter.[26] The TRIPS agreement and U.S. patent law have probably influenced the global developments so that broad patentability has gained an important role in modern patent systems worldwide.

Notwithstanding the achieved universality of the patentability requirements – novelty, inventive-step and industrial applicability – the TRIPS Agreement leaves considerable flexibility for Members to decide on how to interpret these requirements. Therefore, national approaches on this issue may diverge from each other considerably.[27] Article 27 of TRIPS even itself leaves room for diverging approaches by explicitly stating that the terms "inventive step" and "capable of industrial application" can be used synonymously with the terms "non-obvious" and "useful".

*2.2 European developments.* In the EU, national approaches to patentability may diverge, too. This is due to the fact that patent laws are not fully harmonized, even though the European Patent Convention (EPC) has connoted considerable harmonization. Therefore, national laws and their interpretations continue to differ in Europe. For example, it is not yet possible to receive one EU-wide patent.[28] Applicants may seek patents either through the national patent offices (based on partially harmonized national legislation) or through the European Patent Office (EPO, based on the European Patent Convention). In both cases the validity of patents and infringements thereof are evaluated on the basis of national legislation. In other words, the EPO in current system grants a bundle of national patents.[29] Yet, the EPC provides a centralized application procedure whereby the patentability of claims is decided for all national patents sought.[30] In this article, the analysis of patentability and disclosure requirements will focus on the EPO practice under the EPC, to the exclusion of national interpretations.[31]

[26] *Robert P. Merges*, As Many as Six Impossible Patents before Breakfast: Property Rights for Business Concepts and Patent System Reform, from p. 584, Berkeley Technology Law Journal (1999), pp. 577–615.

[27] UNCTAD-ICTSD TRIPS Resource Book: An Authoritative and Practical Guide to the TRIPS Agreement, p. 362.

[28] At the moment there is a Proposal for a regulation of the European Parliament and of the Council implementing enhanced cooperation in the area of the creation of unitary patent protection COM(2011) 215 final. If this enters into force it would mean a provision of uniform patent protection in the participating Member States.

[29] In the proposed unitary patent protection this would naturally not be true. However, in a new situation there would still co-exist a possibility to seek European patents (bundles of national patents) through EPO as well as national patents through national patent offices.

[30] *Guy Tritton et al.*, Intellectual Property in Europe, p. 61, Sweet and Maxwell 2008.

[31] For European patents these parts of the national laws (patentability and disclosure requirements) are harmonized to correspond to the EPC. Article 2 of the EPC stipulates the following: "… (2) The European patent shall, in each of the Contracting States for which it is granted, have the effect of and be subject to the same conditions as a national patent granted by that State, unless otherwise provided in this Convention."

Moreover, Article 138 of the EPC specifies the following: "1) Subject to the provisions of Ar-

Under the EPC (Art. 52), patents are available for any inventions, *in all fields of technology*, provided that they are new, involve an inventive step and are susceptible of industrial application. All the requirements have to be met. This Article was revised by EPC 2000[32] to correspond more closely to Article 27 TRIPS. In this revision, the text "in all fields of technology" was included into Article 52.[33] However, the Article contains a more specific definition of an invention. This definition clarifies, among other things, that mathematical methods, business methods or computer programs as such are not regarded as inventions within the meaning of EPC.[34] When EPC 2000 was discussed, there was a proposal that this exclusion of computer programs "as such" would be deleted from Article 52. However, the initiative did not succeed,[35] notwithstanding the fact that the definition has brought many controversies over the patentable subject matter.[36]

Despite the fact that Article 52 EPC clearly states that computer programs as such are not patentable subject matter, the EPO has granted a notable number of software patents. The fact that the number of applications for computer-implemented inventions increases year by year could itself indicate the relaxation

ticle 139, a European patent may only be revoked under the law of a Contracting State, with effect for its territory, on the following grounds:

(a) if the subject-matter of the European patent is not *patentable* within the terms of *Articles 52 to 57*;

(b) if the European patent does not *disclose* the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art;…"

Most Contracting States have also changed their national patent laws to correspond to the European Patent Convention provisions. Moreover, when Contracting States are interpreting their national law provisions incorporating EPC rules, the interpretation should follow the EPO practice. *Margarete Singer – Dieter Stauder*, European Patent Convention, A Commentary, Vol 1, Thomson Sweet & Maxwell 2003, p. 17, 65. However, it seems to be difficult to achieve uniformity of interpretation for when software is patentable. This divergence also became apparent when the directive for computer-implemented inventions (COM (2002) 92 final – 2002/0047 (COD)) failed.

In case the unitary patent protection (COM(2011) 215 final) enters into force the patentability criteria for that system would be consistent with the European Patent Convention. Since the analysis of this article concentrates on the patentability stage, the analysis would apply to new unitary patent system accordingly.

[32] Act revising the Convention on the Grant of European Patents (European Patent Convention) of 5 October 1973, last revised on 17 December 1991, of 29 November 2000.

[33] *Singer – Stauder, supra* note 31, at 67. The EPC 2000 entered into force on 13 December 2007.

[34] The historical background for this provision is that EPC was meant to be consistent with international agreements and under rules (39.1. and 67.1) of the Patent Cooperation Treaty (PCT) authorities of PCT are not obligated to make prior art searches on specific subject matters. Under the PCT system these exclusions do not imply that these would not constitute inventions. These rules just take into account that not all PCT authorities are able to make the relevant searches for these subject matters. *Justine Pila*, On the European Requirement for Invention, p. 912, IIC 2010, pp. 906–926.

[35] *Singer – Stauder, supra* note 31, at 67.

[36] This might not be a surprise when considering how contradictory the approaches of the national delegations which took part in drafting the initial text of the EPC were. See *Justine Pila*, Article 52(2) of the Convention on the Grant of European Patents: What Did the Framers Intend? A Study of the *Travaux Prepatoires*, pp. 769–770, IIC 2005.

of the patentability test.[37] However, the increasing application numbers could also be explained by other reasons, such as the software industry's growth in magnitude and quality. Nevertheless, if the development of software patentability in EPO case law is analyzed for a longer period of time, it still becomes evident that the threshold for patentable subject matter has also relaxed over time. In essence, the initial exclusion of software from patentability has been demolished. The availability of patent protection has expanded in the EPO practice, step by step. This evolution of law has required defining the patentable subject matter by rulings on what is considered to form an invention, i.e. not a computer program *as such*.

The genesis of the more lenient approach to software patents dates back to 1986 and to the case *Vicom*. The claimed invention related to a mathematical method, which was applied in executing a computer program. Notwithstanding the fact that both mathematical formulas and computer programs *as such belong to the excluded subject matter*, the claimed image processing method was declared to be technical by its nature. In this case it was established that a claim directed to a *technical process*, which process is carried out under the control of a program (hardware or software), cannot be regarded as a computer program as such. Furthermore, it was established that *technical means* also captures the use of a computer program. The analysis combined the subject matter discussion with the requirement that an invention must be industrially applicable. Moreover, it was declared that it is decisive what technical contribution the invention makes as a whole to the known art. In the decision it was emphasized that if conventional patentability criteria are met, then an invention should be patentable notwithstanding the fact that it utilizes modern technological means. The Board held a view that there should not be undue limitation for a patent owner to assert his rights.[38] This case illustrates how the *preference of patentability and protectability* may form a part of the analysis.

The IBM decision meant a new turning point for software patentability in the EPO practice. In the IBM decision it was explained that execution of a program always involves physical effects e.g. electrical currents and such normal physical effects are not in themselves sufficient to lend a computer program technical character. But if a computer program is capable of bringing about, *when running on a computer*, *a further technical effect* going beyond these normal

[37] In EPO's own facts and figures published on an annual basis it is elaborated that patents for computer-implemented inventions are granted by EPO and these relate to various technological fields. See, for example, Facts and Figures 2008, p. 16, available at http://www.epo.org/about-us/publications/general-information/facts-figures.html. Therefore, it is difficult to estimate exact numbers of patents for computer-implemented inventions. Moreover, EPO's own statistics give numbers based on technological fields for patent applications only and not for granted patents. But from the EPO's annual basic figures it can at least be seen that trend in applications in the computing field has been rising.

[38] Vicom T 0208/84 (1986), headnotes, section 7 and 16–17. In the case X-ray apparatus T 0026/86 (1987) the EPO established that a mix of non-technical and technical features is not considered a computer program as such if the described invention uses *technological means*. An invention is patentable if other patentability requirements are met.

physical effects, it is not excluded from patentability, *irrespective of whether it is claimed by itself or as a record on a carrier.*[39] This decision meant that *software product claims* became acceptable. Moreover, the *technical character* requirement became an implicit requirement for invention under Article 52 EPC.[40] However, in this case it was still underlined that in some cases (when there is no further technical effect), computer programs belong to the exclusion under Article 52 EPC.[41]

The case Pension Benefit made clear that if there is an apparatus involved, there is also the required technical character. Firstly, it was elaborated that business method claims which concern the use of technical means (under the understanding of Vicom decision, technical means here refers to a software implementation) for purely non-technical purposes and/or processing purely non-technical information is not always sufficient to lend a method a technical character. However, the reasoning continued by stating that an apparatus containing a physical entity or concrete product is an invention within the meaning of Article 52 even when it is for purposes of performing an economic activity.[42] The next step for an even more lenient approach is case Hitachi. In this case the Technical Board of Appeal deviated from Pension Benefit by deciding that a method involving technical means is enough for a technical character to exist and hence for an invention within the meaning of Article 52 EPC. The purpose of the method no longer mattered under this ruling.[43]

In case Microsoft T 0424/03 it was even declared that a computer-readable medium is a technical product and thus has a technical character. Moreover, computer-implemented method claims were restated not to be computer programs as such.[44] This case clearly deviates from the approach adopted in the IBM case. In the IBM case it was still required that computer program product claims produce a further technical effect. However, in the Microsoft case the approach adopted is that a computer program on a computer-readable medium always avoids exclusion under the article 52 of the EPC. The Enlarged Board of Appeals of the EPO has declared that differences between the IBM case and the Microsoft case are normal evolution of case law and the cases are not therefore diverging.[45]

The last three decisions have been defined as "any hardware approach" meaning that if patent claims contain any reference to a machine the claimed

[39] IBM/Computer program product T 1173/97 (1998). This approach is confirmed in the Guidelines for Examination, where it is written that if computer programs have a technical character, they are not considered to belong to the software as such exclusion. The Guidelines for Examination applicable as of 01 April 2010, Part C, Chapter IV-3, 2.3.6. These Guidelines refer in this context especially to IBM/Computer program product T 1173/97 case and a requirement of further technical effect.

[40] Controlling pension benefits system/PBS PATRNERSHIP T 0931/95 (2000).

[41] EPO G 0003/08, section 10.2.3.

[42] Controlling pension benefits system/PBS PATRNERSHIP T 0931/95 (2000).

[43] Hitachi/Auction method T 258/03 (2004).

[44] Microsoft Corporation/Data transfer with expanded clipboard formats T 0424/03 (2006).

[45] EPO G 0003/08, e.g. headnotes 6.

matter is no longer considered software as such and is not excluded from patentability.[46] This line of cases has led to the situation *that exclusion of computer programs as such in Article 52 of the EPC no longer has any practical significance*.[47]

From the above illustrated case law it becomes evident that software is more easily patentable subject matter than earlier. This creates a broad scope of protection for software technologies as a starting point. One could conclude that principles of patentability and protectability have succeeded in Europe in this technological area. This open approach to patentability also resembles the prospect theory's recommendation. But, analysis so far has focused on the question what is meant by software "as such". Now it is evident that this criterion is no longer an obstacle for software to be patentable. The considerations, however, do not stop here. Article 52 only stipulates what is meant by an invention. This is an initial step for further assessments. Since software as such exclusion has become redundant, it is now crucial how the other patentability criteria are to be interpreted. This has a critical effect on the scope of protection. The prospect theory's implication on patentability threshold was that it is sufficient that the *technological information* is new and worth of further investigations.

In the European Patent Convention the criteria for patentability are that the invention has to be new, include an inventive step and be susceptible for industrial application in order for a patent to be granted. In the IBM case it was established that technical contribution test belongs to the analysis where an inventive step and novelty are considered, and it is not part of analysis under Article 52.[48] It was also elaborated in the Pension Benefit and Hitachi cases that in the inventive step analysis only those features are taken into account, which contribute to the technical character. Hence, by these cases the technical contribution test was clearly separated from the analysis based on Article 52 EPC. In fact, patents were neither granted in Pension Benefit nor in Hitachi. However, in Microsoft T 0424/03 the EPO Board of Appeal did not make a distinction on which parts the inventive step was lying, whether in software or in other features. The prior art to which the invention was compared to was Windows 3.1.[49] This approach seems to deviate from the earlier cases. In this case the patent was even granted.

These developments have not been followed by national courts without doubts. After those decisions, the Court of Appeal of England and Wales in its Aerotel judgement questioned the consistency of the EPO approach regarding software patentability. Moreover, the court of Appeal, without any formal authority to do so, proposed questions which it deemed the President of the EPO

[46] Aerotel Ltd. v. Telco Holdings Ltd & Ors Rev 1 [2006] EWCA Civ 1371 (27 October 2006), section 26.

[47] This case law is taken into account in the Guidelines for Examination, which presently provides that *any claimed subject matter defining or using technical means is an invention within the meaning of article 52 (1)*. The Guidelines for Examination applicable as of 01 April 2010, Part C, Chapter IV-3, 2.3.6.

[48] IBM/Computer program product T 1173/97.

[49] Microsoft/Data Transfer with expanded clipboard formats (2006) T 424/03.

could submit to the Enlarged Board of Appeal under Article 112 of EPO.[50] The President can refer the point of law to the Enlarged Boards of Appeal when Boards of Appeal have given diverging decisions on the point of law referred to. However, the Enlarged Boards of Appeal deemed the President's referral inadmissible since it was found that what has taken place is normal evolution of law. However, the President's referral only focused on the software as such exclusion and did not question the development on inventive step evaluation, even though it was one of the questions put forward in the Aerotel case. Therefore, the Enlarged Boards of Appeal merely noted that a system of how an inventive step is analyzed is summarized and laid down in the case Duns Licensing Associates.[51]

In the decision of Duns Licensing Associates the Board of Appeal explained broadly the rationale of EPO's practice and tried to clarify EPO's position in software patents. It was elaborated that it should be examined separately whether there is an invention within the meaning of Article 52 and whether the invention fulfills the other patentability requirements. In this assessment it was emphasized that invention is a general and absolute requirement while novelty and inventive steps are relative. It was further stressed that novelty and inventive steps have to reside on the technical part of the invention. In this case a new algorithm and the method of estimating sales activity were not patent eligible due to the lack of inventive step. The contribution to the prior art related to a new algorithm. However, the only technical part of the claimed system was to use processor to implement algorithm and non-technical method, and this was held obvious. Even in cases where non-technical features are intermingled with technical features (which is common in cases of computer-implemented inventions), there is a requirement that this kind of invention still has to offer a solution for a technical problem.[52]

Due to the evolution of law, Article 52 EPC exclusion ("software as such") no longer has any practical meaning in preventing software from being patentable. However, the Enlarged Board of Appeal of the EPO assumes that the list of exclusions has a role in determining the inventive step and hence has not fully lost its role.[53] In practice however, if computer programs generally have *technical character* (as it seems under Microsoft T 0424/03), they often avoid the exclusion. Therefore, the exclusion "computer program as such" cannot have an important role in inventive step analysis either. Nevertheless, the other exclusions

[50] Aerotel Ltd. v. Telco Holdings Ltd & Ors Rev 1 [2006] EWCA Civ 1371 (27 October 2006). Moreover, in the case the court specified one German patent case, which was claimed to indicate that German courts are not following the "any hardware approach".

[51] Opinion of 12 May 2010 G 0003/08 headnotes 6 and reasons of the opinion 10.12.1 and 10.13.2.

[52] Estimating sales activity / Duns Licensing Associates T 0154/04 (2006), section 10 and 14–16, 27–28 referring also to the case COMVIK T 641/00 (2003).

[53] G 0003/08 reasons for the opinion 10.13.1. If this would be the case it would mean that the abandoned overall intermingled analysis of "not software as such" and "contribution to the technical field" which earlier took place under article 52 of the EPC, would in future take place under articles 54 and 56.

(for example, scientific theories, mathematical methods or methods for doing business) might become relevant in the analysis even in computer-implemented inventions. This was also illustrated in the case Duns Licensing.[54]

From the case law discussed above one gets an impression that even though the subject matter exclusions seem to have lost some of their muscle, the software patent applications are presently often rejected on the basis of lacking inventive step. Hence, the requirements of novelty and inventive step as interpreted in the framework of the EPC still seem to bear the traditional threshold role for patentability in computer-implemented inventions, as in other technological areas. However, there nonetheless have been some concerns that software patents are granted to trivial inventions. One problem identified in these discussions has been that in the area of new technologies there are some practical difficulties in identifying the prior art. As a consequence the quality of granted patents is claimed to be low. On top of these practical problems it has been argued that inventive step analysis has in practice inflated to the degree that patents are actually granted if inventions are novel.[55] If this is the case then our patent system is in this respect as described in the prospect theory: a patent institution where substantial novelty is a sufficient test for patentability.

When comparing the European situation to the situation in the United States, one recognizes that somewhat similar developments and concerns have taken place there as well. In fact, to put it more precisely, what has first happened in the United States in software patenting and discussions thereof has been followed in Europe in a quite short time span.

*2.3 The developments in the United States.* Title 35 U.S.C § 101 provides patent protection for any new and *useful* process, machine, manufacture, or composition of matter. The starting point of this provision of law is that of broad protectability ("any" new…). However, there are doctrinal limitations for patentability, which have been developed in case law. Excluded from protection are laws of nature, natural phenomena and abstract ideas.[56] Among these limitations, the most relevant for computer programs is non-patentability of abstract ideas. In earlier case law the purpose of an algorithm was seen as solving a mathematical problem. Such an algorithm or mathematical formula was seen parallel to laws of nature and therefore non-patentable. Hence, one was not able to patent algorithms themselves.[57] In the 1970's software was considered a compilation of algorithms and therefore not patentable.[58]

[54] However, it is noteworthy that the Microsoft T 0424/03 (2006) case is not referred to in the case Duns Licensing T 0154/04 (2006).

[55] *Renier Bakels and P. Bernt Hugenholtz*, The patentability of computer programs, Discussion of European-level legislation in the field of patents for software, Study for the Committee on Legal Affairs and the Internal Market of the European Parliament, Working Paper JURI 107 EN (2002), pp. 36–39.

[56] Diamond v. Diehr 450 U.S. 175 (1981).

[57] Gottschalk v. Benson, 409 U.S. 63 (1972). Parker v. Flook, 437 U.S. 584 (1978).

[58] *Cohen – Lemley, supra* note 7, at 8.

In the case Diamond v. Diehr (in 1981) the Supreme Court of the United States clarified software patentability by stating that a patent claim does not become non-statutory only for the reason that it utilizes a mathematical formula, computer program or digital computer. In this case the algorithm itself was not subject to patent claims, but the claims were directed to something "otherwise statutory subject matter". Patent claims were directed to an industrial process for molding rubber products. The court stated that the claims should be analyzed as a whole when considering whether they can be patentable under § 101. It was also clarified that there needed to be activity outside the computer program. More particularly, insignificant post-solution activity alone would not save the claims from being non-patentable.[59]

In 1994 and in the case *In re Alappat*, courts in the United States started to accept software patent claims if there was a reference to a machine. To satisfy a requirement of "otherwise statutory process or machine" it was enough that reference was made to a general purpose computer, which was used to implement an algorithm. It was stated that a general-purpose computer becomes a special-purpose computer when programmed to fulfill specific functions. In this case it was held that claims were directed to a machine, and machines are patentable under § 101.[60]

A step further was taken in 1998 in the case State Street Bank & Trust v. Signature Financial Group. In this case it was elaborated that the patentability analysis should not concentrate on the question which of the four (process, machine, manufacture or composition of a matter) patentable categories the patent claims belong to. The important issue was whether an invention has practical utility. In this case it was clarified that a mathematical algorithm can be patentable on the condition that the algorithm produces a useful, concrete and tangible result. On the same condition business methods were held patentable. In this case it was also emphasized that Congress did not intend to put any limitations on patentability. The term "any" in § 101 refers to this interpretation. This has been understood to indicate that "anything under the sun made by man is patentable".[61] By this case and the cases that followed the limitations for patentability of mathematical algorithms and hence of software were practically demolished.

There have been concerns that the United States Patent Office grants software patents too easily.[62] Recently, however, there has been some trend in the

[59] Diamond v. Diehr 450 U.S. 175 (1981). Furthermore, the court stated that at that stage it will not yet be considered whether the claims satisfy the novelty and non-obviousness tests.

[60] In re Alappat 33 F.3d 1526 (Fed. Cir. 1994) (en blanc).

[61] State Street Bank & Trust v. Signature Financial Group 149 F.3d 1368 (Fed. Cir. 1998). "Everything under the sun made by man" refers to case Diamond v. Chakrabarty, 447 U.S. 303, 309 (1980). The approach of this case was affirmed next year in the case AT&T v. Excel Communication, where court stated that it is enough that software brings a useful, concrete and tangible result. Physical transformation is not necessary even though it is one way to accomplish this aim. 172 F.3d 1352 (Fed. Cir. 1999).

[62] See, for example, *Mark A. Lemley and Carl Shapiro*, Probalistic Patents, p. 83, Journal of Economic Perspectives (2005), pp. 75–98.

Patent Office and in the Federal Circuit to reject patents on the grounds of subject matter limitation.[63] Most attention has naturally been directed at the case which went to the Supreme Court. The USPTO rejected the patent application of Bernand L. Bilski and Rand Warsaw on the grounds that the invention was not implemented on any apparatus, and since it was merely an idea which solved a mathematical problem. This rejection was also affirmed by the Board of Patent Appeal and Interferences (BPAI).[64] The case went to the Federal Circuit, which deviated from its earlier decisions by declaring here that a "useful, concrete and tangible" test is not a proper test for patentability. The court readopted the physical transformation test, which it had earlier abandoned in cases State Street Bank & Trust v. Signature Financial Group and AT&T v. Excel Communication. Physical transformation test denotes that invention transforms an article from one state to another. The Federal Circuit held the claims unpatentable, as well.[65]

The Supreme Court of the United States affirmed that patent application was not patent eligible. However, it did not follow the Federal Circuits' approach in reaching such conclusion, but held that a machine-or-transformation test is not the sole test for patent eligibility, even though it could provide some guidance for patentability in some situations. The Supreme Court further stressed that *courts are not entitled to build limitations for patentability if these are not articulated by the legislature*. The Court observed that the intention of the Congress was to give a broad scope for patent laws. However, the Supreme Court clarified that even though it did not approve the test of the Federal Circuit in the re Bilski case, it does not mean approval of the Federal Circuit's earlier interpretations either. Here the Supreme Court referred to the case State Street Bank & Trust v. Signature Financial Group. The Supreme Court identified some other possibilities to limit patentability of processes, namely, unpatentability of abstract ideas.[66]

One could arrive at twofold conclusions from this case. Firstly, the Supreme Court seems to adhere to the principle of broad patentability when it stressed the courts' non-authorization to set limits for the patentable subject matter. However, the Supreme Court also indicated that there are possibilities to limit patentable subject matter, but these have not been applied efficiently by courts. Hence, the current state of affairs is not fully satisfying the Supreme Court. It opined that the non-patentability of ideas needs to be taken into consideration more thoroughly in process claims. However, at present it is confirmed that software and business methods no longer belong to the excluded subject matter, nor do they need to be connected to machines in order to be patent eligible.

[63] See e.g. In re Petrus A.C.M. Nuijten, 500 F.3d 1346 (Fed. Cir. 2007) (en banc reh'g denied, Feb. 11, 2008) and In re Stephen W. Comiskey, 499, F. 3d 1365 (Fed. Cir. 2007) the latter case was partly also relating to obviousness requirement.

[64] Ex Parte Bernand L. Bilski and Rand A Warshaw, 2006 WL 4080055 available at http://www.uspto.gov/ip/boards/bpai/decisions/inform/fd022257.pdf.

[65] In re Bernard L. Bilski and Rand A Warsaw 545 F.3d 943, 954 (Fed. Cir. 2008).

[66] Bilski v. Kappos 561 U.S. (2010).

These can be excluded on the basis that they are non-patentable ideas. The closest European correlate for this exclusion at the moment is the non-patentability of scientific theories and mathematical methods under Article 52 EPC.

However, as discussed above in the European context, the subject matter limitation is not the only limitation on patentable inventions. Title 35 U.S.C § 102 and 103 require that inventions need to be novel and non-obvious in order to be patentable. Even in the case State Street Bank & Trust v. Signature Financial Group the Federal Circuit stressed that patentable inventions must also satisfy the other criteria of patentability including novelty, non-obviousness and adequacy of disclosure.[67] The same was emphasized by the Supreme Court in the Bilski case.

In fact, some software patents have been found invalid due to obviousness. In Amazon.com the court found that Barnes & Nobel had raised serious questions on validity of one-click shopping element on the grounds of obviousness, since there existed references where this kind of system was motivated.[68] This is not only a recent trend. In an older Supreme Court case from 1976 it was reasoned that if there exist analogous earlier programs, then a program is considered obvious. The detailed differences between programs were not analyzed in the patentability test. In this case the court did not even consider the question of patentable subject matter, because it held the system obvious in any case.[69] However, some cases indicate that the obviousness standard is fairly easy to pass. In the case In re Zurko the invention was held non-obvious even though all elements of the invention were available in the prior art. The end result was reasoned by the fact that the problem to be solved was not defined in the prior art.[70]

In the case Lockwood v. American Airlines the non-obviousness standard was linked to the level of the patent applicant's disclosure. The court stated that there were prior art references which made the applicant's system obvious. In fact these references related to the issue that the patent applicant's own system had been in public use. The applicant claimed that these references were not so detailed that a person skilled in the art would have been able to reproduce the system. However, the court held that the applicant's own disclosure in patent application was similarly imprecise.[71]

Actually, there has been discussion whether the non-obviousness standard should be raised in order to improve the quality of issued patents.[72] In KSR Int'l, Co. v. Teleflex, Inc. (the invention was about car pedals) the Supreme Court did not accept the non-obviousness test utilized by the Federal Circuit.

[67] State Street Bank & Trust v. Signature Financial Group 172 F.3d 1352 (Fed. Cir. 1999).
[68] Amazon.com v. Barnes & Noble 239 F.3d 1343 (Fed. Cir. 2001). This case was about preliminary injunction. The case addresses a serious problem that initially the patent was granted. The patent was held obvious at the stage where the patent holder brought a suit on infringement. Hence, the quality of patents issued by USPTO can be questioned.
[69] *Dann. v. Johnston* 425 U.S. 219 (1976).
[70] In re Zurko, 111 F.3d 887 (Fed. Cir. 1997).
[71] Lawrence B. Lockwood v. American Airlines, Inc. 107 F.3d 1565 (Fed. Cir. 1997).
[72] *Lemley and Shapiro, supra* note 15, at 84.

Under the test an invention for combining the known elements was held obvious only "if some motivation or suggestion to combine prior art teachings can be found in prior art teachings, the nature of the problem or the knowledge of a person having an ordinary skill in the art" (teaching-suggestion-motivation test). This approach was considered too narrow a rule for the proper analysis of obviousness. The Supreme Court held that general principles cannot be turned into rigid rules to limit the analysis of what can be considered as obvious. The Supreme Court further stressed that the obviousness analysis should not only cover the problem to be solved, but any need or problem known at the time of application may render a combination obvious. In non-obviousness analysis courts can presume that a person of ordinary skill in art also would have some creativity and patents should not be granted to ordinary inventions. In essence, the obviousness analysis should be flexible in order to guarantee that patents are issued to inventions which are sufficiently advancing the state of art. Otherwise a patent institute would rather stifle than promote innovation.[73]

If the non-obviousness standard functions in the way addressed by the Supreme Court, it would restrict the patent scope to those inventions which are worth rewarding. This kind of approach would deviate from the prospect theory's propositions. However, there has been some controversy over the issue whether or not the KSR case has raised the standard of non-obviousness in the Federal Circuits' case law.[74] It is also noteworthy, that this standard is in practice extremely difficult one to define. Alongside with this notion it has been argued that the Supreme Court did not give proper analytical tools for deciding on non-obviousness standard. Therefore, there will be some uncertainty in future how the norm should be interpreted.[75]

*2.4 Comparative aspects and concluding remarks on patentability threshold.* The analysis above confirms that developments in the EPO case law have to great extent followed the trajectories taken first in the United States.[76] In the 1970's in the United States algorithms were comparable to laws of nature and therefore non-patentable. In Europe the European Patent Convention from 1973 excluded computer programs as such from patent protection. The next step in the United States was taken in the case Diamond v. Diehr, which reminds closely the EPO's approach in Vicom. In these cases it was elaborated that when claims are directed at a technical process (otherwise statutory subject matter), the claims are not considered to belong to the excluded subject matter.

[73] KSR Int'l Co. v. Teleflex, Inc., 127 S.Ct. 1727, 550 U.S. 398 (2007).
[74] See *Ali Mojibi*, An Empirical Study of the Effect of KSR v. Teleflex on the Federal Circuit's Patent Validity Jurisprudence, Albany Law Journal of Science and Technology (2010), pp. 559–596.
[75] *Sarah A. Geers*, Common Sense and the Fact Finder Without Skill in the Art: The Role of Objective Evidence in Achieving Proper Technology Specificity, pp. 228, 236–237, Seton Hall Law Review (2010) pp. 225–272.
[76] See also *Reto M. Hilty and Christophe Geiger*, Patenting Software? A Judicial and Socio-Economic Analysis, p. 620, IIC (2005), pp. 615–646.

The developments in the United States have also meant pressure on the European patent system later on. One could claim that EPO cases Pension Benefit (2000), Hitachi (2004) and Microsoft (2006) follow the logic of the cases In re Alappat (1994), State Street Bank & Trust v. Signature Financial Group (1998) and AT&T v. Excel Communication (1999) by broadening the patentable subject matter and by interpreting the limitation "software as such" narrowly. In these European cases any reference to hardware is enough to circumvent "software as such" limitation on patentability. These cases follow the logic of the case In re Alappat. Moreover, since the Hitachi case from the EPO, a purpose of a method no longer matters in subject matter analysis, and therefore computer-implemented business methods became more broadly patentable similarly to the developments in the U.S. in the State Street Bank & Trust v. Signature Financial Group.

This comparative analysis confirms that the scope of protection has broadened through the expansion of the patentable subject matter both in Europe and the United States. The latest developments do not seem to change this trend dramatically. This development could be seen as an implication of the prospect theory generally recommending a broad scope of protection and not setting explicit limits for the subject matter. However, if the non-obviousness standard and respective inventive step standard are kept sufficiently strict, the problems created trough expansion of patentable subject matter could be mitigated to some extent. Consequently, the traditional patentability tests play a critical role in limiting the area of patent eligible inventions. The patent system with true non-obviousness / inventive step standard cannot be honestly said to mirror the prospect theory on patentability criteria. After all, under the prospect theory the only test for patentability was the substantial novelty of the information. However, if it is hoped that a patent system deviates from the model set in the prospect theory, it should be critically analyzed whether claims on the deterioration of inventive step / non-obviousness standard hold true and what the actual reasons for such development are.

Next it will be analyzed what the society has received in patent trade. Even though the sufficiency of disclosure can be seen as one requirement for a valid patent, it also functions as another side of the patent bargain. Society grants patent monopolies and receives something in return.

## 3. Disclosure requirements: crippled – dead-letter law?

*3.1 Objective of disclosure and international setting.* The disclosure requirement of patent laws has been seen as a justification for the patent system. Without the patent system it could easily happen that the innovator keeps his innovation as a trade secret without others having any knowledge of the new information or possibility to benefit from it. Therefore, the patent system induces an innovator to publish the information. As a reward for publication an innovator receives a patent monopoly.[77] By this, the patent system fulfills the public interest through

[77] UNCTAD-ICTSD TRIPS Resource Book, *supra* note 27, at 449.

making the new technological knowledge available to all. Consequently, the progress of science is made possible. Others can build on the previous knowledge; they do not need to put resources on solving the problem already solved. The prerequisite for this development is that the patent system truly guarantees the publication of adequate technological information. After the patent term this information enters fully into the public domain. During the patent term the disclosure helps in designing around or by facilitating improvements, which are eligible for patent protection. Therefore, the disclosure requirement is an essential element of contract theory justification of the patent system.[78]

Somewhat surprisingly Kitch, too, argued that one function of the patent system is to avoid keeping innovations as trade secrets. However, for him it did not seem to be of much concern whether the information provided through patent law disclosure is sufficient. For Kitch, disclosure served the purpose of finding the legal boundaries of a patent monopoly and not to reveal commercially relevant information.[79] Kitch argued that expanding disclosure would mean more costs for the patent institution without necessarily leading to larger availability of useful information. This assumption relates to his proposition of early patent rights. When patents are granted at an early stage of the innovation process, there is not yet necessarily detailed information available when patents are applied, but the invention needs to be further investigated and developed before put on the market. However, black letter laws of the Unites States require disclosing the best mode of practicing the invention. Even in Europe one way to implement the invention has to be disclosed.

Moreover, Kitch argued that disclosure could be left for the patent holder who would disseminate the relevant information.[80] However, it is questionable if leaving the disclosure for patent holders would constitute more efficient information sharing. In many cases it may be doubted whether there would be disclosure at all. Then, the question rises if the other side of the patent bargain is fulfilled.

Today it is the patent claims in patent application which define the metes and bounds of a patent monopoly. In addition to patent claims, the applicant needs to provide information which makes it possible for third parties to reproduce the invention. Hence, at present the disclosure has also a function other than setting limits for infringement analysis. Even though patent claims are different from disclosure under patent specification, these two are closely bound to each other. The patent claims should not cover broader monopoly than what the inventor has invented and specified through patent law disclosure. Under the TRIPS Agreement, Members are, however, free to decide what is the exact connection between the patent specification and patent claims.[81]

Article 29 TRIPS requires that Members set a disclosure obligation for patent applicants. The invention has to be disclosed in a manner sufficiently clear and

[78] See for example *Burk and Lemley, supra* note 8, at 82.
[79] *Kitch*, *supra* note 10, at 276 and 287.
[80] Loc. cit.
[81] UNCTAD-ICTSD TRIPS Resource Book, supra note 27, at 449.

complete for an invention to be carried out by a person skilled in the art. This has also been called the enablement requirement, meaning that the disclosed information should be such that it enables third parties to make the invention without too many experiments. Moreover, Members may obligate the applicant to disclose the best mode for carrying out the invention at the time of filing the application. It has been spelled out that, since at that time the invention is at its early stage, this best mode disclosed might not be of great practical use.[82]

*3.2 Disclosure requirements under the European context.* Article 83 EPC follows TRIPS and sets a requirement for a patent applicant to disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. The importance of the disclosure requirement is emphasized by making the fulfillment of the disclosure a ground for validity of a European patent. If the disclosure is insufficient, a European patent can be revoked in national proceedings under article 138 EPC.

Under the EPC, the disclosure requirement does not include a best mode requirement. Neither can EPC Members set a best mode requirement into their national patent laws.[83] However, Rule 42 in the Implementing Regulations for the European Patent Convention specifies what the description of the invention must contain. Rule 42 provides that the description "*shall describe in detail at least one way of carrying out the invention claimed, using examples where appropriate…*" The Guidelines for Examination of EPO clarify the European Patent Convention further. These Guidelines are non-binding, but can be expected to be followed at least at the first stage of the examination procedure.[84] The Guidelines for Examination of EPO provide that an invention must be disclosed in a way to render it apparent for the person skilled in the art. In some cases one example may be sufficient but if claims cover a broad area a sufficient disclosure requires a number of examples or alternative embodiments. The sufficiency of disclosure is assessed on the basis of the application as a whole.[85] Hence, the description of the invention does not need to contain all information, but drawings and claims are taken into consideration as well when analyzing the sufficiency of disclosure.[86] To conclude at this point, European Patent Convention and the Implementing Regulations seem to guarantee a sufficient disclosure. The disclosure requirement appears to be a fundamental part of the European patent system.

However, if we look at the disclosure requirements in the software patent field more closely, the picture changes to some extent. In the field of computer programs, it is required that the description of an invention is written in normal language. EPO does not deem code listings to fulfill the disclosure of the invention. Only short code listings in commonly used programming languages are

[82] Op. cit., at 451–452.
[83] *Tritton*, *supra* note 30, at 67 and 86.
[84] Op. cit., at 88.
[85] The Guidelines for Examination applicable as of 01 April 2010, Part C, Chapter II-2, 4.1. and 4.9.
[86] *Singer – Stauder*, *supra* note 31, at 357.

accepted if these illustrate an embodiment of the invention.[87] EPO refuses to accept code listings even in cases where patent applicants would wish to disclose them. In the Guidelines for Examination this practice is reasoned by saying that the aim is that a person skilled in the art *who is not a specialist in any programming language*, but does *have general programming skills*, would be able to understand the invention.[88]

However, if we compare how a person skilled in the art is understood in other circumstances in the EPC, this kind of definition "not a specialist in any programming language" for a person skilled in the programming art seems unexpected. It is established that a person skilled in the art for disclosure analysis is assumed to have the same qualifications as a person skilled in the art for inventive step analysis.[89] In fact, in the inventive step analysis a person skilled in the art is understood as being a person specialized in the respective technological field. Moreover, in cases where a problem directs a person to find a solution from a different technological area, a person skilled in the art becomes a specialist in that respective art. Therefore, this imaginary person does not even need to be the same person for all analyzed technological areas. It is enough that the technological fields have such contact points that a person skilled in one art would know when to consult the specialist in another technological field for finding a solution.[90] Consequently, a person skilled in the art needs to be specialist in some technological area and where consultation is required from other fields then the specialist in this consulted area becomes a person skilled in the art.

From this analysis it seems to be reasonable to define, for disclosure purposes, the "person skilled in the art" in the computer program field to refer to a specialist in the programming. Furthermore, a natural expectation is that a specialist in a programming art is knowledgeable at least in one programming language and not only someone having "general programming skills". This person could also be assumed to consult specialists in other programming languages and therefore a person skilled in the art will cover all programming languages. This kind of interpretation of article 83 of the EPC would be consistent with how other articles of the EPC are interpreted and especially how a person skilled in the art is generally understood in this legal context.

If we agree that a person skilled in the programming art refers to a specialist in at least one programming language, then one would assume that the natural language for the purposes of disclosure is the source code. After all, it has been perceived that code is the way how programmers communicate ideas to each other.[91] Moreover, Rule 42 requires that the description describes one way to implement the invention. The program code is an implementation in software

[87] The Guidelines for Examination applicable as of 01 April 2010, Part C, Chapter II-8, 4.15.
[88] Loc. cit.
[89] *Singer – Stauder*, *supra* note 31, at 358.
[90] *Tritton*, *supra* note 30, at 104.
[91] "*Programmers communicating ideas to one another almost inevitably use code, much as musicians use notes*" Universal Studios, Inc. v. Corley, 273 F.3d 448 (2d Cir. 2001).

inventions. The question rises if the source code should be an inherent part of the sufficient disclosure. When the directive proposal on the patentability of computer-implemented inventions was debated in the EU, several proposals were made regarding the disclosure obligation. In many of these proposals, sufficient disclosure was defined to cover code documentation.[92] The code documentation would also help "persons skilled in the art" in small software companies to utilize patent data in a language they understand without the expertise of patent application specialists. However, the current state of affairs is that source code is not required.

*3.3 Disclosure requirements under the United States' context.* The disclosure requirement in the United States is closely similar to the European one. Title 35 U.S.C § 112 provides that the specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to make and use the same. Moreover, differently from EPC, the specification shall set forth the best mode contemplated by the inventor of carrying out his invention. Accordingly, when a patent is applied through the Patent Co-operation Treaty and the designated state is the United States, the patent application has to fulfill the best mode requirement.[93] The disclosure requirements are understood as written description, enablement and best mode requirements.[94]

The written description requirement ensures that the right to exclude as expressed in the claims does not cover a broader scope than what the inventor has contributed to the technological field.[95] In other words, written description has been defined as providing evidence that the inventor truly holds in his hands the invention he is claiming for. The enablement requirement, for its part, is related to what the description teaches for persons skilled in the art.[96] In some cases these requirements are seen as being actually one and the same thing.[97] Both of these are anyway limiting the scope of protection as they narrow down the area of possible (and valid) claims. Moreover, all of the disclosure requirements serve the patent bargain by providing the technological information to the public domain.

[92] Such obligations were included in the amendments 124, 125 and 144. European Parliament, Amendments 40–256, Draft recommendation for second reading Michael Rocard, Commission des affaires juridiques 4.5.2005 (PE 357.776v01-00), Patentability of computer-implemented inventions, Council common position (11979/1/2004 – C6-0058/2005 – 2002/0047(COD)).
[93] *Singer – Stauder, supra* note 31, at 369.
[94] See more about the evolution of written description requirement for software inventions *Ajeet P. Pai*, Note: The Low Written Description Bar for Software Inventions, Virginia Law Review (2008), pp. 457–493.
[95] Reiffin v. Microsoft Corp 214 F.3d 1342 (Fed. Cir. 2000).
[96] Vas-Cath Inc. v. Mahurkar, 935 F.2d 1555, 1563-63 (Fed. Cir. 1991). However, there has been discussion whether in normal cases there is a need for two separate principles of written description and enablement or whether enablement could alone be sufficient in providing proof of an invention to exist. *Merges, supra* note 8, at 1651.
[97] LizardTech, 424 F. 3d, 1345 (Fed. Cir. 2005).

It has been argued that the Federal Circuit has basically relieved software inventions from enablement and best mode requirements. Accordingly, a very abstract description has been sufficient for disclosure (written description) purposes.[98] This leads to a situation where applicants are able to draft broad claims for functions of software. Hence, first comers gain a broad patent right in cases where their claims are not considered obvious.[99]

In the relevant case law the reason given for easy disclosure requirements is that writing a computer program may sometimes merely require clerical skills while sometimes it requires more inventive activity. The requirements vary from one program to another. It has also been said that the disclosure requirements are not there to give production instructions to third parties.[100] It is noteworthy here that Kitch also argued that the disclosure requirement does not mean that commercially relevant information would be shared.[101] In many recent cases applicants have not been required to disclose the source code or flowcharts. This has been reasoned by stating that when the functions of the software are disclosed, a person skilled in the art is capable of writing a code for such functions. It is assumed that code writing can be done easily without undue experimentation. Therefore, the description of the functions has been argued to be sufficient for fulfillment of enablement and best mode requirements. Moreover, this has been stated to be in accordance with the long-standing principle of a patent law that written description does not need to contain information which is general knowledge to the person skilled in the art.[102] Even though implementing and testing the code from general description might take time, it has been argued that this experimenting is not the same experimenting than what is meant by enablement. Enablement refers to experimenting that the invention works.[103]

There have been doubts in the academia if programming specialists are as skilled as imagined.[104] Some programming specialists have described the task of programming to be difficult. It is defined as a process where even the problem sometimes needs to be described many times anew until the final program is ready.[105] This indicates that until the program implementation is ready, the actual invention is not yet known. Since the written description serves as a proof that the inventor possesses the claimed invention, it could be argued that the actual code is the way to fulfill the written description requirement. However,

[98] *Burk – Lemley, supra* note 17, at 9.
[99] *Burk – Lemley, supra* note 8, at 87.
[100] Northern Telecom Inc v. Datapoint Group, 908 F.2d 931 (Fed. Cir. 1990).
[101] *Kitch, supra* note 10, at 287.
[102] Fonar Corporation v. General Electric Company, 107 F.3d 1543 (Fed. Cir. 1997). Similar line of reasoning also In re Hayes Microcomputer Products Inc., Patent Litigation, 982 F.2d 1527 (Fed. Cir. 1992) and Sherwood, 613 F.2d 809 (C.C.P.A. 1980).
[103] *Kenneth Canfield*, The Disclosure of Source Code in Software Patents: Should Software Patents be Open Source, p. 11, The Columbia Science and Technology Law review, 2006, pp. 1–25.
[104] See for example *Burk – Lemley, supra* note 8, p. 84.
[105] Computer Science and Telecommunications Board, National Research Council, Intellectual Property Issues in Software, p. 45, National Academy Press 1991.

it has been argued that after the code is implemented there are also other functional ways to sufficiently describe the software invention.[106]

Even though the Federal Court has also defined the best mode to be satisfied by describing the functions of the software, it has been argued that the requirement might mean a more detailed disclosure. This is the case when the inventor prefers a certain way to implement the invention. If the inventor favored certain coding the best mode would in principle be satisfied by disclosing the source code or something close to that, such as a pseudocode. Moreover, the preferred way to implement the invention in fact covers a broader area than the actual claims. However, it is noteworthy that the best mode requirement is a subjective one. Therefore, in cases where there is not yet knowledge of the preferred way to implement the invention, then there is no requirement for disclosure under the best mode. Consequently, the best mode requirement can be easily circumvented by applying for a patent at an early stage. This is in accordance with the principle that the inventor does not need to reduce her invention into practice before filing a patent application.[107] Accordingly, this illustrates that early patenting is part of patent laws. This is one idea on which the prospect theory was based.

*3.4 Comparative aspects with concluding remarks.* It is remarkable that the reasons given in the relevant case law for not requiring source code in the Unites States are very different from the European ones. In the European Guidelines it is assumed that a person skilled in the art cannot understand the description written in the programming language. In the United States this is general knowledge for a person skilled in the art. As these reasonings are so contradictory, although black letter disclosure requirements are quite similar, one might suspect that the reasons given are not the sincere ones. Possible direct explanations for not requiring the code documentation may rest on practical impediments related to the resources of the patent office such as qualifications of patent examiners and possibilities to handle and store the vast amount of documentation.[108] The documentation problems could partly be resolved by accepting electronic submission. For other practical impediments, in the United States it has been realized that the possibility to submit a source code would in fact require patent examiners to learn several programming languages, which would burden the already overworked patent officials.[109] Therefore, it seems that a person skilled in the art and what needs to be disclosed for such persons might in fact be defined

[106] *Canfield*, *supra* note 103, at 8.
[107] Op. cit., at 12–14 and 17.
[108] See discussion on poor capacity of patent examiners in the United States and proposals how to improve this. *Merges*, *supra* note 26, from 606–. In the United States it has also been noted that the technical expertise of the patent bar is not in correlation with the area where patents are applied and granted. This together with the lacking expertise in the PTO has been presumed to lead to the existence of obvious software patents. See *Ralph D Clifford, Thomas G Field, Jr., & John R. Cavicchi*, A Statistical Analysis of the Patent Bar: Where are the Software-Savy Patent Attorneys, North Carolina Journal of Law & Technology, Vol 11, Issue 2, Spring 2010, pp. 223–268.
[109] *Canfield*, *supra* note 103, at 9 and 24.

from the perspective of patent examiners' expertise and influenced by other resources of patent office. It seems that administrative costs are the reason not to introduce more rigid disclosure. From the viewpoint of the prospect theory these reasons could be valuable. However, from the perspective of contract theory justification of the patent institution these factors are not similarly important.

The European Patent Convention as well as the Patent Act of the Unites States can be interpreted as requiring more detailed disclosure. Nevertheless, as explained above, for example, a source code of a computer program has remained as a trade secret notwithstanding a patent monopoly. These developments have raised serious concerns that the patent system has failed to foster innovation through patent law disclosure in this technological area.[110] Hence, it should be considered whether the current practices are in compliance with the established rules. If the Patent Offices deviate from the set disclosure requirements, it would mean that the other side of the patent bargain is not fulfilled. If software inventions are not in practice disclosed in a manner that third parties can use and practice the invention, the society has given a patent monopoly without receiving the contract theory-based benefits from it. This kind of patent system erupts one of its founding justifications. Moreover, if the legal rules seem to require more from disclosure and the reasons given are not convincing, the legality of the system will be at stake.

Disclosure requirement is a fundamental part of the patent bargaining theory, but additionally it influences in the patent scope as a limitation to broad patent claims. Imprecise disclosure means that the limits of patent scope become blurred. Third parties are unable to estimate what has been monopolized. In order to avoid infringement, they need to circumvent a wider area. This also leads to a broader patent scope. However, the critics of prospect theory have recommended a narrow scope of protection for software patents. One way to achieve this would be rigid disclosure requirements.

However, the impreciseness of disclosure can lift the standard of obviousness. These two requirements are linked together through the concept "a person skilled in the art". In the U.S. a person skilled in the art is thought to be capable of implementing a program based on general description of functions of a program. Consequently, it is reasoned that patent applicants only need to disclose very general information. Therefore, a source code is not required. One could see that the burden of required disclosure is not heavy. However, this may also work against patent applicants. It can raise the non-obviousness standard. Even vague references in prior art make many patent applications obvious and therefore non-patentable. This was illustrated in case Lockwood v. American Airlines, referred to above.

It is apparent that "a person skilled in the art" is the key concept in patent law. This concept is important for both sides of the patent bargain. Firstly, it sets

[110] Federal Trade Commission, To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy, A Report by the Federal Trade Commission 2003, Chapter 3 p. 49.

the borderline of what is obvious for a person skilled in the art. By this connection to obviousness standard it narrows down the area of protectable inventions. Additionally, patentable inventions need to be disclosed in a manner sufficiently clear for a person skilled in the art. Therefore, what is the skill level in the respective technological area defines both what becomes protectable and what needs to be disclosed? It has been argued that through keeping the obviousness standard rigid the narrow scope of patent protection can be achieved and there would be no need for tailoring the disclosure requirements.[111] This would mean less software patents, but not necessarily narrow protection for those granted.

However, if we estimate the present stage of software patentability in the United States or under EPO practice, one gets the impression that broad patent protection is guaranteed by both practices. Firstly, the current state of affairs is that software inventions are more easily protectable. There are no longer specific limits for software inventions. Moreover, it is not certain that obviousness standard and especially "a person skilled in the art" is interpreted in the patent system consistently so that lenient approach for disclosure requirements factually means lifting of the non-obviousness standard. Rather, it seems that patents are more easily available and they are broader on their scope since disclosure requirements are not limiting the scope of protection either. In addition, there are other concerns on the quality of utilized non-obviousness criteria.

## 4. Theoretical premises for the future

A patent system is often justified by its benefits to the society. Essentially, the benefits of the patent system are connected to the dissemination of new technological information. This is thought to take place principally under the patent law disclosure. At the level of patent regulations under the European Patent Convention and under the patent law doctrines of the United States, it seems that the patent system is fundamentally standing on these foundations. This is stressed by making the fulfillment of a disclosure requirement as a condition for validity of a patent.

However, when present interpretations in the area of software technologies are analyzed more closely, it seems that the patent system is allocating more property rights by broadening area of patentable subject matter. Patentability has gained a role as the guiding principle in the patent system, leading to more software patents. This line of development becomes apparent when one concentrates on the question of what has happened to earlier limitations concerning patentability of software as such in Europe, or the respective limitations in the United States. These limitations have practically become demolished, and software has become generally patentable subject matter. This trend was neither reversed by the EPO's Enlarged Boards of Appeal, nor by the Supreme Court of the United States in their latest decisions concerning software patentability. This tendency could be connected to the ideas of prospect theory, as the theory

[111] *Pai*, *supra* note 94, at 493.

stresses early, strong patent rights based only on novelty of information. It may be argued that already the expansion of patentable subject matter reflects these ideals. However, the patentability issue depends more critically on how serious the threshold criteria non-obviousness will be to software patentability in the future. If inventive step will be kept as a true threshold, then the patent system will not follow the prospect theory's recommendations on abandoning the non-obviousness test. However, if this is what is hoped for then the concerns on the corrosion of inventive step requirement should be analyzed more thoroughly.

In addition to concerns on patentability criteria, patent offices have limited the area of obligatory disclosure. Therefore, it its questionable if dissemination of information takes place as intended. The current state of affairs seems to lean to the direction of the prospect theory's model. It provides early patent rights based on somewhat lenient criteria and minimum disclosure in the patent application process. This does not mean that the situation is a conscious choice of the key actors interpreting the relevant patent law norms. However, the way prospect theory often forms the core part of economic analysis in law and economics literature of patent law might give for this theory an influential power, which may surface in practical interpretations of the relevant patent law norms. Changing this would require re-invigoration and popularization of other justification and economic theories, such as contract theory and evolutionary economics.

Article 4

# Patents and Computer Program Interoperability in Europe. Are the Exceptions in Current Patent Laws and the Proposed Unitary Patent Protection Sufficient?

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# Patents and Computer Program Interoperability in Europe. Are the Exceptions in Current Patent Laws and the Proposed Unitary Patent Protection Sufficient?*

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## 1. Introduction

The basic premise of patent law is expressed in Article 7 of the TRIPS Agreement, which says that the protection of intellectual property rights should contribute to the promotion of technological innovation and to the dissemination of technology in a manner conductive to social and economic welfare. The Doha Declaration states that every provision of TRIPS should be construed in the light of this objective.[1] This formulation implies that technological development and the transfer of technology are internationally recognized as the fundamental objectives of the patent institution. Moreover, TRIPS does not only serve as an instrument granting patent protection, but patent rights should be balanced with social and economic welfare interests.[2] Consequently, one can argue that the patent institution is an instrument for achieving goals other than mere patent protection.[3] One of these important goals is technological development.[4] Similar principles of interpretation should apply to European patent laws.

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[1] Declaration on the TRIPS Agreement and Public Health, WTO document WT/MIN/(01)/DEC/2 of 20 November 2001, paragraph 5 (a). The promoted model of interpretation is teleological. In this model, the main objective of the treaty is emphasized to the extent that the explicit articles are construed from the perspective of the object of the treaty, See *Hiroko Yamane*, Interpreting TRIPS, Globalisation of Intellectual Property Rights and Access to Medicines, pp. 194–196, Hart Publishing 2011.

[2] *Abdulqawi A. Yusuf*, TRIPS: Background, Principles and General Provisions, pp. 12–13, in Carlos M. Correa & Abdulqawi A. Yusuf, Intellectual Property and International Trade the TRIPS Agreement, Kluwer Law International 2008, pp. 3–21.

[3] See also *Jens Schovsbo*, Increasing access to patented inventions by post-grant measures, p. 609, Science and Public Policy 36(8), October 2009, pp. 609–618.

[4] This is a utilitarian way of formulating the objective of patent law. However, there are also other justifications for the patent institution, such as natural law. Nevertheless, the utilitarian justifica-

It is widely recognized that interoperability in the information and communication technologies (ICT) is important for the promotion of technological development and economic growth.[5] As computer program interoperability arguably fosters technological development, one can assume that the need for interoperability is taken into consideration in patent laws. Paradoxically, this does not seem to be the case. In fact, it has been argued that patents rather cause problems for interoperability.[6] Yet, some believe that other measures, such as standardization and application of competition law, mitigate the problems patents are causing to the extent that there is less need for tailoring patent laws than has been argued.[7] However, the problem-solving potential of these measures is restricted, as will be argued in more detail subsequently under heading 2.1.

Taking into account the limitations of competition law measures and private ordering related to standardization, this article argues that problems should rather be solved at their roots. If patent rights cause barriers to interoperability, one should consider whether patent laws could be interpreted or modified in a way that these obstacles are overcome. Any tailoring outside patent laws tends to resolve the question only partially. Exceptions to intellectual property laws have an advantage that they postulate a general rule rather than individual decisions reachable for example through competition law measures. Therefore, exceptions are a better tool for providing legal certainty.[8] Furthermore, patent law is a natural context in which to take into account technology-specific issues. The patent institution should adhere to its objective of promoting technological development and consequently take into consideration the needs for interoperability.

This article explores first to what extent and how interoperability could be taken into account in the interpretations of existing patent law exceptions. It further considers the possibilities under TRIPS to modify patent laws so that interoperability could be taken into consideration better than today. This would diminish the need for patching outside patent laws, without suggesting that

tion is often seen as the most convincing. On justifications for intellectual property and their persuasiveness, see for example *Edwin C. Hettinger*, Justifying Intellectual Property, in Peter Drahos (ed.), Intellectual Property, Ashgate Publishing Company 1999, pp. 117–138. In this article, the patent institution is analyzed purely from the perspective of utilitarian justification set by the TRIPS Agreement and especially from the perspective of technological development.

[5] *Pamela Samuelson*, Are Patents on Interfaces Impeding Interoperability?, p. 1, Minnesota Law Review, Forthcoming; UC Berkeley Public Law Research Paper No. 1323838. Available at SSRN: http://ssrn.com/abstract=1323838.

[6] See for example *Kamiel J. Koelman*, An Exceptio Standardis: Do we need an IP Exemption for Standards?, p. 823, IIC 2006, pp. 823–843.

[7] See for example, *Samuelson*, *supra* note 5.

[8] Similarly, in the copyright context, see *Christophe Geiger, Jonathan Griffiths and Reto M. Hilty*, Declaration on a Balanced Interpretation of the "Three-Step-Test" in Copyright Law, p. 710, IIC 2008, pp. 707–712. Under the patent laws, in addition to exceptions, there is also a possibility for compulsory licensing. However, compulsory licenses are also decided individually concerning a specific situation and a specific party. Consequently, resolving interoperability through compulsory licensing is of limited use. Therefore, in this article, the focus is on patent law exceptions.

remedies outside patent law would cease to be relevant. The aim is to analyze how the patent doctrine itself could participate in the promotion of interoperability, as this aim arguably forms a legitimate part of patent laws because of its capacity to foster technological development. The focus is first on the analysis of traditional patent law exceptions in Europe, as they currently stand, taking also into account the recent developments under the Proposal for the Unitary Patent Protection in the EU.[9] The aim of the proposal is to provide the same scope of patent protection in all participating member states. This indicates, among other things, a harmonization of the patent law exceptions within the region.

The patent law exceptions under focus in this article are the experimental use exception and exhaustion principle in Europe. This article analyzes whether one under the experimental use privilege would be entitled to study a computer program by means of reverse engineering in order to discern interoperability information.[10] The article looks at the exhaustion principle from a similar perspective. The view of the author is that even if one could interpret these exceptions so as to allow the detection of interoperability information, there are a number of uncertainties on the way. Therefore, the author welcomes the attempt to resolve this issue by way of a specific exception in Article 8(j) in the Proposal for a Unitary Patent Protection. Yet, even though the proposal were to be successful the current exceptions will continue to be relevant for national patents whenever the patent applicant has not applied for unitary protection. The third section of the article analyzes the requirements that the TRIPS Agreement sets for implementing exceptions to patent rights. It concentrates on the proposed interoperability exception in the Unitary Patent Protection. The article further evaluates the shortcomings of the specific exception. In addition, even when access to interoperability information is secured, there remains one more potential impediment to achieving interoperability in practice. If the in-

[9] Proposal for a Regulation of the European Parliament and of the Council implementing enhanced cooperation in the area of the creation of unitary patent protection, COM(2011) 215 final. Even though the proposal is now waiting for first reading in the European Parliament, it is not certain if and when it will enter into force. Moreover the content of the final solution is at the moment uncertain. It has even been proposed that the patent law exceptions discussed in this paper should be deleted from the proposal. The entry into force of the Proposal is now linked to the date of entry into force of the Agreement on a Unified Patent Court. [See Article 22.2, Report on the proposal for a regulation of the European Parliament and of the Council implementing enhanced cooperation in the area of the creation of unitary patent protection (COM(2011)0215 – C7 0099/2011 – 2011/0093(COD)), Committee on Legal Affairs, Rapporteur: Bernhard Rapkay, A7-0001/2012, 11.1.2012(PE 472.059v04-00)]. Further potential obstacles are the cases Spain and Italy have filed in the EUCJ, C-274/11 Spain v Council and C-295/11, Italy v Council. The cases challenge the use of the enhanced cooperation, and do not seem to be without merit. See for example *Matthias Lamping*, Enhanced Cooperation – A Proper Approach to Market Integration in the Field of Unitary Patent Protection, p. 905-, IIC 2011, pp. 879–929.

[10] Interface information is not detectable without the utilization of such techniques. As a starting point, the use of these techniques requires making and using the patented technology. These acts belong to the exclusive rights of a patent holder. The acts become permissible only if one finds an exception applicable to the situation.

terface itself is patented, one is not entitled to use the patented technology during the lifetime of the patent. In cases when the patented technology cannot be circumvented, it may become a bottleneck even when there is access to interoperability information. In such cases, a patent holdup is a realistic scenario. Hence, the final substantive section analyzes the possibilities to implement a new patent law exception for accomplishing interoperability in such possible bottleneck situations. The final section of the article sums up the current situation and the key questions still waiting to be resolved.

## 2. Are current measures and patent law exceptions sufficient?

*2.1 The inadequacy of measures outside patent laws.* It cannot be denied that for example the interoperability standards of the European Telecommunication Standardization Institute (ETSI) play an important role for the ICT industries. ETSI has an intellectual property policy under which the standardization process is open to all. The participants are obligated to reveal their intellectual property rights belonging to a standard. Most importantly, the participants are also obligated to license their intellectual property rights belonging to a standard on fair, reasonable and non-discriminatory terms.[11] Yet, even though these standards are open to all participants, not all key stakeholders wish to be involved in the standardization processes. Moreover, even though the standardization bodies aim to avoid the inclusion of patents belonging to third parties in the standard specifications, they are not always successful in achieving this goal in practice. This means that some of the essential patents may be in the hands of third parties who are not obligated by the licensing terms of the standardization body.[12] There are also technological areas where standards created through standardization bodies are not so important. De facto standards may dominate some technology markets. Consequently, the rules of the standardization bodies regulate only a portion of interface technologies. Therefore, in many situations, the patent holders still have the final say in to whom (if to anyone) they wish to license their interface technology, and on what conditions. Consequently, there is a possibility for patent holdup.[13]

Similarly, competition law can be applied to only certain types of behaviour. In its relationship to intellectual property rights, competition law has predominantly been utilized in situations where a company has abused its dominant po-

[11] See ETSI Rules of Procedure, 30 November 2011; Annex 6: ETSI Intellectual Property Rights Policy, available at http://www.etsi.org/WebSite/AboutETSI/IPRsInETSI/IPRsinETSI.aspx (15.3.2012).

[12] Moreover, there have been cases where participants have resigned the standardization process without disclosing their essential intellectual property rights. Later on, they have filed infringement suits and claimed license fees from those who have implemented the standard and utilized their IPR. For more examples on cases and problems related to standardization and patents see *Liguo Zhang*, How IPR Policies of Telecommunication Standard-Setting Organizations Can Effectively Address the Patent Ambush Problem, IIC 2010, pp. 380–410.

[13] On problems related to patent holdup situations in modular technologies, see *Mark A. Lemley & Carl Shapiro*, Patent Holdup and Royalty Stacking, Texas Law Review, vol. 85, 2007.

sition.[14] The requirement of a dominant position narrows down the applicability of the competition law measures. Furthermore, the competition law examination of a dominant position is based mainly on a market share analysis, where the technological environment is not properly taken into consideration in the evaluation of market power.[15] Another shortcoming in the utilization of competition law is the time factor. The Microsoft case, which concerned computer program interoperability, was pending for nine years. In the end, it was demonstrated that by withholding interoperability information Microsoft had prevented a paradigmatic change within the computer program industry.[16] This means that at least for the time period the case was pending, technological development in this industry context was partially impeded due to Microsoft's behaviour.

Finally, the recent Orange Book case from the German Federal Supreme Court demonstrates that it is sometimes difficult to have recourse to a competition law measure as a counter-claim when the patent owner has filed a suit for patent infringement. This was the situation even though the patented technology was a part of a technology standard and the counter-claim was based on the abuse of dominant position.[17] The Orange Book decision has faced criticism and it deviates from the earlier practice in Germany.[18] Yet, the case demonstrates well the potential deficiencies related to measures outside patent laws in solving patent holdup problems. Therefore, in the following, the focus will be on the analysis of whether patent laws could be interpreted or modified so that interoperability could be taken into account.

*2.2 Patent law's disclosure requirement.* Article 83 EPC requires patent applicants to disclose their invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. In addition, Rule 42 in the Implementing Regulations for the European Patent Convention requires that the description provides in detail at least one way of carrying out the invention claimed. Based on these provisions one might assume that interface information would be available in the patent documentation when one has patented a computer-implemented invention. Presently, the disclosure requirement does not guarantee detailed information as source code or other code documentation is not required for sufficient disclosure.[19] There have been proposals where suffi-

[14] See for example *Magill* C-241/91 P and C-242/91 P, RTE and ITP v Commission [1995] ECR I-743; C-418/01 *IMS Health* GmbH v NDC Health GmbH [2004] ECR I-5039; and T-201/04 *Microsoft* Corp. v Commission [2007] ECR II-3601.

[15] *Tuomas Mylly,* Intellectual Property and European Economic Constitutional Law, The Trouble with Private Informational Power, pp. 452–455, Publications of the IPR University Center 2009.

[16] T-201/04 *Microsoft* Corp. v Commission [2007] ECR II-3601, recital 1345 referring to *Microsoft* [2004]COMP/C-3/37.792, recital 1065 and further to recital 770.

[17] German Federal Supreme Court, 6 May 2009, Orange Book Standard.

[18] *Hanns Ullrich*, Patents and Standards – A Comment on the German Federal Supreme Court Decision *Orange Book Standard*, IIC 2010, pp. 337–350.

[19] The Guidelines for Examination as of 01 April 2010, Part C, Chapter II-8, 4.15.

cient disclosure would cover code documentation in cases of computer-implemented inventions.[20] However, it is likely that patent documentation does not currently provide sufficiently detailed information for interoperability purposes.

Even if the disclosure requirements would be tightened, it could only provide information in cases where the patented technology is the interface. In cases where other parts of a computer program are patented the patent documentation does not help. Moreover, a patented invention is not necessarily exactly the same as the commercial product circulating at markets. Consequently, if one needs access to the interface information of a commercial software product, one needs recourse to other patent law doctrines than disclosure requirement in order to get access to the relevant information.

*2.3 Experimental use.* The general justification for the experimental use exception has been that it is not in the public interest to allow patent owners to prevent acts which aim at advancing technology.[21] The approach of accepting experimental use due to its capacity to foster technological development has also formed part of the reasoning in case law. It has been clearly stated that it would be inconsistent if patent laws excluded acts which aim at advancing technological development.[22] It has been argued to be part of the patent bargain that a patent holder cannot prevent others from developing the technologies further.[23] Additionally, on a general level it has been recognized that experimental use is not patent infringement because it is not utilization of the invention in a way for which patent protection is given. This argument has been used as a general justification for creation of the experimental use exception in the first place.[24]

The experimental use exception is provided in Article 31 (b) of the Community Patent Convention (CPC) from 1975, which has never entered into force. In many European countries, the experimental use provisions of patent laws have been drafted in accordance with this model.[25] The contents of the article has remained the same in the proposal for a Community Patent Regulation (Article 9 (b))[26] and also in the latest Proposal for Unitary Patent Protection

[20] Amendments 124, 125 and 144. European Parliament, Amendments 40-256, Draft Recommendation for second reading Michael Rocard, Commission des affaires juridiques 4.5.2005 (PE 357.776v01-00), Patentability of computer-implemented inventions, Council common position (11979/1/2004 – C6-0058/2005 – 2002/0047(COD)).

[21] *Amiran Benyamini*, Patent Infringement in the European Community, p. 266, IIC Studies, Studies in Industrial Property and Copyright Law, 1993.

[22] See e.g. Federal Supreme Court (Bundesgerichtshof) 11.07.1995 X ZR 99/92 "*Clinical Tests*"; "*Klinische Versuche*", English translation in IIC 1997, pp. 103–113.

[23] Canada – Patent Protection of Pharmaceutical Products, WT/DS114/R, 17 March 2000, paragraph 4.30 b) ii).

[24] *Benyamini*, *supra* note 21, at 267.

[25] *Joseph Straus*, Implications of the TRIPs Agreement in the Field of Patent Law, pp. 202–203, in *Friedrich-Karl Beier – Gerhard Schriker* (eds.), From GATT to TRIPS – The Agreement Related Aspects of Intellectual Property, IIC Studies Volume 18, 1996, pp. 160–215.

[26] Proposal for a Council Regulation on the Community Patent, COM/2000/412 final, OL C 337 E 28.11.2000, pp. 278–290.

(Article 8 (b)), which is waiting for to be discussed in the European Parliament.[27] One could thus argue that there has long existed a harmonized legal basis for experimental use in Europe, even though the national wordings of the experimental use exception have varied to some extent from country to country.[28] Therefore, there has been a possibility for diverging interpretations. Yet, it is possible to identify some common trends in the interpretations.[29]

Under the Unitary Patent Protection in the countries taking part in this enhanced cooperation there would be a uniform legal basis for this patent law exception, since the wording of the article is now exactly the same in all participating Member States when a patent applicant has applied a single protection for this uniform area. The aim of the Proposal is to provide the same scope of patent protection within the entire area.[30] But what kind of interpretation should form the common basis for experimental use and what should it provide for software interoperability purposes?

Article 8 (b) provides that *acts done for experimental purposes* relating to the subject matter of patented invention are excluded from the patent protection. It has been a condition for this exception to apply that there is no commercial purpose involved *in the experiments*. However, one can conduct the experiments with a commercial objective in mind, as long as the experiments themselves do not contain elements of commercial use. It has been recognized that even though the initial drafts of the CPC aimed at exempting only non-commercial experiments, the final text of the article does not support a distinction to be made between commercial and non-commercial purposes. Moreover, the CPC article formulation indicates that experiments conducted by commercial entities are not excluded as such from this privilege.[31] The case laws of various European countries support that the experimental use exception is applicable even

[27] Proposal for a Regulation of the European Parliament and of the Council implementing enhanced cooperation in the area of the creation of unitary patent protection, COM(2011) 215 final.

[28] *William R. Cornish*, Experimental Use of Patented Inventions in European Community States, p. 736, IIC 1998, pp. 735–753.

[29] *Cornish*, *supra* note 28.

[30] However, for some time, a clear shortcoming was that the European and Community Patents Court Draft Agreement (Council document 7928/09 of 23 March 2009) was not processed alongside with the proposal for unitary patent protection due to opinion against the proposal of the Court of Justice of the European Union (Opinion 1/09). Until there is a functioning system that enables a uniform interpretation the system does not truly guarantee a uniform patent protection. See for example *Steve Peers*, p. 237, The Constitutional Implications of the EU Patent, European Constitutional Law Review 2/2011, pp. 229–266. However, at present, the proposal is linked to the establishment of a functioning patent court system. See Article 22.2, report on the proposal for a regulation of the European Parliament and of the Council implementing enhanced cooperation in the area of the creation of unitary patent protection (COM(2011)0215 – C7-0099/2011 – 2011/0093(COD)), Committee on Legal Affairs, Rapporteur: Bernhard Rapkay, A7-0001/2012, 11.1.2012 (PE 472.059v04-00). In cases where the applicant has not applied protection for this area, the experimental use exception will be interpreted in accordance with the national provisions. As also explained above, these provisions are to a great extent drafted in accordance with the CPC model.

[31] *Benyamini*, *supra* note 21, at 265, 267, 271 and 275.

when experiments are made with a commercial purpose in mind. This reflects the reality, where research interests can no longer be clearly distinguished from economic intentions. However, the trend has been to accept the experiments which aim at advancing technological development, which is one of the objectives of the patent institution.[32]

Most of the cases and scholarship concerning experimental use have concerned pharmaceuticals. However, on a general level, it has been argued that reverse engineering of patented products would be allowed under the experimental use exception in European jurisdictions.[33] It is essential to note that any experimental use is aimed at gaining information.[34] Reverse engineering clearly appears by its nature to count as experimental use. Accordingly, the experimental use exception has been said to cover situations where reverse engineering has been conducted in order to achieve interoperability.[35] On a general level, one can argue that computer programs can be reverse engineered and interoperability information detected even when this is done by a business entity and even when the aim is to bring a new commercial product on the software market. At least the experimental use privilege would cover situations where the reverse engineering is done with the aim to develop technology.

If the commercial end is not a problem per se, a more critical requirement in the experimental use exception might be that the accepted experiments need to *relate to the subject matter of patented invention*. This means that it is acceptable to do experiments when one wishes to know more about the patented invention. Examples of accepted links to the subject matter are: the intention of the experiment is to test whether the invention works as described, whether it could be improved, or whether the patent could be invalidated. This requirement has been understood to prohibit uses where patented technology is utilized in the course of experimenting with some other related matter or other patented technology. For example, one is not entitled to use a patented technology in order to prove invalid a related patent even when these two technologies are meant to work together.[36]

[32] *Cornish*, *supra* note 28 at 735–736. Compare however with, *Vincenzo Di Cataldo*, The Experimental Use of the Patented Invention: A Free Use or Infringing Use? pp. 87–88, in Wolrad Prinz zu Waldeck und Pyrmont, Martin J. Adelman, Robert Brauneis, Josef Drexl and Ralph Nack (eds.), Patents and Technological Progress in a Globalized World, Liber Amicorum Joseph Straus, MPI Studies on Intellectual Property, Competition and Tax Law, vol. 6, 2009, pp. 87–97. He claims that experimental use is limited in nature and not meant for commercial purposes.

[33] *Ansgar Ohly*, Reverse Engineering: Unfair Competition or Catalyst for Innovation?, p. 544, in Wolrad Prinz zu Waldeck und Pyrmont, Martin J. Adelman, Robert Brauneis, Josef Drexl and Ralph Nack (eds.), Patents and Technological Progress in a Globalized World, Liber Amicorum Joseph Straus, MPI Studies on Intellectual Property, Competition and Tax Law, vol. 6, 2009, pp. 535–552.

[34] *Trevor Cook*, A European Perspective as to the Extent to which Experimental Use, and Certain Other, Defences to Patent Infringement, apply to Differing Types of Research, A Report for the Intellectual Property Institute March 2006, p. 40.

[35] *Koelman*, *supra* note 6 at 826.

[36] *Benyamini*, *supra* note 21 at 278.

If the computer program interface is the patented invention, then this requirement does not create a problem for experiments directed at discerning the interoperability information. The problem arises in situations where the interface itself is not the subject matter of the patent, but the patent covers other components of a computer program or only parts of the interface. The experiments (i.e. reverse engineering) necessarily cover the entire program including the patented components, but in these situations, the aim is to learn about something else than the subject matter of the patented invention. Is one, then, entitled to reverse engineer a partly patented computer program in order to discern the unpatented interface information? There is another potential problem relating to the issue of which part of the computer program the patented technology is residing in. If one aims to improve the subject matter of the patented invention, experiments are allowed. Therefore, it is possible to differentiate between situations where the aim is to bring a competing but enhanced technology into the market and when it is to bring a new e.g. compatible technology into the market. In cases where the intent is to bring a competing technology on the market, reverse engineering arguably relates to the subject matter of the patented invention in addition to the interface information. However, if the goal is to create a compatible technology and reverse engineers the program to uncover unpatented interface information, the experiments have a more distant relationship to the subject matter of the patented invention. Interface information is nevertheless always necessary.

The term "relate" has been construed quite broadly in cases dealing with other technological areas.[37] It has been clarified that patented technology cannot be used only as an aid in experiments relating to something else.[38] The above defined differences relating to which part of a program is patented may be too fine. The literal interpretation of the requirement of "relate to the subject matter of patented invention" would lead to illogical outcomes if one were allowed to discern patented interface information but not to discern unpatented interface information. This is a problem which is specific to computer program products, as experiments towards unprotected information also always require making (copying) the protected information which is residing in the very same product. Therefore, this situation is different from the case where two separate products are designed to work together and the patented technology residing in one of these is used in order to experiment the product. The situation clearly illustrates the problem related to specific exceptions. One could argue that allow-

[37] See *Peter Ruess*, Accepting Exceptions?: A Comparative Approach to Experimental Use in U.S. and German Patent Law, p. 102, Marquette Intellectual Property Law Review (2006), pp. 82–110.

[38] *Cook*, *supra* note 34 at 44. It is clear that patented research tools cannot be used in experiments relating to other patented technology. See for example *Martin Senftleben*, Overprotection and Protection Overlaps in Intellectual Property Law – The Need for Horizontal Fair Use Defense, p. 22, (April 16, 2010). THE STRUCTURE OF INTELLECTUAL PROPERTY LAW: CAN ONE SIZE FIT ALL?, A. Kur/V. Mizaras (eds.), Cheltenham: Edward Elgar Publishing 2011. Available at SSRN: http://ssrn.com/abstract=1597123.

ing reverse engineering in all situations illustrated above would be the most rational interpretation even though it might require stretching the interpretation of the experimental use exception. At a minimum, it would require construing the experimental use exception in a manner so that it takes into account the technology-specific contours. Provided that this requirement is understood from the perspective of technological development, then whenever interface information is detected, in order to enhance some part of the underlying computer program technology, the experimental use privilege will cover the situation.

It has been recognized that the language of an exception may cause difficulties in situations where new technologies arise. Narrowly defined exceptions are not very adaptive to changes. Therefore, some authors have suggested that intellectual property laws should contain openly defined and flexible limitations such as the fair use doctrine in the United States.[39] Another way forward would be to interpret specific exceptions in a manner which new technological contexts are taken into account. The possible flexibilities within exceptions themselves should be utilized. Abandoning the belief that intellectual property law exceptions should be interpreted narrowly would be an essential first step for a more flexible reading of exceptions.[40] Moreover, a literal interpretation of an exception should be complemented with a teleological interpretation where the objective of an exception plays a crucial role. The experimental use is tightly connected to the main objective of the patent system in fostering technological development. Arguably, it is possible to interpret the experimental use privilege to cover such reverse engineering activities which aim at detecting interoperability information if it is done in order to improve the underlying technology.

*2.5 Exhaustion.* The exhaustion principle is not similarly connected to the main objective of the patent system as experimental use. The core of the exhaustion principle is that the patent monopoly is limited to the extent that a monopoly holder cannot influence the further commercialization of a patented product after it has been put on the market.[41] In addition to this main objective of the exhaustion principle, it has been connected to the reward theory and the transfer of a property.[42] All of these aim at limiting the scope of the monopoly in the sense that after a patent holder has received the remuneration from selling the patent-protected product and has transferred the title of this product, the prod-

[39] *Senftleben*, *supra* note 38 at 5.

[40] The narrow interpretation of IP law exceptions has been questioned in *Henrik Holzapfel and George Werner*, Interpreting Exceptions in Intellectual Property Law, p. 111, in Wolrad Prinz zu Waldeck und Pyrmont, Martin J. Adelman, Robert Brauneis, Josef Drexl and Ralph Nack (eds.) Patents and Technological Progress in a Globalized World, Liber Amicorum Joseph Straus, MPI Studies on Intellectual Property, Competition and Tax Law, vol. 6, 2009, pp. 98–114.

[41] *Benyamini*, *supra* note 21 at 293.

[42] *Benyamini*, *supra* note 21 at 335- and *Andreas Wiebe*, The Principle of Exhaustion in European Copyright Law and the Distinction Between Digital Goods and Digital Services, pp. 114, GRUR Int. 2009, pp. 114–118.

uct does not belong to the control of the patent holder anymore, but is part of the free market.

Similarly to the experimental use exception, the exhaustion principle of the CPC was included in the Community Patent Regulation (Article 10) in almost identical form, and is now also part of the Proposal for Unitary Patent Protection (Article 9). Likewise, this Article has earlier provided a model for national legislations in Europe, in addition to the case law of CJEU regarding exhaustion. It has been argued that the exhaustion principle could also form a general basis for accepting reverse engineering products that are lawfully on the market.[43]

Article 9 of the Proposal for the Unitary Patent Protection provides:

"The rights conferred by a European patent with unitary effect shall not extend to *acts concerning a product* covered by that patent which are carried out within the territories of the participating Member States…after that product has been *put on the market* in the Union by the proprietor of the patent or with his/her consent, unless there are legitimate grounds for the proprietor to oppose further commercialization of the product."

The core of the exhaustion principle is that a patent holder cannot prevent further commercialization of a patented product after it has been put on the market. On the European level, this principle has been associated with the free movement of goods and has been interpreted and developed accordingly in the case law of CJEU, mainly on the basis of the Treaty articles that relate to the free movement of goods.[44] This has taken place without reference to the patent law provisions, as such binding provisions on this issue have not existed at the European level.[45] The case law of the CJEU is thus clearly related to further commercialization and is therefore of limited use when analyzing whether this specific patent law exception applies to reverse engineering of computer programs and what the limits of its application are. Therefore, national level interpretations of patent law's exhaustion are a relevant source for building a uniform interpretation of doctrine at the European level. Union-wide harmonization, including exhaustion, already exists in other areas of intellectual property

[43] *Marianne Levin*, Lärobok i Immaterialrätt, p. 325, Norstedts Juridik 2011.

[44] *Benyamini*, *supra* note 21 at 293–295.

[45] It has thus been necessary for CJEU to create a doctrine where the nationally granted patent rights are adjusted to the system of free movement of goods. Under the created doctrine, the free movement of goods does not constrain the existence of national patent rights but only the exercise of these rights. The core of the intellectual property right, which cannot be limited by the Treaty provisions related to free movement of goods, is sometimes referred to as a "special function" and a "specific subject matter" or something similar. *Jens Schovsbo*, Exhaustion of Rights and Common Principles of European Intellectual Property Law (February 8, 2010), p. 7, COMMON PRINCIPLES OF EUROPEAN INTELLECTUAL PROPERTY LAW, Ansgar Ohly, ed., Mohr Siebeck, Tübingen, 2010. Available at SSRN: http://ssrn.com/abstract=1549526. A narrow and very specific exhaustion principle is applicable, at present, for biotechnological inventions; see Article 10 of the Directive 98/44/EC of the European Parliament and of the Council of 6 July 1998 on the legal protection of biotechnological inventions, 1998 O.J. (L 213) 13.

legislation. The interpretations concerning the exhaustion principle relating to these harmonized areas may provide guidance for the analysis of patent law's exhaustion principle. Especially helpful are the interpretations related to the Software Copyright Directive.[46]

Patent law's exhaustion principle can be understood in a broader sense and not only as limited to the further commercialization of a product. It has been stated that as a patent law provision it encompasses many acts, which do not have a connection to the free circulation of goods. For example, the right to conduct repairs can be derived from the exhaustion principle.[47] Moreover, the right to investigate the product governed by the patent has been deduced from the exhaustion principle.[48] In the copyright context (relating to computer programs), the exhaustion principle has at the European level been clearly written so it only covers the distribution right (Article 4.2 of the Software Copyright Directive). Consequently, this case law is also focused on the issue whether a copyright holder can prevent further commercialization of a computer program.[49] However, the exhaustion principle, as provided in the above-mentioned patent articles, refers to all acts relating to a patented product.[50] Therefore, it is clear that patent exhaustion covers more than distribution right.

The rights conferred by a patent include, among others, the making and using of a patented product. Normally these rights belong to the exclusive rights of the patent holder. Reverse engineering is in practice carried out with the computer program product, which is acquired from a patent holder. Therefore, the acts primarily concern the protected product. As explained above, in a reverse engineering process, a computer program product is used and also copied (made) many times during the process. These technical copies are however part of the reverse engineering process and the rationale of these copies is to analyze the underlying protected product (code). The copies are not made for distributive purposes. Hence, it seems a reasonable interpretation that the exhaustion principle is applicable and the act of reverse engineering would be allowed. Some have argued that the exhaustion principle makes reverse engineering acceptable and exempted from the exclusive rights of a patent holder.[51] Based on the analysis so far, the exhaustion principle seems to cover the situation.

One possible limitation on the applicability of the exhaustion principle on

[46] Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the Legal Protection of Computer Programs (codified version), 2009 O.J. (L 111) 16. The codified version contains the content of Council Directive 91/250/EEC of 14 May 1991 on the Legal Protection of Computer Programs as amended, 1991 O.J. (L 122) 42.

[47] *Benyamini*, *supra* note 21 at 301 and 338.

[48] *Ohly*, *supra* note 33 at 543.

[49] Other acts, such as the act of reverse engineering, are tackled by specific articles where the allowed acts and their preconditions are described separately. See Articles 4 to 6 of "the Software Copyright Directive". Therefore, in the copyright context, the fact that the exhaustion principle focuses on the distribution right is not so problematic.

[50] In the Finnish Patent Act, the exhaustion covers the *exploitation* of a patent-protected product.

[51] *Levin*, *supra* note 43 at 325.

patented computer programs is that they are not always claimed as products, but patent claims can be directed at underlying processes. The basic interpretation has been that the exhaustion principle is not applicable at all in these situations.[52] However, exhaustion is not limited to product claims in the sense that the principle refers to products protected by a monopoly right. The exclusion of processes from exhaustion has been based on the assumption that processes cannot be put on the market. However, when a device can only practice a patented process, then it can naturally be put on the market. In these cases, the principle of exhaustion is applicable and in some countries (at least in Germany and Austria), it has been interpreted as exhausting rights in both the process and the device. However, in some situations, the exhaustion of process patents has been construed under the implied license doctrine.[53] If it were construed under the implied license, this would mean that it can also be contracted out.

Another possible uncertainty relates to the issue of whether the exhaustion principle can be applied to computer programs which are delivered to customers without a hard copy (of said program), but only in electronic form, for example over the Internet. The traditional interpretation related to copyrighted works has been that delivery, for example through cable, is a service and not a delivery of a good.[54] Accordingly, the traditional approach for software has been that the exhaustion principle is applicable only when the software has been sold in a physical data carrier.[55] The exhaustion principle in the Software Copyright Directive refers to the first sale of a program copy in the Community. The interpretation of the Commission has been that software delivery through on-line services does not result in exhaustion. However, the Commission earlier considered it noteworthy that the Software Copyright Directive refers to "any form" of distribution. Whether this could be interpreted to mean that also intangible distribution can entail exhaustion was considered to require further clarification in the Information Society Directive.[56] In the Information Society Directive, the distinction between material copies and on-line delivery was maintained. On-line delivery was considered to be a service and not a supply of goods. Furthermore, it was stated that exhaustion does not materialize

[52] See for example *Joachim Weyand and Heiko Haase*, Patenting Computer Programs: New Challenges, p. 654, IIC 2005, pp. 647–663.

[53] *Benyamini*, *supra* note 21 at 338 and 340–341.

[54] See for example, C-262/81 *Coditel v Ciné Vog Films* [1982] ECR 3381. Also in the Database Directive (Recital 33 and 43), it has been stated that exhaustion does not take place with regards to electronic databases as they are considered services. Directive 96/9/EC of the European Parliament and of the Council on the Legal Protection of Databases. OJ L 077, 27 March 1996, pp. 20–28.

[55] *Tjeerd Overdijk – Polo van Der Putt – Eva de Vries – Thomas Schafft*, Exhaustion and Software Resale Rights, A comparison between the European exhaustion doctrine and the U.S. first sale doctrine in the light of recent case law, p. 34, Cri 2/2011, pp. 33–39.

[56] Report from the Commission to the Council, the European Parliament and the Economic and Social Committee on the implementation and effects of Directive 91/250/EEC on the legal protection of computer programs, COM/2000/0199 final, chapter VII.

when delivering services.[57] This distinction has been interpreted to be applicable to the electronic delivery of computer programs.[58]

For a more thorough analysis of exhaustion, some researchers have created three categories for delivery through online technology, as it has been argued that on-line delivery is not always a service by its nature. The categorization has been as follows: 1) delivery of a material copy in a traditional manner but using on-line contracts; 2) on-line delivery of goods in a digital form; and 3) on-line delivery of a service without a delivery of a digital copy of the work being transmitted. In the first category, exhaustion does take place and in the last category it does not. It has been argued that the second category would be the grey area. Concerning the grey area, one branch of argumentation correlates every on-line delivery with services. The principal basis for this logic is that here, a copy is not transferred from a seller to a user, but a copy is created after a download of a computer program. What is transferred is the right to use a copy. This argumentation is based on the literal interpretation of the Database Directive and the Information Society Directive. This restrictive interpretation also emphasizes that in the digital environment, the interests of a right holder are endangered because he cannot properly control the distribution of unlawful copies.[59]

However, this dogmatic approach has been heavily criticized. The difference is merely based on formalities. The end-result is deduced from the exhaustion principle and not from the realities of transactions.[60] A more liberal line of argumentation makes no difference between the delivery of a digital copy through the Internet and the delivery of a material copy. This argumentation emphasizes that these deliveries are no different from the perspective of the right holder perspective. Here, however, it is argued that in cases where an on-line connection is constantly required for the use of a computer program, exhaustion does not take place, whereas delivering a copy of computer program through an on-line service exhausts the rights to a copy so delivered.[61] In addition to the importance of the free circulation of goods and their marketability, the remuneration theory and the transfer of a property can be seen as rationales for the exhaustion principle. The remuneration theory emphasizes that it is suf-

[57] Directive 2001/29 of the European Parliament and of the Council of 22 May 2001 on the Harmonization of Certain Aspects of Copyright and Related Rights in the Information Society, Recital 29

[58] *Overdijk – van Der Putt – de Vries – Schafft*, *supra* note 55 at 35.

[59] *Wiebe*, *supra* note 42 at 115–116.

[60] *Schovsbo*, *supra* note 45 at 10.

[61] *Wiebe*, *supra* note 42 at 116. Here one should notice that new models for making software available have emerged. Therefore, one needs to distinguish those transactions which may qualify as "sales transactions" from those which can be seen as purely services. E.g. application service providing and cloud computing could qualify as services. See *Matthias Leistner*, "Used" Software Before Europe's Top Court – The German Federal Supreme Court Refers the Oracle v. UsedSoft Case to the European Court of Justice, p. 505, IIC 2011, pp. 503–506.

ficient that the right holder has received a reward from the first sale.[62] The liberal argumentation can be complemented with the viewpoint of remuneration theory. As the right holder has received a reward from the sale of a copy, the rights for that copy have been exhausted. Moreover, the user of the software has received a permanent copy and therefore one could claim that a transfer of a property right has taken place. This issue was clarified by CJEU in its UsedSoft-case. The court held that electronic distribution exhausts the distribution right for software in the copyright context. In its reasoning court referred both to the transfer of a property and remuneration theory.[63] This kind of interpretation takes into account the realities of distribution channels today and does not concentrate on formalities in the legislation. Author's understanding is that this interpretation could be applied analogically to the patent context.

Traditionally, the exhaustion principle has been applicable if a patented product has been sold. In the U.S., the principle is even called the "first sale doctrine". However, software is often delivered to customers with licensing agreements and not with sales transactions. The use of licensing schemes raises the question whether this form of making available fulfils the exhaustion requirement of being "put on the market". In German case law and legal literature, the interpretation in the copyright context has been that if a computer program is acquired on a permanent basis, it is regarded as a sales contract even though the agreement would be called a license agreement.[64] Similarly, the Finnish Supreme Court has considered that licensing can be comparable to a sales transaction if the license is for an unlimited term and for a one-time fee.[65] This approach was also adopted by CJEU in the UsedSoft case.[66] The restrictive terms in a license agreement do not have an impact on exhaustion. Therefore, acts against such license terms do not constitute a copyright infringement, but they may constitute an infringement of contractual obligations.[67] Also under German, Italian and Dutch law, the *patent law exhaustion* principle has been interpreted to prevent a patent holder from making contractual restrictions on the purchasers. Acts against such contractual limitations have not formed patent infringements even though it could have constituted a contractual breach. How-

[62] *Benyamini*, *supra* note 21 at 335 and *Wiebe*, *supra* note 43 at 114.
[63] C-128/11, UsedSoft GmbH v Oracle International Corp., 3 July 2012, nyr.
[64] *Michael Lehmann*, The New Software Contract Under European and German Copyright Law – Sale and Licensing of Computer Programs, p. 46, IIC 1994, pp. 39–53.
[65] Finnish Supreme Court KKO 2003:88. A similar approach has been taken for example by the Austrian Supreme Court. See *Leistner*, *supra* note 61 at 505 and the footnote 3 thereof. The approach in the United States has been changing in the sense that earlier, the licensing for an unlimited term for a single price qualified as a sales transaction, whereas more recently, licensing has not qualified for the "first sale doctrine" to become applicable. See a short description about U.S. case law developments in *Overdijk – van Der Putt – de Vries – Schafft*, *supra* note 55 at 39.
[66] C-128/11, UsedSoft GmbH v Oracle International Corp., 3 July 2012, nyr.
[67] Finnish Supreme Court KKO 2003:88. Similarly also in the Netherland, see *Overdijk – van Der Putt – de Vries – Schafft*, *supra* note 55 at 38.

ever, these kinds of contractual limitations have been considered to exceed the patent right and, hence, be null and void. Only the licensing conditions related to how a product is first to be put on the market have been considered valid. In the UK, the earlier approach was that it is possible to impose contractual limitations, and a violation of these contract terms has constituted a patent infringement.[68]

In the copyright context, it is clearly stated in the Software Copyright Directive that the distribution right is exhausted if the software has been sold. This is probably why the interpretations relating to exhaustion in this context have focused on the question of what constitutes a sales transaction. However, in the patent context, the terminology for exhaustion refers to the acts of "putting on the market". Consequently, this may take place without remuneration. Therefore, license agreements without a fee may qualify for exhaustion. Moreover, in the copyright context, some acts are permitted for those who have a legal right to use a computer program. For example, right of reverse engineering is allowed for those who have somehow acquired a right to use a copy of a program. If these issues are interpreted analogically in the patent context, it means that at least other acts than further commercialization could be exhausted without a payment of a fee.

Generally, the German approach to the exhaustion of intellectual property rights is based on the idea that exhaustion is a principle of its own, whereas the UK approach is based on the idea that exhaustion emanates from an implied license. This difference explains why freedom of contract has been prevailing in the UK system, which is sometimes referred to as liberalistic. The current European system as applied by CJEU adheres to exhaustion as a principle.[69] This implies that rules on exhaustion are mandatory. Therefore, when exhaustion is applicable, it cannot be contracted out.[70]

The aforementioned interpretations have concerned the exhaustion of the distribution right. However, as explained above, the exhaustion of patent rights also refers to other acts than the distribution right. The applicability of the exhaustion principle may accordingly mean that contractual restrictions on other acts relating to patent-protected products would be invalid. Therefore, the prohibition of reverse engineering in a license agreement could be null and void under the principle of exhaustion.[71] At least a violation of these contractual provisions would not constitute a patent infringement.

From the outset it seemed that exhaustion provides a privilege for the reverse engineering of computer programs for interoperability purposes. However, a more detailed analysis has revealed that there are some uncertainties. The main

[68] *Benyamini*, *supra* note 21 at 288–290.
[69] *Schovsbo*, *supra* note 45 at 3, 5 and 6.
[70] *Lehmann*, *supra* note 64 at 47.
[71] In the Software Copyright Directive, this issue has been regulated separately. The Directive clearly provides that contractual clauses restricting the reverse engineering right are null and void, Article 8.

concern is whether exhaustion is applicable to all forms of delivering computer programs. Now CJEU has decided in the copyright context that delivery through the Internet will exhaust distribution right. However, it is somewhat uncertain whether exhaustion principle would be applied similarly in the patent context and whether it would cover reverse engineering activities. There are also some uncertainties whether the experimental use privilege provides such a right. Consequently, an explicit exception for reverse engineering activities would have some benefits. In the following, I will analyze whether the interoperability provision in the Proposal for Unitary Patent Protection is in compliance with the TRIPS' principles concerning patent law exceptions and what are the specific problems relating to the proposed exception.

## 3. The possibility for new exceptions under the TRIPS requirements

*3.1 Analysis of a proposed interoperability exception.* The Proposal for Unitary Patent Protection now includes a specific authorization for interoperability purposes. It excludes certain acts from patent protection. Article 8 (j) specifies that the same acts and the use of information are allowed as under the Software Copyright Directive.[72] Essentially, if the proposal succeeds in its current form, the reverse engineering of a patented computer program will be allowed if it is indispensable for the purposes of achieving interoperability between two computer programs. Even if the current proposal does not succeed this time, the copyright articles provide one model of how this issue could be regulated, and therefore this analysis would be relevant regardless of the outcome of the proposal.[73] Under Article 30 TRIPS:

> "[m]embers may provide limited exceptions to the exclusive rights conferred by a patent, provided that such exceptions do not unreasonably conflict with a normal exploitation of the patent and do not unreasonably prejudice the legitimate interest of the patent owner, taking into account of the legitimate interests of third parties."

As a starting point, it is noteworthy, that TRIPS does not set constraints on the purposes for which exceptions may be used, as this will be for the Members to decide. Thus, an exception can be used also for reaching software interoperability, provided that the exception fulfils the criteria set in the Article. These three requirements are cumulative, i.e. they all need to be satisfied.[74]

Firstly, it has been recognized that the term '*limited*' needs to have a meaning, which is separate from the term '*exception*', which itself already indicates limited.

[72] Same acts as under Article 5 and 6 of Council Directive 2009/24/EC.

[73] Even the earlier proposals which have aimed to improve patent laws in this respect in the EU have followed the model from the copyright context. Proposal for a Directive of the European Parliament and of the Council on the patentability of computer-implemented inventions COM/2002/0092 final – COD 2002/0047. Therefore, it is probable that even future proposals will follow the same logic for patent law exception for interoperability purposes.

[74] Canada – Patent Protection of Pharmaceutical Products, WT/DS114/R, 17 March 2000, paragraph 7.20.

Otherwise the term becomes redundant. '*Limited*' has been interpreted to mean that the exception in question may only make a small reduction in the patent rights. Here, the reduction of rights would concern *legal rights* and not to exception's economic impact.[75] The legal rights in question are those included in article 28 of the TRIPS agreement. The patent holder has an exclusive right e.g. to make and use the patented invention during the patent term. The exceptions from these exclusive rights are analyzed in quantitative and qualitative terms. The WTO panel's ruling on its EC-Canada stressed that the stockpiling exception did not contain any limitation on the quantity of production.[76] The panel also analyzed the circle of potential beneficiaries of this exception.[77] The fact that the stockpiling exception was limited to a period of six months forms a qualitative limitation as it narrows down the area of the exception conceptually.[78] The stockpiling exception was rejected on the very basis that production was not limited. However, it was established that for test purposes, one is allowed to produce substantial quantities of patented invention.[79] Testing for regulatory approval was also limited for the specific purpose, which formed a conceptual restriction, in other words, a qualitative limitation.[80]

Under the Proposal, acts of reverse engineering are allowed only under certain circumstances. These acts are only allowed for the licensee or for another person who has the legal right to use a program copy. Moreover, the process has to be limited to those parts of a program which are necessary in order to achieve interoperability.[81] An additional requirement is that the necessary information has not previously been readily available otherwise. When a computer program is reverse engineered, an analyst has legally acquired a program copy and merely conducts experiments with this one copy. In the process of reverse engineering, a computer program is technically copied, but these technical copies are only utilized by a licensee (or some other party who has legally acquired a program copy). Hence, there will not be any third party distributable copies. This means that an exception is quantitatively restricted as the circle of

[75] Canada – Patent Protection of Pharmaceutical Products, WT/DS114/R, 17 March 2000, paragraph 7.30. However, the interpretation rule that IP exceptions should be construed narrowly has been contested; see for example *Holzapfel and Werner*, *supra* note 40 at 111.

[76] Canada – Patent Protection of Pharmaceutical Products, WT/DS114/R, 17 March 2000, paragraph 7.34.

[77] Canada – Patent Protection of Pharmaceutical Products, WT/DS114/R, 17 March 2000, paragraph 7.45.

[78] *Martin Senftleben*, Towards a Horizontal Standard for Limiting Intellectual Property Rights? – WTO Panel Reports Shed Light on the Three-Step Test in Copyright Law and Related Tests in Patent and Trademark Law, p. 418, IIC 2006. The copyright panel decision referred to here is: United States – Section 110(5) of the US Copyright Act WT/DS160/R.

[79] Canada – Patent Protection of Pharmaceutical Products, WT/DS114/R, 17 March 2000, paragraphs 7.34, 7.45 and 7.37.

[80] *Senftleben*, *supra* note 78 at 420.

[81] In the copyright context, this limitation has been criticized, since in practice it is impossible to know beforehand where in the program copy the necessary information resides. See *Ulla-Maija Mylly*, An Evolutionary Economics Perspective on Computer Program Interoperability and Copyright, p. 310, IIC International Review of Intellectual Property and Competition Law, 3/2010, Volume 41.

potential beneficiaries is factually limited to the licensees. The process is also quantitatively limited in a sense that it has to focus on the parts of a program where the interoperability information resides. This prevents unnecessary copying during the process. Unnecessary copying is also prevented by the quantitative limitations, i.e. that the process is only allowed when the information has not earlier been readily available. This also restricts the circle of potential beneficiaries. These conditions clearly function as quantitative restrictions for the proposed exception. In addition, the exception is restricted to the specific purpose as it only allows creating interoperability between two computer programs.[82] The information received through this process cannot be used for any other purposes. This limitation narrows down the exception conceptually and forms a qualitative restriction. Hence, the proposed exception is limited both quantitatively and qualitatively, and so it arguably fulfils the TRIPS requirement of a "limited exception".

Economic implications are taken into account under the last two requirements of Article 30. The second requirement under the TRIPS article 30 is that an exception should *not unreasonably conflict with the normal exploitation of a patent*. Here, normal exploitation has been understood as the possibility of the patent owner to recoup an economic return from the patent.[83] Firstly, in this situation, the patent holder has received remuneration from the licensed program copy. Reverse engineering is conducted using this copy and for the purposes of analyzing the interoperability information. Secondly, during this process, the licensee does not make any copies for distributive purposes. When patented medicines are used in clinical tests, it means that an extensive amount of medicines are prepared and distributed to patients without the patent holder's consent and without any compensation to him.[84] Compared to the situation where patent-protected medicines are produced and distributed to patients in order to clinically test their effects, the outcome is quite clear. From the viewpoint of the patent holder's economic interests, the exception for the purposes of reverse engineering is less harmful than the exception for the regulatory approval. Yet, a WTO panel has affirmed that the exception for regulatory approval fulfils the TRIPS requirements.[85] This illustrative comparison to regulatory approval supports the conclusion that the drafted interoperability exception would fulfil the TRIPS requirements discussed above.

The last sentence of Article 30 provides that when considering an exception, the legitimate interest of third parties should be taken into account. Interoperability has been considered economically important in system technologies such

[82] This limitation to software-software interoperability has been criticized in the copyright context, since it does not fully take into account the various forms of and needs for interoperability. Moreover, there may be other justifiable purposes for reverse engineering than interoperability. Ibid., pp. 308–309.

[83] UNCTAD-ICTSD Resource Book on TRIPS and Development: An Authoritative and Practical Guide to the TRIPS Agreement, p. 436.

[84] See e.g. Canada – Patent Protection of Pharmaceutical Products, WT/DS114/R, 17 March 2000.

[85] Canada – Patent Protection of Pharmaceutical Products, WT/DS114/R, 17 March 2000.

as computer software.[86] Therefore, also some interest groups have suggested that interoperability should form part of government policy.[87] Access to interoperability information is the first step in enabling the development of technologically advanced interoperable products. Technological development, in turn, is beneficial to consumers and to the general welfare. These arguments can be interpreted as forming the third-party interests under Article 30 of TRIPS. These considerations can have weight when deciding if an exception is acceptable. If one analyzes the TRIPS agreement more broadly, one recognizes that technological development and general welfare are also some of the aims of the patent institution. This is stated in Article 7 of the TRIPS. Therefore, the interoperability exception could also be justified from the perspective of the general purpose of the patent institution.

Finally, the wording of Article 30 when compared to the respective copyright Article of the TRIPS Agreement indicates that exceptions are more easily acceptable in the patent context than in the copyright context. The proposed exception is already in force in the copyright legislation in Europe in the same form, and its functional equivalent is in force in the United States under the fair use doctrine of the Copyright Act. Accordingly, this implies that the exception would pass these specific TRIPS requirements for patent law exceptions.

The new exception would naturally clarify the situation. Access to interoperability information in these situations would be secured under this exception. However, the lack of such an explicit article does not prevent reasonable interpretations based on general experimental use and exhaustion privileges, as discussed above. These privileges are included in the Proposal for Unitary Patent Protection, but they are also part of many European national legislations already in force.[88] Yet, as explained above, there are some uncertainties as to whether these exceptions provide a necessary exemption for interoperability purposes.

*3.2 Shortcomings of the specific proposal.* In the specific proposal, there are also some limitations. Most importantly, in the copyright context it has already been recognized that the right to reverse engineer does not provide viable means for achieving interoperability. Firstly, reverse engineering as a technique is a time consuming and expensive method.[89] Secondly, by utilizing this technique one does not always reach the level of interoperability that would be required for commercial competition with the original program. These problems became apparent in the Microsoft-case of the European Court of First Instance. In that

[86] See for example, *Robert P. Merges – Richard R. Nelson*, On limiting or encouraging rivalry in technical process: The effect of patent scope decisions, Journal of Economic Behavior & Organization 1994, pp. 1–24.

[87] See for example, EICTA Interoperability White Paper, 21 June 2004.

[88] Exhaustion and experimental use exceptions are in force also in the United States. Whether these could be interpreted in a way to allow the detection of software interoperability information has been analyzed in *Julie E. Cohen – Mark A. Lemley*, Patent Scope and Innovation in the Software Industry, California Law Review 2001 pp. 1–57.

[89] *Pamela Samuelson & Suzanne Scotchmer*, The Law and Economics of Reverse Engineering, Yale Law Journal 2002, pp. 1618–1625.

case the competitors of Microsoft needed recourse to competition law measures because they were not able to achieve a sufficient level of interoperability through the reverse engineering right provided for by copyright provisions.[90] Because of these shortcomings in copyright law, I have recommended in another context that access to critical interface information should be provided more efficiently. Therefore, even the relevant copyright provisions should be revised.[91] However, as legal changes are slow and developments take place step-by-step, the next logical step in the patent context is to make sure that, at the minimum, the right to reverse engineer for interoperability purposes exists also under patent laws.

Another recognized shortcoming in the specific copyright provision is that it only allows reverse engineering for purposes of software-software interoperability. This might be too limiting way of defining required interoperability, as sometimes information might be required for broader purposes.[92] In this respect, it would be a better solution that reverse engineering right is formulated under the experimental use exception or under the exhaustion principle, as these would provide broader applicability of the exception. Another way forward would be that the specific provision would be formulated so that reverse engineering would be allowed for all forms of interoperability.

There are some shortcomings, which relate to the applied reference technique. The Software Copyright Directive states that the right to reverse engineer cannot be contracted out (Article 8). This issue has not been regulated under the Proposal for Unitary Patent Protection. The references cover only Articles 5 and 6, not Article 8, which is relevant for contractual issues. The list of exceptions in the Proposal for Unitary Patent Protection also contains exceptions, which have been deemed mandatory. For example, one of the exceptions included in the list is exhaustion. Based on the nature of other exceptions, one could argue that also the reverse engineering right is a mandatory exception. However, the reference technique makes this somewhat difficult because the relevant Article in the Software Copyright Directive is not referred to in the Proposal. Whether this is an omission by the drafters is unclear. Consequently, one may be able to restrict the reverse engineering right through a licensing agreement. This possibility dilutes the aim of the exception.

One problem still remains, however. Also this problem is related to the reference technique. The reference to the Software Copyright Directive Article 6 allows the use of interoperability information if the information is not used for the development, production or marketing of a computer program which is substantially similar in its expression. Therefore, the use of interface information is allowed as long as it does not infringe on the copyright protection of a computer program. In the copyright context, it is relatively easy to implement an interface without infringing on the underlying copyright protection of said in-

[90] T-201/04 Microsoft Corp. v Commission [2007] ECR II-3601, recital 435.
[91] *Mylly*, supra note 81, at 315.
[92] Op. cit. note 81, at 308–309.

terface. The core requirement is that the programming task is done independently. The parts of a computer program, which are determined by external factors, such as the programming environment, are not protected by copyright. Moreover, if there is only one way to achieve an implementation, this kind of implementation is not protected by copyright. Therefore, the requirement that one is not entitled to use interoperability information in a way that it infringes on copyright is here for the sake of clarity. The copyright protection of a computer program interface normally does not create a bottleneck problem at the implementation phase. However, the same is not similarly true for the patent context, but patent protection also covers the interface implementation (covering also equivalent solutions) and, therefore, the patent protection of interfaces creates a bottleneck problem.

It is quite clear that this provision does not exclude uses which would infringe on the patent protection of a computer program. Therefore, under this exception one cannot implement a patent-protected interface in a competing product. The situation would be the same even in situations where reverse engineering right would be construed under the exhaustion or experimental use privilege. The problem related to interface implementations was also recognized when the directive proposal for computer-implemented inventions was discussed in the EU. It became apparent that the exception guaranteeing access to interface information is not sufficient for interoperability purposes, so there is a need to draft a provision, which would also enable the use of patented technology in the end products. Next I will examine whether such an exception would be possible under the TRIPS requirements.

*3.3 A possible exception for interface implementation.* In Europe, there is currently no specific exception enabling interoperability implementation in cases when an interface is patented. The CPC did not provide any model for such an exception. Neither is one drafted in Community Patent Regulation nor in the Proposal for Unitary Patent Protection. If such an exception is to be implemented, it has to be in compliance with TRIPS. If one compares the situation to that of copyright, it is noteworthy that in the copyright context, interoperability can be achieved after the interface information is detected, because copyright only protects expression and not the ideas underlying the program code. However, in the patent context such principles are not applicable. Moreover, a patent gives stronger protection for interfaces, as patent protection covers also equivalent solutions. Hence, it is possible that a patented interface cannot be implemented in a non-infringing way, and therefore the only way to achieve interoperability is to get a license from the patent holder. The end result of the negotiations could be that there is no license available or that the licensing conditions are not reasonable.[93] In the copyright context, the current provisions

[93] Similarly, for patented interoperability standards, see *Nari Lee*, Patented Standards and the Tragedy of Anti-Commons, pp. 25–28, Teollisoikeudellisia Kirjoituksia, 2006. Available at SSRN: http://ssrn.com/abstract=881702.

seek to enable that a competitor can implement an interface without the copyright holder's consent. Hence, an analysis of whether the same could be achieved in the patent context is needed.[94]

Firstly, one must take into account article 27.1 of TRIPS, which requires that all fields of technology are patentable without discrimination. However, Article 27.1 has been interpreted not to be an obstacle for exceptions that aim to resolve problems inherent to specific product areas.[95] Therefore, in the TRIPS context it is possible that exceptions relate only to a specific technological area. Software technology contains some special features which differentiate it from other technological areas. For example, its development is cumulative by nature. Moreover, software can be defined as belonging to system technologies, where compatibility is important.[96] It has been argued that in these kinds of technological areas, intellectual property protection should be narrow.[97] One way to achieve narrow protection is to implement exceptions. Interoperability itself has been defined as an important factor in system technologies. Therefore, interoperability is the key to solve technology-specific problems in this patentable subject matter. Consequently, a specific exception for interoperability purposes could be justified from the perspective of the particular needs of technological development in this industry. To sum up, an exception for this purpose could be implemented without the fear of breaching Article 27.1 of TRIPS.

When drafting an exception for interoperability purposes, the criterion of a "limited exception" under the TRIPS Agreement may become critical. The problem arises when the interface itself is a subject matter of the patent. In fact, this is the only actual case when the additional exception for interoperability purposes would be a necessity. However, it is difficult to imagine any quantitative restrictions. Basically, the amounts of production could not be limited as interoperability would be required for every distributed commercial program copy. Even though one would be entitled to produce substantial amounts for test purposes, this probably would not be the case for commercial copies generally required in interoperability cases. However, Senftleben has argued that in patent cases it does not seem to play a decisive role whether the limitation is

[94] Senftleben has argued that in situations where a single creation can be protected through various intellectual property systems it would be reasonable that freedoms ensured by one intellectual property system not be destroyed through the protection provided by another system. He has argued that there should be similar limitations throughout different intellectual property systems. *Martin Senftleben*, Overprotection and Protection Overlaps in Intellectual Property Law – The Need for Horizontal Fair Use Defense, p. 2, (April 16, 2010). THE STRUCTURE OF INTELLECTUAL PROPERTY LAW: CAN ONE SIZE FIT ALL?, A. Kur/V. Mizaras (eds.), Cheltenham: Edward Elgar Publishing 2011. Available at SSRN: http://ssrn.com/abstract=1597123. Samuelson has explained that because computer program interfaces were not efficiently protected by copyright, the IP holders shifted their attention to the protection possibilities provided through patent laws. *Samuelson*, *supra* note 6 at 8–13.

[95] Canada – Patent Protection of Pharmaceutical Products, WT/DS114/R, 17 March 2000, paragraph 7.92.

[96] *Pamela Samuelson – Randall Davis – Mitchell D. Kapoor – J.H. Reichman*, A Manifesto Concerning the Legal Protection of Computer Programs, Columbia Law Review 1994, pp. 2308–2431.

[97] *Merges – Nelson*, *supra* note 86 at 5–6 and 20–21.

qualitative or quantitative. His reason for this argument has been that the patent panel in the EC-Canada case did not require that the exception be narrow both in a quantitative and a qualitative sense.[98] Therefore, even though it may be difficult to draft quantitative restrictions, it is possible to concentrate on qualitative limitations. This could be done by a conceptual restriction to the exception.

When the directive proposal for computer-implemented inventions was discussed in the EU, several proposals were made on how an exception for interoperability purposes could be formulated. Many of these draft articles included a requirement that if there is no equally efficient unpatented way to enable interoperability, then the use of patented technology does not constitute a patent infringement. Some proposals included a requirement that if the use of patented technology is indispensable for enabling interoperability, then its use does not constitute a patent infringement.[99] This kind of formulations could form conceptual restrictions and hence make the exception compliant with Article 30 of TRIPS.

The next requirement under Article 30 is that the exception should not unreasonably conflict with the normal exploitation of a patent, nor unreasonably prejudice the legitimate interests of the patent owner. This requirement as well as the requirement of taking into account the legitimate interest of third parties have been understood to refer to economic considerations. On the side of the patent owner, this is understood as an inducement of innovation and an opportunity to make economic returns based on market exclusivity.[100] Moreover, it has been recognized that in the WTO practice the panel has emphasized the patent owner's innovation incentives over the interests of dissemination of technology and the general purpose of the patent institution. The panel's one-sided approach has faced criticism,[101] but its interpretations cannot be overlooked. However, the WTO panel's case where the emphasis on the patent owner's innovation incentives was clear concerned pharmaceuticals.[102] Also, studies have shown that patent-created incentives are more important in the pharmaceutical sector. In other industries, patents do not have such a big role in providing incentives, but there are other mechanisms available.[103] Moreover, it has been realized that technology-specific issues even have a role in the inter-

[98] *Senftleben*, *supra* note 78 at 418. The copyright panel decision referred to here is: United States – Section 110(5) of the US Copyright Act WT/DS160/R.

[99] See European Parliament, Amendments 40-256, Draft recommendation for second reading; Michel Rocard, Commission des affaires juridiques 4.5.2005 (PE 357.776v01-00); Patentability of computer-implemented inventions, Council common position (11979/1/2004 – C6-0058/2005 – 2002/0047(COD)). Amendments 146–160 included proposals on how to enable the use of patented technology for interoperability purposes. Some of these proposals were drafted in the form of an exception while others followed the logic of compulsory licensing.

[100] Canada – Patent Protection of Pharmaceutical Products, WT/DS114/R, 17 March 2000, paragraph 7.55.

[101] UNCTAD-ICTSD Resource Book on TRIPS and Development: An Authoritative and Practical Guide to the TRIPS Agreement, p. 435.

[102] Canada – Patent Protection of Pharmaceutical Products, WT/DS114/R, 17 March 2000.

[103] *Yamane*, *supra* note 1 at 20–21.

pretations of general patent law doctrines.[104] Also the WTO panel has indicated that TRIPS leaves room for technology-specific exceptions.[105] These considerations allow the interpretation of Article 30 that also analyzes the patent owner's innovation incentives by taking into account the technological context.

It is noteworthy that interoperability has a bearing on the size of the markets. In many situations, interoperability works not only for the interests of third parties, but also in favour of a patent holder, since bigger network makes even his products more valuable to a consumer. Accordingly, some have used network effects as an argument for promoting interoperability and against intellectual property protection.[106] Due to network effects linked to interoperability, the rewards the patent holder receives through these effects may be much bigger than the rewards based on patent rights.[107] These economic considerations could be taken into account when assessing whether the interoperability exception does unreasonably prejudice the legitimate interests of a patent owner. These aspects would to some extent balance the expectations of the patent owner for receiving rewards through patent rights related to a patented interface.

The influence on innovation incentives more generally is a factor worth further analysis. It has been recognized that software developers as a rule do have incentives to make their software interoperable with other software and hardware, notwithstanding whether there is patent protection or not. Generally, it does not make sense to develop non-interoperable software. Additionally, competition has the potential to increase innovation incentives related to the main software product. When a developer faces competition he needs to make his product more attractive to consumers by developing it further. Moreover, it has been remarked that interoperability also increases the innovation incentives of actors other than the patent owner. This, in turn, would lead to a wider availability of technological alternatives for consumers.[108] Access to interface technology serves the differentiation of innovation and intra-technology competition.[109] To sum up, it seems that overall innovation incentives increase if interface technology is available. Therefore, narrowing the patent protection of interfaces might not be detrimental to the overall promotion of innovation. It can even be seen as beneficial to technological development in general.

[104] *Dan L. Burk – Mark A Lemley*, Is Patent Law Technology-Specific?,(2002) University of California at Berkeley, School of Law, Public Law & Legal Theory Research Paper Series, Research Paper No. 106 and University of Minnesota Law School, Public Law & Legal Theory Research Paper Series, Research Paper No. 02-14, available at: http://ssrn.com/abstract_id=349761.

[105] Canada-Patent Protection of Pharmaceutical Products, WT/DS114/R, 17 March 2000.

[106] *Mark A. Lemley & David McGowan*, Legal Implications of Network Economic Effects, p. 523, California Law Review 1998, pp. 479–611.

[107] *Robert Hart – Peter Holmes – John Reid*, Study: The Economic Impact of Patentability of Computer Programs, Report to European Commission 2000, p. 6, available at: http://ec.europa.eu/internal_market/indprop/comp/index_en.htm.

[108] T-201/04 *Microsoft* Corp. v Commission [2007] ECR II-3601, recital 655–658.

[109] Similar arguments have been addressed relating to the access to patented standards. See *Ullrich*, supra note 18 at 348. The same arguments can be put forward for interface technologies, as these are in a similar manner essential for the implementation of the relevant technology.

However, some of the aforementioned arguments are based on the assumption that the patent holder has also developed the technology relevant to the main software product, to which the interface is only ancillary. Therefore, some of the arguments are applicable only when the patent owner has not confined himself to the interface technology alone. If the interface is the only technology that the patent covers and the patent owner has neither related patents nor technology, then in this specific case it is harder to justify an exception for interface implementation by saying that the patent holder receives rewards through other means than the patent monopoly. The consequence of an exception in this situation would be that the patent becomes economically meaningless. This could have a negative effect on the patent owner's innovation incentives and technological development in cases where interfaces are designed separately. In these specific situations, an exception might unreasonably conflict with the normal exploitation of a patent, at least if the exception is drafted as a zero-price exception, as they normally are. In these situations, remuneration could balance the patent owner's legitimate interest.[110] If an exception were drafted in the form of a liability rule with remuneration, it would at least in these situations be in compliance with the TRIPS Agreement – also in the sense that the exception would no longer cause an unreasonable conflict with the normal exploitation of a patent.[111] In the copyright context this type of exceptions or limitations are broadly utilized in some legal systems.[112] It has been argued that when the intellectual property owner receives adequate compensation, the exception, in fact, favours his interests.[113] Consequently, if the exception were dependent on remuneration, the patent owner would be able to recoup the intended rewards and, thus, the innovation incentives would not be diminished.[114]

[110] About zero-price liability rules and the possibility for compensation, see *Mark A. Lemley – Phil Weiser*, Should Property Rules Govern Information?, pp. 790–792, Texas Law Review vol. 85, Number 4, March 2007, pp. 783–841. These types of exceptions are sometimes defined as (automatic) compulsory licensing. See for example *Schovsbo supra* note 3 at 614. However, under the TRIPS, compulsory licenses are not meant to be used for blanket licenses but instead, compulsory licenses should be evaluated on their individual merits. See UNCTAD-ICTSD Resource Book on TRIPS and Development: An Authoritative and Practical Guide to the TRIPS Agreement, p. 468. In any case, the terminology is not uniform as these compulsory licenses are sometimes also referred to as statutory licenses. See for example *Friedrich-Karl Beier*, Exclusive Rights, Statutory Licenses and Compulsory Licenses in Patent and Utility Model Law, p. 257, IIC 1999, pp. 251–274. In this article, the possibility for compulsory licensing will not be discussed more broadly.

[111] Similarly, for the copyright context, see e.g. *Huaiwen He*, Seeking a Balanced Interpretation of the Three-Step-Test – An Adjusted Structure in View of Divergent Approaches, p. 278, IIC 2009, pp. 274–308. Samuelson has analyzed various ways to implement a liability rule for the use of interface technologies. *Samuelson*, *supra* note 5 at 30.

[112] About various copyright licensing schemes as copyright limitations, see for example *Mikko Huuskonen*, COPYRIGHT, MASS USE AND EXCLUSIVITY On the Industry Initiated Limitations to Copyright Exclusivity, Especially Regarding Sound Recording and Broadcasting, Yliopistopaino, Helsinki, 2006.

[113] *Geiger, Griffiths and Hilty* 2008, *supra* note 8 at 709.

[114] Here the problem would be how to decide the amount of adequate compensation. It has been argued that the market price is not the only way of determining adequate compensation.

A diffusion of knowledge is in the interest of third parties as well as in the public interest.[115] Interoperability fosters the diffusion of technology. These arguments form relevant third party interests under TRIPS. Interoperability is in the interests of potential competitors, but also in the interest of consumers and the general welfare. As mentioned earlier in this article, third-party interests are to be taken into account under article 30 of TRIPS, alongside with the analysis of whether an exception would unreasonably prejudice the legitimate interests of a patent owner. Moreover, from a legal perspective, when interpreting international treaties, one is obligated to take into account the purpose of such treaties. This obligation is stated in the Vienna Convention on the Law of Treaties 1969, Article 31. Article 7 of TRIPS states that the aim of the patent system is to serve the public interest and foster social and economic welfare. In addition, Article 8 allows Members to depend on measures to promote the public interest in sectors of vital importance to their socio-economic and technological development. The importance of these aims is underlined by the fact that they are stated in the articles of the treaty and not only in its preamble.[116]

Hence, one can find a variety of arguments for supporting an exception to be drafted for interface implementations. These supporting arguments mainly lie on the side of third-party interests and on the general purpose of the patent system. It has been argued that the three-step test should be applied in a manner enabling a comprehensive assessment of the possibly conflicting interests. This would mean that one part of the test should not be analyzed separately, but an overall assessment would balance the parts of the test.[117] In fact, it could be argued that even the interpretations concerning the application of Article 30 of the TRIPS direct to this kind of analysis.[118] Consequently, under the patent provisions of TRIPS it is easy to find justifications for this kind of a comprehensive approach for the three-step test requirements.

At present, there is no proposal for interface implementations that could be analyzed more thoroughly. Therefore, if the proposal for unitary patent protection proceeds in its current form, the relevant patent provisions in Europe still do not resolve the problem of computer program interoperability.

## 4. Concluding Remarks

Technological development is an integral part of the patent institution, as it is one of its founding justifications. Therefore, it is natural that it forms an inter-

The compensation is sufficient when innovation incentives do not diminish to the extent that there would no longer be further innovations. See *Geiger, Griffiths, and Hilty*, supra note 8 at 710.

[115] UNCTAD-ICTSD Resource Book on TRIPS and Development: An Authoritative and Practical Guide to the TRIPS Agreement, p. 435.

[116] Daniel Gervais, The TRIPS Agreement: Drafting History and Analysis, p. 64, Sweet & Maxwell 1998.

[117] In the copyright context, see *Geiger, Griffiths and Hilty, supra* note 8 at 709. For quite a similar approach, see *Kamiel J. Koelman*, Fixing the Three-Step-Test, p. 410, European Intellectual Property Review 2006.

[118] Canada – Patent Protection of Pharmaceutical Products, WT/DS114/R, 17 March 2000, for example paragraph 7.51.

pretative element for specific patent law provisions. Current European patent laws may provide access to interoperability information especially if the reason for detecting this information is to develop the underlying invention further. However, it is not certain if the current exceptions provide the right to reverse engineer computer programs in every situation. Therefore, a specific exception for reverse engineering might clarify the situation. This would bring the patent protection of computer programs closer to the situation achieved within the copyright system, so that critical interoperability information can be accessed without the consent of the intellectual property owner. Clearly, this specific exception contained in the Proposal for Unitary Patent Protection is a step in the right direction. Another way forward is to interpret current exceptions in a manner to enable reverse engineering activities.

In any case, the current Proposal for Unitary Patent Protection still has a way to go to become enforceable law. Moreover, it only covers situations where uniform protection has been applied for through the EPO. Therefore, national patent law exceptions, which have been drafted in conformity with the old CPC articles, will also in the future be relevant when the applicant has applied for a national patent or a bundle of national patents (through the EPO). Consequently, the interpretative flexibilities within these exceptions would still need to be utilized. In this respect it would be better if the right to reverse engineer would be construed under the old exceptions. The way of interpretation could find its way into national laws quite easily. In addition, even one would have an access to the critical interoperability information patent protection may in the end prevent the use of interface technology. This could in some occasions lead to a serious bottleneck situation. Consequently, a possibility to draft an exception for an interface implementation should be considered anew at the European level.