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Software Patent Eligibility and Patentability: An Overview of the Developments in Japan, Europe and the United States and an Analysis of Their Impact on Patenting Trends

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Abstract

Despite the increasing harmonization of IP laws, the patenting of software inventions still varies from country to country and is a subject of debate. As opposed to the initial favor shown toward the patenting of computer programs, even in more liberal countries like the US, the general attitude towards said practice seems to be rapidly changing, with positions ranging from slightly amending the patenting standards to more radical solutions. The famous US case Alice, along with the subsequent case law, seems to follow this trend. However, some argue Alice and its progeny have caused more harm than good. This article deals with this issue by analyzing also the often-neglected Japanese patent system and comparing it to those of the US and Europe. The paper will then discuss this comparison in light of the available data and studies regarding patents in general and, more specifically, software patents, in order to understand how changes in policies, statutes and case law influence patenting trends.

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I. Introduction

Patent protection for software inventions[1] (sometimes called computer program inventions, computer-implemented inventions or other similar names) has always been the subject of debate. While the US was one of its strongest promoters a few years ago, recently criticism and skepticism towards the practice have grown exponentially[2].

Software patents have been associated with "hold up" practices, "patent trolling" behaviors, they have been seen as the symbol of either weak or overly broad patents and sometimes even as a deterrent to innovation itself. Scholars, as well as practitioners and judges, have started to openly advocate for their complete abolition from the categories of patent-eligible "inventions"[3].

To overcome some of the problems afflicting it, the US' patent system has undergone significant changes, including the inadmissibility of bare-bone patent complaints, the introduction of the AIA post-grant proceedings, easier fee shifting, and the new *Alice-Mayo* test to assess patent-eligibility. The result, however, has not been entirely satisfactory. For instance, post-grant review proceedings often disfavor the patentee, and the *Alice-Mayo* two-step test is difficult to understand and even harder to apply, with side effects for other categories of patents (biotech inventions, for example).

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[1] This paper has been developed in the ambit of the Stanford-Vienna Transatlantic Technology Law Forum Fellowship. This work also benefits from the research carried out under the Industrial Property Research Promotion Project FY2015-2017 entrusted by the Japan Patent Office. I would like to deeply thank, for their invaluable support in my investigation of the Japanese patent system, Mr. Yoshiaki AITA, Mr. Miki GOTO, Prof. Ryuta HIRASHIMA, Mr. Hajime MIYAKAWA, Ms. Reina SATO, Mr. Kenta SAKURAI, Prof. Masabumi SUZUKI, Prof. Yoshiyuki TAMURA, Mr. Masayuki YAMANOUCHI, Prof. Etsuko YOSHIDA. It should be noted that any opinion, evaluation or comment expressed in this work belongs solely to the author and cannot be attributed to the above institutions and persons.

[2] See, *ex multis*, E. Goldman, *Fixing Software Patents*, Santa Clara Univ. Legal Studies Research Paper No. 01-13 (2013), *available at* SSRN: https://ssrn.com/abstract=2199180. Some authors have even questiond the patent system as an incentive for innovation: *see ex multis* L. Larrimore Ouellette, *Patentable Subject Matter and Nonpatent Innovation Incentives*, 1115 UC Irvine Law Review 5 (2015); Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, 1 INNOVATION POL'Y & ECON. 119, 120 (2000).

[3] *See for example* Colleen V. Chien, *Reforming Software Patents*, 50 HOUS. L. REV. 325 (2012); D. Crouch, *We the People: Petitioning President Obama to End Software Patents*, PATENTLY-O BLOG (Nov. 2, 2011), available at http://www.patentlyo.com/patent/2011/11/we-the-people-petitioning-president-obama- to-end-software-patents.html (last visited on January 2, 2017); Vivek Wadha, *Why We Need to Abolish Software Patents*, TECHCRUNCH.COM (Aug., 7, 2010), available at http://techcrunch.com/2010/08/07/why-we-need-to-abolish-software-patents/.

In early 2019, the US Congress has decided to consider whether there is a need for reforms to the present system, and consultations are being held as this working paper is drafted in order to understand if and how the law should be changed to correct the anomalies that the recent case law seems to have introduced[4].

In trying to understand which system works best and whether something can be learnt from other legal systems, many scholars have compared the European Patent Convention system to that of the US in order to find out more about the European Patent Office (EPO) practice, and vice versa. Just a few, however, have attempted to compare both the EPO and the US practices with the Japanese system.

This working paper, which draws in part from previous articles on the same topic and was written in anticipation of a more comprehensive monographic work, aims at analyzing whether the evolution of the law and, especially, the case law in Japan, Europe and US is accompanied by patenting trends that reflect such evolution. In other words, this paper tries to understand whether the increased or decreased difficulty in obtaining or enforcing a software patent in a given country as per the evolution of the law/case law is accompanied by a (consequential?), respectively, decrease or increase of patent applications and/or patent grants at the patent office level. The goal is also to understand if and how legislative and case law changes affect the patenting strategies of companies and individuals.

[4] See https://www.judiciary.senate.gov/meetings/the-state-of-patent-eligibility-in-america-part-iii; https://www.judiciary.senate.gov/meetings/the-state-of-patent-eligibility-in-america-part-ii; https://www.judiciary.senate.gov/meetings/the-state-of-patent-eligibility-in-america-part-i; Lemley, Mark A., Senate Testimony on Patentable Subject Matter Reform (June 3, 2019). Available at SSRN: https://ssrn.com/abstract=3398552 or http://dx.doi.org/10.2139/ssrn.3398552.

II. The Japanese approach.

An extensive analysis of the case law and existing scholarship, as well as the author's many interviews with legal professionals in Japan (including IP professors, patent attorneys, JPO examiners and JPO officers) confirmed the following about the patenting of software in Japan.

1. A brief historical overview

In contrast with other legal systems, in Japan there were no "software specific" cases until a couple of decades ago. Before issuing the first judicial decisions dealing specifically with the topic of computer programs' patent-eligibility or patentability, Japanese courts decided a few cases about patent-eligibility regarding inventions in other fields. However, these decisions are also relevant for other technologies, not just computer software[5], as they clarify the legal requirement contained

[5] One of the first cases that attempt to explain the meaning of "use of natural laws" is *Utility Pole Advertising Method* (Tokyo High Court Judgment, December 25, 1956, Gyōshū, Vol. 7, No. 12, p. 3157). Several years later, in the *Ionic Toothbrush* case (Tokyo High Court, December 22, 1970, Hanta, No. 260, at 334.), the Tokyo High Court stated that an invention was not patentable because the human element was necessary to make the invention (a ionic toothbrush) work ("the essential constituent feature" of the invention - *See* Akihiro Sako, *Patentability of Inventions Incorporating Human Mental Acts (Intellectual Property High Court, August 26, 2008)*, Intellectual Property Law and Policy Journal, vol. 34, 2011.). Another interesting case about patent-eligibility is *Electric Mirror Stand and Full Length Mirror* (Tokyo High Court, February 12, 1986, Hanrei Kogyoshoyukenho 2001, at 16.) where the court found that the invention was not patent-eligible, because the physical, "technical", objects (cameras etc.) were merely rearranged, thanks to a human being's mental activity, and therefore the claimed "invention" was nothing more than the simple utilization of the original function of televisions and cameras, without any technical means being involved in such utilization (*see* Akihiro Sako, *Patentability of Inventions, supra* in this same note).

in Japanese Patent Act. Article 2[6] states that an invention – in order to be considered for patenting – must be a creation of a technical idea utilizing the laws of nature. Said requirement, as it will be shown below, is a particularly hard one to meet for software inventions.

Although (and probably because) there was no specific case law regarding software patents, the JPO took up the task of delineating which kind of protection software inventions deserved, if any[7]. The JPO Examination Guidelines of 1976 were the first JPO document to offer some guidance about computer program inventions[8]. Software-related inventions were considered patentable as "process patents", as long as the procedures underlying the computer program were using natural laws. The 1976 guidelines also clarified that some kinds of inventions related to computer programs had to be considered as not utilizing laws of nature, including i) programs, ii) computer operations, iii) program-recording media and iv) programmed computing machines. In such cases, according to the guidelines, the inventions could not even be labeled as methods or products, since they were excessively abstract and therefore lacked "inventiveness".

The "Implementation Guidelines for Inventions Related to Microcomputer Applied Technology" of 1982 seemed to slowly move things forward in the direction of patent-eligibility, by prescribing that microcomputer-controlled instruments – a technology that was starting to grow exponentially – could be considered as "apparatus inventions".

In 1988, the Draft Examination Practice on Computer-Related Inventions added that a software-

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[6] *See* Law No.121 of Apri1 13, 1959, Article 2.

[7] See Hiroaki Sakai, *Historical Transition of Computer Program Protection- A Review of Examination Guidelines over a Quarter Century*, *Habataki -- 21 seiki no chiteki zaisanho* (Flapping -- Intellectual Property Law in 21st Century), marking the 70th birthday of Mr. Nobuhiro Nakayama," pp.154-172 (Kobundo Publishing Co., 2015)

[8] *See* Yoshiaki Aita, Ch. 3 Legal Protection of Computer Software, 3 History of Legal Protection of Software, 3) Patent Protection (Yoshiaki Aita et al., Advanced Science Technology and Intellectual Property Rights, Hatsumei Kyokai, 2001, pp. 117-119. *See also* Hiroaki Sakai, *Historical Transition of Computer Program Protection…*, *supra* note 7, at page 156, footnote 4, where the author underlines that the adoption of the guidelines was not an easy decision. Whether computer programs could be considered as a technical creation that makes use of the laws of nature was debated for more than four years, since the discussion about the adoption of new guidelines started in 1971. Moreover, the 1975 guidelines were labelled "part 1", because in the original plan also parts 2 and 3 had to be later published, but they never were.

related invention that controls a computer, such as an operating system, can be patented as long as it utilizes specific features of the hardware components[9].

In 1993, new Examination Guidelines were enacted in order to clarify that: 1) an invention which is about information processing is deemed patent eligible as long as it is based on the physical or technical nature of the subject and 2) an invention which makes use of hardware resources is considered patent eligible provided that the use of such hardware resources is not a mere inevitable outcome of the use of the computer. This is not a revolutionary deviation from the previous standards, because "computer programs" per se, as well as "recording media recorded with computer programs", are not categorized as inventions, cannot be considered a creation of a technical idea, and thus cannot be considered a "statutory", patent eligible, invention[10]. However, this is another step towards a more open approach to computer program inventions.

In 1994, Japan became a founding member of the World Trade Organization and, as such, was subject also to the TRIPs Agreement, which entered into force in 1995. Since the treaty has been interpreted in Japan as having direct legal effect within the Country, Japanese law had to be read accordingly even without official modifications of its text. Therefore, some had argued that even absent a legislative change, as long as it is considered "a technology", should be patentable if the other conditions of patentability are present and to the extent that an exclusion does not apply[11].

A couple of years later, in 1997, the new "implementing guidelines" of the new Examination Guidelines were published. According to such implementing guidelines, an invention can be considered as a "statutory invention" only if the means for solving a problem utilize natural laws. Merely using hardware resources does not make an invention patent eligible, but a specific

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[9] *See* Hiroaki Sakai, *Historical Transition of Computer Program Protection…*, *supra* note 7, at page 159.

[10] *See* Intellectual Property Committee of the Industrial Structure Council, Report, December 2001 (available at http://www.jpo.go.jp/shiryou_e/toushin_e/shingikai_e/pdf/bukai_report_e.pdf), page 11

[11] See Katsuya Tamai, "Business Method Patent and the Examination of the Non-technical Elements of the Patent Application -A Comparative Study with the Practice in Europe-", Patent Studies No.38, p.22 (2004).

use/connection must be claimed. Significantly for the present analysis, "computer-readable storage medium having a program recorded thereon" disappear from the list of non-statutory inventions contained in the guidelines: media on which software is recorded, along with the installed software, can now be considered patent-eligible as product inventions[12].

Starting from the late Nineties[13] but especially from the early years of the Twentieth century, cases dealing specifically with computer programs began to be decided.

In the meantime, the JPO decided to change its Guidelines again. It clarified that a sequence of computer processes can be considered as a "statutory invention" regardless of the applied field and suggested that even a computer program per se, if specifically linked to hardware, can be claimed as an invention and be the subject of a patent. The Intellectual Property Committee of the Industrial Structure Council Report clarifies that such a change is justified by the "*increasing need to protect network-distributed software*."[14]

The 2000 Examination Guidelines, which became effective from January 10, 2001, simplified the

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[12] *See* The Planning Subcommittee of the Industrial Property Council, *Report of the Planning Subcommittee of the Industrial Property Council - To the better understanding of pro-patent policy* -, November, 1998 (available at Report of the Planning Subcommittee of the Industrial Property Council - To the better understanding of pro-patent policy - The Planning Subcommittee of the Industrial Property Council, November, 1998)

[13] *See* Tokyo High Court, May 26, 1999, No. 1997 (Gyo-Ke) 206, *Hanji*, No. 1682, p. 118 (the so-called *Video Recording Media* case). *Video Recording Media* is probably the first case to be remembered dealing with a software-related patent about a "Karaoke" video recording medium. In this case, the Tokyo High Court underlines that "*the technical features of the invention must be comprehensible from the structure stated in the scope of claims.*" In other words, technical features cannot be inferred from the specifications only but they must emerge from the claims. Moreover, the court states that even though at the core of this invention there is a presentation of information (in particular presentation of images, sounds and letters), such presentation of information was technical. The court seems to say that even though the inventive part consists mainly of a (different) presentation of information, per se non patentable, the invention considered as a whole has technical character, and solves a technical problem. Therefore, patentability cannot be denied. *See also* on patent-eligibility in general, Tokyo High Court, February 12, 1986, *Hanrei Kōgyō Shoyūken Hō* 2001 (Law Report: Industrial Property Law 2001), p. 15/Tokkyo Nyūsu (Patent News) No. 6901 (the so called *Electronic Mirrored Dressing Table* case), where an invention of an electronic mirrored dressing table that exploits the functions of a television and a camera to allow a person to see her back and front at the same time, was deemed patent-ineligible because it was considered a mere "rearrangement" regarding a television that did not involve any technical means utilizing a law of nature.

[14] *See* Intellectual Property Committee of the Industrial Structure Council, Report, *supra* note 10, page 12.

patent-eligibility requirements for software-related inventions, simply stating that hardware resources had to be concretely used by the information processor for the claimed invention to be considered eligible for a patent.

In 2002, the Japanese Patent Act was amended and, in particular, Article 2 was changed to add "computer programs" and "any other set of information similar to a program that is designed to be used for computer processing" to the possible subjects of "product patents", in order to provide stronger protection for information technology products[15].

From 2003 onwards, a series of decisions contributed to shaping the Japanese approach vis-à-vis software patents, confirming (and integrating) what had already been stated in the new JPO Guidelines. The most important cases are the following: *Balance Sheet*[16] (2003), *LSI Simulator*[17] (2004), *Method to Generate Abbreviated Expression of Bit Group*[18] (2007), *Dental Treatment*[19] (2008), *Bilingual Dictionary*[20] (2008), *Amusement Machine*[21] (2009), *Energy Saving Action Sheet*[22] (2012), *Knowledge Base System*[23] (2014), and *Energy Saving Action Sheet II*[24] (2016). In

[15] *See* Task Force on Industrial Competitiveness and Intellectual Property Policy Report, June 5, 2002, page 5 and Yoshiaki Aita, Current State and Remaining Issues of Patent Protection for Computer Programs, Jurist, 1303, pp.138-143 (2005) - 相田義明「コンピュータ・プログラムの特許保護の現状と課題」ジュリスト1303号138-143頁(2005). Reference is also made by the Author to *"Kaisei sangyou-zaisanhou no kaisetsu"* (Explanation of the Revised Intellectual Property Law), [Legal Revision of 2002], published by the Japan Patent Office [http://www.jpo.go.jp/shiryou/hourei/kakokai/sangyou-zaisanhou.htm]. *See also* Naoki Mizutani, *"Hatsumei" no nakani "puroguramu tou" wo fukumeru kototoshita heisei 14 nentokkyohou kaisei no jitsumu he no eikyou"* (Effects on business practice of the decision to regard a "program, etc." as an "invention" at the revision of the Patent Law in 2002), Intellectual Property Management, vol. 53, no. 5 (2003): Page 709.

[16] *See* Tokyo District Court Judgment, January 20, 2003, *Hanji*, No. 1809, p. 3/*Hanta*, No. 1114, p. 145 (the so called *Balance Sheet* case).

[17] *See* Tokyo High Court, December 21, 2004, 2004 (Gyo-Ke) 188, Hanji 1891·139

[18] See Intellectual Property High Court, February 29, 2008, *Hanji*, No. 2012, p. 97, 2007 (Gyo-Ke) 10239.

[19] See Intellectual Property High Court, First Division, June 24, 2008, 2007 (Gyo-Ke) 10369.

[20] *See* Intellectual Property High Court, August 26, 2008, *Hanji*, No. 2041, p. 124/Hanta No. 1296, p. 263, 2008 (Gyo-Ke) 10001. *See generally* Akihiro Sako, *Patentability of Inventions, supra* note 5.

[21] *See* Intellectual Property High Court of June 16, 2009, Hanji, No. 2064 (so called *Amusement Machine* case) as explained in Akihiro Sako, *Patentability of Inventions, supra* note 5, at notes 55 and 56.

[22] See Tokyo IP High Court, December 5, 2012, 2012(Gyo-ke) 10134

[23] *See* Tokyo IP High Court, September 24, 2014, 2014(Gyo-ke)10014

[24] *See* Tokyo IP High Court, February 24, 2016, 2015 (Gyo-Ke) 10130.

particular, the abovementioned decisions - albeit with some contrasts and slight incoherence between them - clarify that: 1) mathematical equations and algorithms by themselves cannot be patented, unless they utilize the laws of nature; 2) even though some technical means are described in the patent, the invention remains non-patentable if the "essential nature" of the invention is directed to a human being's mental activities; 3) the invention, considered as a whole, must have some technical significance in order to be considered patent-eligible/patentable (and if it does, also automation invention, i.e. inventions that automate tasks that human beings can usually do by themselves, are of course patent-eligible/patentable).

2. The current situation in more detail

As highlighted above, the starting point when talking about the current Japanese approach to software patent-eligibility and patentability is the definition of invention.

Article 1 of the Japanese Patent Act (hereinafter, "JPA") explains that "*The purpose of this Act is, through promoting the protection and the utilization of inventions, to encourage inventions, and thereby to contribute to the development of industry*."[25] Article 2 of JPA clarifies that "'Invention' in this Act means the highly advanced creation of technical ideas utilizing the laws of nature"[26].

While the purpose of "highly advanced" is merely to distinguish between inventions and utility models, the interesting parts of this definition are "technical ideas" and "by which a law of nature

[25] See Law No.121 of Apri1 13, 1959, Article 1.

[26] *See* Law No.121 of Apri1 13, 1959, as lately amended by the Act on the Partial Revision of the Patent Act and Other Acts (Act No. 55 of July 10, 2015), Article 2(1). See http://www.japaneselawtranslation.go.jp/law/detail/?id=42&vm=04&re=02 (last visited on November 15, 2016).

is utilized". In contrast to other legal systems, the JPA explicitly mentions both "technical ideas" and "laws of nature". But above all, instead of stating what cannot be considered as an invention, the JPA tries to positively define what an "invention" is. While the reference to laws of nature would merely specify that mental activities, pure academic principles, rules for games and businesses, etc. are excluded from patentability[27], the reference to "technical ideas" seems to be linked to the concept that an invention must be "technical", *i.e*. something objective and that can be repeated (not the product of randomness[28]), and linked to the concept of enablement[29].

Finally, "creation" is to distinguish inventions from mere discoveries, where human beings do not intervene[30].

According to some authors, the courts would consider the requirements of technicality and utilization of the laws of nature without separating them, and this seems to be the practice also in recent case law[31].

Article 2 of the JPA also defines a "computer program, etc.": "*A 'computer program, etc.' in this Act means a computer program (a set of instructions given to an electronic computer which are combined in order to produce a specific result, hereinafter the same shall apply in this paragraph)*

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[27] *See* Nobuhiro Nakayama, Industrial Property Law, *supra* note 23, at pages 105-106. *See* Akihiro Sako, *Patentability of Inventions, supra* note 7.

[28] *See Id*. at 114. *See also* Supreme Court of Japan, February 29, 2000, Hanta, No. 1028, at 173 (so called *Breeding and Proliferation Method* case), as explained in Akihiro Sako, *Patentability of Inventions, supra* note 7, at footnote 15.

[29] *See* Akihiro Sako, *Patentability of Inventions, supra* note 7, at footnote 8. However, *see also* 玉井克哉「ビジネス方法特許と非技術的事項の審査-ヨーロッパの特許実務に照らしての一考察-」特許研究 38 号 22 頁 (2004) Katsuya Tamai, *Business Method Patent and the Examination of the Non-technical Elements of the Patent Application -A Comparative Study with the Practice in Europe*, Patent Studies No.38, p.22 (2004), regarding the need to consider "computer software" as "technology" after the TRIPs Agreement.

[30] *See* Akihiro Sako, *Patentability of Inventions, supra* note 5, at footnote 9 and 11 and Tokyo High Court, February 12, 1986, Hanrei Kogyo Shoyukenho 2001, at 16 (so called electronic mirror stand and full-length mirror case); Tokyo High Court of December 21, 2004, Hanji, No. 1891, at 139 (so called circuit simulation method case), Intellectual Property High Court, September 26, 2006, 2005 (Gyo-Ke) 10698 (so called point management and device method case) and See Intellectual Property High Court, First Division, June 24, 2008, 2007 (Gyo-Ke) 10369 (so called interactive dental treatment network case).

[31] Reference is done also to the cases cited before, in the preceding paragraph.

and any other information that is to be processed by an electronic computer equivalent to a computer program"[32]. Moreover, as already stated above, since recently the JPA clarified that "programs etc." may constitute the invention of a "product"[33].

Article 29 of the JPA then contains the general definition of patentability: "*An inventor of an invention that is industrially applicable may be entitled to obtain a patent for the said invention, except*" when the invention is not new or not inventive (to "*a person ordinarily skilled in the art of the invention*")[34].

Other important sources which can be relied upon when dealing with software patents are the JPO "Examination Guidelines for Patent and Utility Model in Japan" (hereinafter, "Examination Guidelines") and the JPO "Examination Handbook for Patent and Utility Model" (hereinafter, "Examination Handbook"). While the Examination Guidelines are, as the name suggests, a "basic" (although detailed) guideline through the patent law provisions and the examination process, the Handbook contains a series of additional clarifications and countless examples that go into the details of very specific issues, software patents included.

Both the Examination Guidelines and the Examination Handbook have been newly revised. In particular, the Examination Guidelines contain a revised section on computer software-related inventions which came into effect on April 1, 2018[35], and the Examination Handbook was last revised in April 2019.

Mainly based on Article 2 of the JPA, but also on the case law, the Examination Guidelines enlist a series of subject matters excluded from patent-eligibility, also called "Non-Statutory

[32] *See* Law No.121 of April 13, 1959, as amended during the years, Article 2(4).
[33] See Law No.121 of April 13, 1959, Article 2(3)(i).
[34] See Law No.121 of April 13, 1959, Articles 29(1) and 29(2).
[35] See https://www.jpo.go.jp/e/news/public/feedback/document/h3003_kaitei/software_sinsa_kizyun_e.pdf.

Inventions"[36]. It is worth noticing that there is no such list in the Japanese Patent Act (in contrast to, for example, the European Patent Convention Article 52), but the categories that follow are not considered a "creation of a technical idea utilizing a law of nature", and therefore are *de facto* recognized by the JPO as excluded from the scope of Article 2 JPA:

(i) *A law of nature as such*.

(ii) *Mere discoveries and not creations*.

(iii) *Those contrary to a law of nature*.

(iv) *Those in which a law of nature is not utilized*.

(v) *Those not regarded as technical ideas*.

(vi) *Those for which it is clearly impossible to solve the problem to be solved by any means presented in a claim*.

Such a list is not present in the Japanese Patent Act but only in the guidelines. In fact, Japanese law contains a "positive" definition of invention (which is, for instance, missing in the US and in the EPC systems), and it does not contain a list of excluded subject-matter based on which one can infer what is invention and what is not. For the sake of clarify and to offer some guidelines, however, the JPO Examination Guidelines contain such a non-exclusive list.

[36] See the Examination Guidelines for Patent and Utility Model in Japan, page 2, 2.1.

(1) Software patent-eligibility and patentability: JPO Guidelines and Handbook, case law and practice

When dealing with software patent-eligibility, we have to go back once again to the basic definition of invention mentioned by the JPA, according to which an invention must be the "*creation of a technical idea utilizing a law of nature":*

In this regard, the Examination Guidelines specify[37], after enlisting the general categories of "non-statutory inventions" mentioned in the previous paragraph, that inventions relating to business methods, playing a game and calculating a mathematical formula can be considered as "not utilizing the laws of nature when considered as a whole", even though they make use of "an article, apparatus, device, system, computer software etc.". Therefore, such inventions have to be carefully examined to see whether "as a whole" the invention utilizes a law of nature. It might happen that a part of the invention utilizes a law of nature but "as a whole" the invention does not, while the opposite could also be true.

The JPO Guidelines also state that some inventions relating to business methods, playing a game or calculating formulas could be deemed "statutory inventions" just because they utilize computer software. In such a case, the invention and its patent-eligibility must be considered "from the point of view of computer software"[38].

[37] *See* chapter 2.2 of the JPO Examination Guidelines.

[38] *Id*. *See also* the JPO Examination Handbook, Annex B, page 1 and seq. for a list of definitions including "information processing", "program", "program list", "software" (a "*program related to operation of a computer and*

In contrast, some inventions can be considered to be a "creation of a technical idea utilizing a law of nature" independently of whether computer software is used or not. Those kinds of inventions do not have to be examined "from a viewpoint of computer software". In other words, if computer software is used to cause a computer to execute a method that, in itself, is already "a creation of a technical idea utilizing a law of nature", the invention does not have to be examined "from the viewpoint of software". Similarly, if the computer software is used in connection with a system or a computer for executing a method which can already be considered a "statutory invention", there is no need to examine the claimed invention from the viewpoint of software[39].

When an invention is specifically related to software and must therefore be analyzed under the "computer software viewpoint", the Examination Handbook provides some guidance on how that must be done.

First of all, the software of a software-related invention is considered "a creation of a technical idea utilizing a law of nature" if the information processing by such software is "specifically implemented by using hardware resources."[40] This means that an information processor or one of its operation methods is construed through the cooperation of software and hardware. In other words, there is a meaningful interaction between hardware and software components.

As a consequence, in the case of a "software-related invention" involving an information processor (or an operation method thereof) which cooperates with the software or involves a computer

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other information supplied for processing by the computer and conforming to the program") and "hardware resource" ("*A physical device or physical element that is used in processing, operation, or implementation of a function. For example, this refers to a computer as a physical device, and a CPU, memory, input device, output device, or physical device connected to a computer, which are components thereof.*").

[39] *See* chapter 2.2 of the JPO Examination Guidelines, where the Examination Guidelines also provide some examples: *(i) Those concretely performing control of an apparatus (e.g., rice cooker, washing machine, engine, hard disk drive, chemical reaction apparatus, nucleic acid amplifier), or processing with respect to the control*
(b) Those concretely performing information processing based on the technical properties such as physical, chemical, biological or electric properties of an object (e.g., rotation rate of engine, rolling temperature, relation between gene sequence and expression of a trait in a living body, physical or chemical relation of bound substances)."

[40] *See* JPO Examination Handbook, Annex B, page 9 and seq.

readable recording medium, the "software-related invention" can be patent-eligible. Of course, the patent-eligibility is conditioned to the software being "a creation of a technical idea utilizing a law of nature" according to the criterion stated earlier.

The Handbook further specifies that the examiner therefore has to assess whether information processing by software is specifically implemented by using hardware resources, "*that is to say, whether or not a specific information processor or an operation method thereof depending on intended use is constructed through cooperation of software and hardware resources"*. In doing so, the examiner has to determine, based on the content of the claims, "*whether or not calculation or processing of specific information depending on the intended use is implemented by specific means or a specific procedure on which software and hardware resources cooperate."*[41]

In other words, if some hardware resources, technical means or apparatus is claimed in conjunction with software, the computer program is patentable. As the guidelines and the case law point out, however, such mention is not enough, but there must be a specific indication of how the software interacts with the hardware. Merely mentioning a random apparatus is not sufficient to pass the patent-eligibility test. The Handbook offers some examples about how to distinguish software which was "implemented specifically by using hardware resources" and software inventions that merely recite some physical components in order to quickly pass the patent-eligibility threshold[42].

In Japan, as specified by the JPA (which allows for the patenting of software computer programs as "product inventions"), it is possible to patent software "per se", *i.e*. without making reference to the interaction with hardware components in the claims, provided that such computer program uses the laws of nature.

For instance, if a claim directed only to a pure software program were drafted, such claim would

[41] *Id*.
[42] *See* JPO Examination Handbook, Annex B, pages 14 and seq.

pass the patent-eligibility test and would not be considered too abstract or "using the laws of nature" when the interaction between software and hardware components is self-evident to the expert of the field.

The bar is set slightly higher by the JPO when dealing with peculiar inventions, like business method claims. With those kinds of inventions, sometimes the technical part is not inventive in any way, while the business method alone might be. This is why the JPO usually requires applicants to make explicit, in the claims, the relationship between hardware and software, also by specifically mentioning the hardware components that are involved. In such cases, the hardware/apparatus must be present in the claims, and it is not enough that some physical components are referred to in the specifications of the invention. If this were to happen, the claims might be judged to be too broad, and unsupported by the specifications. This aspect would normally be highlighted by a patent examiner, and it is therefore unlikely that such a patent would survive examination without amendments.

In the patent-eligibility examination, the invention is considered "as a whole", as the Examination Guidelines carefully point out: "[s]*ince the invention should be viewed as a whole, it is inappropriate to identify the claimed invention separating the aspect of artificial arrangement and that of automation technique.*"[43] Also the case law quoted in the preceding paragraphs supports this conclusion[44]. Therefore, unlike the US but similarly to the EPO system, the patent-eligibility test in Japan is rapidly passed if a careful claim drafting technique is adopted: i.e., if some hardware

[43] *See also* Guidelines of Examination, chapter 2.2, previously quoted, where the need to consider the invention "as a whole" is also stressed.

[44] *See ex multis* Intellectual Property High Court, First Division, June 24, 2008, 2007 (Gyo-Ke) 10369. *See* Intellectual Property High Court, September 26, 2006, 2005 (Gyo-Ke), 10698 (so called *Amusement Management* case) as explained in Akihiro Sako, *Patentability of Inventions, supra* note 5, at note 55.

is mentioned in the claims and a meaningful connection between hardware and software is explained. My interviews with Japanese patent lawyers and patent attorneys revealed that patent-eligibility issues are rarely a problem, since the guidelines and the case law seem quite clear about what it takes to pass the patent-eligibility test. A competent draftsman would rarely make a mistake if the *status quo* remains unchanged.

Since this is the situation, the most important part of software patents examination is shifted to the analysis of the inventive step of the invention[45]. Once again, as the next part of this work will highlight, the similarity with the EPO system can be noticed, but with a major difference.

Also at this stage, the invention – and in particular every single claim – is considered and evaluated "as a whole", *i.e*. without artificially severing the inventive parts from the non-inventive parts and, most importantly, without separating technical from non-technical elements. Everything is considered together.

No court or examiner will think that if the only "new and inventive" part is the software program, then the invention is not patentable, as long as the interaction between the components of the invention - software and hardware - is sufficiently specified (patent-eligibility) and this interaction creates a new process or product which, in itself (and as a whole), can be considered novel and inventive by the Person Having Ordinary Skill In The Art (PHOSITA).

The above implies that, for instance, just changing the data that are processed by software is likely to be considered as lacking inventive step, because the underlying program and the interaction between computer program and the machine are exactly the same.

However, if a new mathematical formula implemented by a computer process were to create, as a

[45] *See* for instance one of the last decisions involving software patents, Intellectual Property High Court, August 6, 2015, 2014 (Gyo-Ke) 10231, where the claimed invention was found to be lacking an inventive step.

result, a new and non-obvious process, under the Japanese law this could be a patent-eligible invention and, if as a whole the process were to be found new and inventive, such invention could be considered patentable. Such an invention would probably have a harder time being awarded a patent in the EPO system or in the current US system.

III. The European (EPO) approach

1. Europe

When reference to Europe is made in this report, it does not mean that every single European Country is taken into consideration. When the word "European" is used, it usually means the States which are parties to the European Patent Convention (EPC) and, therefore, follow the case law of the European Patent Office (EPO), which was established under the EPC. EPO's "bundle-patents" are recognized in all the Member States of the EPC, even though they have slightly different legal value because they are regulated, for the most part, by the state law of the individual EPC Countries.

Sometimes reference could be made to the European Union, which, patent-wise, plays a very important role.

Before addressing the EPO's approach to patent-eligibility, another clarification is necessary. Since the European Patent Convention entered into force in 1978, the EPO began to work only in the late Seventies. Moreover, as anticipated, the patents granted by the EPO are not "complete" patents: they are a bundle of national patents subject to the law of the EPC member States. This means that

before the early Eighties there is no EPO patent case law, and the final word about patents still belongs to the national courts. Nonetheless, the creation of a centralized Patent Office with an appellate board which decides whether an Examining Division was right or wrong in granting a patent or rejecting an application helped in creating a greater harmonization in European patent law. Moreover, some national patent offices (like the Italian patent office until a few years ago) conducted only a formal examination of patent applications. On the other hand, the EPO fully examines the invention and then the Technical Boards and the Boards of Appeal revise these examinations as required. The inherent value (and strength) of a European Patent was (and is) thus very high also in national patent courts.

2. The EPC and Software Patenting

When dealing with software patenting in Europe, we must start from Article 52.1 EPC, according to which patents "*shall be granted for any inventions which are susceptible of industrial application, which are new and which involve an inventive step*".

First of all, access to patentability (also called "patent eligibility" or "inherent patentability") requires an invention. However, the term "invention" is not positively described within the EPC, which offers merely a negative definition. According to Article 52.2 EPC, discoveries, scientific theories, mathematical methods, aesthetic creations, schemes, rules and methods for performing mental acts, playing games or doing business, presentations of information and programs for computers shall not be regarded as inventions.

At the same time, in Europe, several scholars and national Courts see an invention as a "technical

solution to a technical problem"[46]. This is why it has been argued that computer programs (along with the other categories mentioned in Article 52.2 EPC) are excluded from patentability because they are not technical creations. The reason for this exclusion, however, is the product of a peculiar interpretation of the Convention, which is hardly to reconcile with its plain language and the preparatory works[47]. The above-mentioned exclusion, however, is not as absolute as it might seem, since Article 52.3 EPC clarifies that it is limited only to patent applications directed to computer programs "*as such*".

Therefore, since a computer program seemed to be excluded "per se" from patentability, the analysis of the EPO Boards of Appeal was focused on distinguishing a patent-eligible software-related invention from a patent-ineligible one and then trying to understand when a patent-eligible software invention is then patentable (*i.e*. new, inventive and industrially applicable, as well as described accurately enough to enable the PHOSITA[48] to recreate the invention by reading the patent specifications).

The following paragraphs deal primarily with the development of the EPO Boards of Appeals (BOA) case law on software patent-eligibility (and patentability). Such case law initially followed two different general approaches with regard to patent-eligibility, but more specifically with regard to software patent eligibility: the contribution approach and the whole-content approach (sometimes called "whole contents" approach). It should be kept in mind that such net division in

[46] See R.M. HILTY, C. Geiger, *Patenting Software? A Judicial and Socio-Economic Analysis*, in *IIC*, 2005, n. 6, p. 623.
[47] See E. AREZZO, *Tutela brevettuale e autoriale dei programmi per elaboratore: profili e critica di una dicotomia normativa*, Milano, 2012, pp. 236 and ff.
[48] PHOSITA is an acronym borrowed from U.S. legal terminology, and it means the Person Having Ordinary Skill In The Art, *i.e*. the expert of the field to which a patent application is destined and which is the standard to evaluate a patent application's obviousness, as well as, to some extent, written description (and/or enablement).

two "classes" of approach is done for the sake of simplicity and categorization purposes, since the decisions were a bit more articulated and varied, but they can nonetheless be separated into two general approaches[49].

(1) The so-called "contribution approach"

According to the so called "contribution approach", the patent-eligibility is established after a *prima facie* examination of the (alleged) invention's inventiveness: the invention is inherently patentable when the invention's contribution to the art is technical and, in the majority of the relevant European cases, is not limited to a subject-matter excluded from patentability (which in the case of the EPC includes software *per se*, algorithms, etc.).

Following this first approach, which has been adopted in several decisions[50], when examining a patent application the first task is to establish what contribution the subject matter as a whole makes to the prior art. If a contribution to the prior art is established because the claimed subject-matter as a whole differs from the prior art, it has to be determined whether the contribution is of a technical character[51]. The reasoning behind this theory is that an intrinsically unpatentable

[49] See P. Van den Berg, *Patentability of Computer-software-related Inventions*, in Members of the Enlarged Board of Appeal of the EPO (contributors), *The Law and Practice of the Enlarged Board of Appeal of the European Patent Office During Its First Ten Years*, Munich, 1996, p. 33 and seq.

[50] Some of the first decisions of the Technical Boards were not strictly related to software inventions, but they are still worth mentioning because the patent-eligibility analysis is the same. *See* for example T 0016/83, *Christian Franceries/Traffic Regulation*; T 0051/84, *Stockburger/Coded distinctive mark;* T 366/87, *Sternheimer/Harmonic Vibrations*. *See also*, more specifically on computer programs, T 22/85, *IBM/Document abstracting and retrieving,* T 0121/85, *IBM/Spelling Checking;* T 0038/86, *IBM/Text processing*; T 0052/85, *IBM/Input Linguistic Expressions;* T 59/93, *IBM/Rotating Displayed Objects*; T 0769/92, *SOHEI/General-Purpose Management System*; T 110/90, *Editable Document Form/IBM;* T 833/91, *IBM/External Interface Simulation*; T 204/93, *AT&T/System for generating source code components. See generally* J. PILA, *Dispute over the Meaning of "Invention" in Article 52(2) EPC – The patentability of computer-implemented inventions in Europe*, in IIC, 2005, v. 36, pp. 173–191.

[51] *See* G.D. KOLLE, *Patentability of Software-Related Inventions in Europe*, in *IIC*, 1991, n. 5 pp. 660 and seq. and J. Drexl, *What Is Protected in a Computer Program?*, in *IIC Studies*, v. 15, 1994; G. Guglielmetti, *Brevettabilità delle invenzioni concernenti software nella giurisprudenza della Commissione di ricorso dell'Ufficio europeo dei brevetti*,

subject matter, such as a computer program, should not suddenly become patentable if associated with other known manufactured articles. As a consequence, even when a computer program is claimed in the form of a physical medium (such as a data storage unit, per se patent-eligible), if the contribution to the art is to be found only in the software (per se patent-ineligible), such "invention" is automatically patent-ineligible.

In other words, according to the "contribution approach" the invention is not examined "as whole" to determine the patent-eligibility, but very soon the inventive part of the (alleged) invention is somehow severed from the initial "whole" and analyzed separately. If what seems to be the inventive part is made up only by excluded subject matter (or constitutes an advancement in an excluded category), like computer programs, the invention is not patent eligible.

All of this is done at the patent-eligibility stage, therefore before analyzing whether the invention is new, inventive and industrially applicable (and sufficiently described).

(2) The so-called "whole content approach"

According to the "whole content approach", in order to verify whether the invention is patent eligible or not, the "whole content" of the invention must be taken into consideration, without splitting it in inventive and non-inventive parts.

If the "whole" invention is patent-eligible because it does not fall into one of the excluded categories, then the patentability analysis must be carried out. As a consequence of this approach, if the invention is a mix of technical and non-technical elements, the patent-eligibility test is more

in *Riv. Dir. Ind.*, II, 1994

rapidly passed, because the invention could hardly be considered "a computer program per se", "a mathematical formula as such", etc.

Of course, the issue of excluded subject matter is not solved with this first assessment, but it revives when considering the discrete criteria of patentability (novelty, inventiveness and industrial applicability), and in particular the inventive step (*i.e.* non-obviousness). The invention is inventive, and thus patentable, if the contribution to the art is technical: the invention is the solution to technical problems or technical means are used to achieve such a solution. Even in this case, the contribution to the art is usually required to pertain to a field non-excluded from patentability, *i.e.* a technical field.

The EPO Technical Boards followed this second approach in several decisions[52], alternating it with the above-described "contribution approach". At some point, the "contribution approach" was slowly abandoned by the Boards[53], even though it has been occasionally alluded to in some decisions[54].

(3) The evolution of the "whole content approach" and the shift from the patent-eligibility to the patentability investigation.

[52] *See for example* T 0208/84 *Vicom/Computer-related Invention* (even though this decision was not be followed in the subsequent EPO Boards' decisions, probably because of its partial ambiguity and because it went too far in allowing software patenting); *T 26/86 Koch & Sterzel/X-Ray Apparatus;* T 115/85 *IBM/Computer-Related Invention* (with several differences from *Vicom*, as already highlighted, and some more similarities to *Koch*); *KEARNEY/Computer-Related Invention,* T 0042/87; T 236/91 *TEXAS INSTRUMENTS/Language Understanding System*; T 164/92 *Computer Components/Bosch;* etc.. *See also* D. SCHIUMA, *TRIPS and Exclusion of Software "as such" from Patentability*, in *IIC*, 2000, n. 1, pp. 36 and seq. and G.F. Casucci, *Software and Computer-Related Inventions: Protection by Patent and Copyright,* in C. HEATH, A. KAMPERMAN SANDERS (eds.), NEW FRONTIERS OF INTELLECTUAL PROPERTY LAW, 2005.

[53] *See for example* T 1173/97, *Computer Program Product/IBM;* T 1194/97, *PHILIPS/Record Carrier*; T 931/95, *PBS PARTNERSHIP/Controlling Pension Benefits System* etc.

[54] See P. Leith, *Software and Patents in Europe*, Cambridge, 2007.

Starting in 2006, after the European Communities had just rejected the last proposal to introduce a Directive that specifically allowed for software patenting[55] and after the EPC amendment proposal to eliminate computer programs from the EPC excluded subject matter was abandoned, the BoAs started adopting a slightly different approach[56]. This trend might be seen as an evolution of the "whole content approach": the invention is not only considered as a whole when considering its patent-eligibility, but the patent-eligibility investigation itself starts to lose its importance. The patentability analysis, and in particular the inventive step (non-obviousness) assessment becomes crucial.

The EPO Boards of Appeal, in fact, start recognizing that some technical means are enough to confer "technical character" to the software-related invention, shifting the investigation to the patent-eligibility assessment, where it still must be evaluated whether the invention makes a technical contribution to the prior art. This new line of decisions[57] has been referred to as "any hardware approach", since the mentioning of any hardware next to the computer software would be enough to make the "whole" invention patent-eligible and quickly go to the patentability analysis.

The BoA goes as far as stating that technical and non-technical elements must be considered together when assessing the inventive step (non-obviousness) of the invention, as long as they are tied together. If that is the case, the non-technical elements can contribute to the inventiveness of the invention, even though "the innovation must be on the technical side, not in a non-patentable

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[55] *See Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the patentability of computer-implemented inventions,* COM(2002) 92 final, available at eur.lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2002:0092:FIN:EN:PDF. *See also* R.M. Hilty, C. Geiger, *Towards a new instrument of protection for software in the EU? Learning the lessons from harmonization failure of software patentability*, in E. Arezzo, G. Ghidini, *Biotechnology and Software Patent Law – A Comparative Review of New Developments*, Celetenham, 2011

[56] See T 258/03, *Auction Method/HITACHI;* T 424/03, *Clipboards formats I/Microsoft*; T 154/04, *DUNS LICENSING ASSOCIATES/Estimating Sales Activities*

[57] But especially T 424/03, *Clipboards formats I/Microsoft.*

field”[58].

(4) The EPO Enlarged Board of Appeal decision of 2010 and its progeny.

The last round of cases regarding software patentability/patent-eligibility were deemed to cast additional doubts about the correct interpretation of the (Article 52 EPC) exclusion of computer programs from patentability. That is why, in late 2008, the President of the European Patent Office decided to intervene and to make a referral to the EPO Enlarged Board of Appeal[59]. In the referral[60], the President – after having remarked on the complexity of the software “issue”, known since the drafting of the EPC itself – stated that both the national courts and the public were concerned with some of the recent decisions of the Board of Appeal. Some of them, in fact, seemed to give an overly restrictive interpretation to the software patentability exclusion, while some others (in particular, the *Clipboards formats I/Microsoft* decision[61]) seemed to go even further, making such exclusion meaningless. In fact, some of the last cases considered the patent-eligibility test to be passed as long as “any hardware” was quoted, without requiring any “further technical effect” to take place in order to consider the invention “technical”: citing a computer seemed to be enough.

[58] The BOA in T 154/04, Paragraph 15 and ff. of the Reasons cites the *Comvik* decision (T 641/00), where the “problem-solution” approach, i.e. one of the approaches used to determine when the invention was innovating in a technical field, was explained: “For the purpose of the problem-and-solution approach, the problem must be a technical problem, it must actually be solved by the solution claimed, all the features in the claim should contribute to the solution, and the problem must be one that the skilled person in the particular technical field might be asked to solve at the priority date. In this context "problem" is used merely to indicate that the skilled person is to be considered as faced with some task (German "Aufgabe"), not that its solution need necessarily involve any great difficulty”. And again “where the claim refers to an aim to be achieved in a non-technical field, this aim may legitimately appear in the formulation of the problem as part of the framework of the technical problem that is to be solved, in particular as a constraint that has to be met”.
[59] *See* Article 112 EPC regarding the powers of the EPO President.
[60] See G 03/08 Referral.
[61] *See* T 424/03.

The EPO Enlarged Board of Appeal decided the above-referenced Presidential Referral in 2010[62], and clarified that there is no general inconsistency in the EPO Technical Boards' decisions. The cases which have been decided merely show the slow evolution of the case law. Such evolution highlights the definitive abandonment of the contribution approach: a computer program, in order to be patentable, has to generate "further technical effects", but those effects do not have to be new (such analysis will be left to the subsequent inventive step and novelty assessments). In issuing such a statement, the Enlarged Board of Appeals confirms that tying the software with "any hardware" is not enough: further technical effects must be achieved, when the software is claimed alone.

However, if something else containing the software is claimed, for instance a "storage medium", there is no patent-eligibility issue there. Since "storage media" are not per se excluded from patentability, the analysis will immediately be focused on the patentability requirements[63]. In other words, mentioning a "computer", a medium, etc. avoids any sort of patent-eligibility problems and postpones the "software issue" to the patentability analysis.

In such an analysis, the Enlarged Board of Appeal clarified that all the elements of the claimed invention have to be taken into account, not only the technical/non-excluded ones. In fact, matters excluded from patentability may nonetheless contribute to the technical character of the invention. Moreover, the technical effects that the invention has to produce do not have to be limited to the "physical world".

Lastly, even though the activity of the programmer might be considered technical, programming is not technical per se: the programmer must have had technical considerations in addition to

[62] See G 03/08.
[63] See G 03/08, pp. 38-39 at 10.8.7.

having found an algorithm to carry out a procedure. Similarly, the fact that when a program is run on a computer it produces a technical effect because current circulates into the computer, that is not enough to confer technical character to the computer claimed alone[64].

The EBA's teachings have been followed in the subsequent decisions of the Technical Boards up until now[65], and they have been incorporated in the EPO Guidelines for Examination, the last version of which entered into effect on November 1st, 2019[66].

Finally, it must be noted that while the patent-eligibility "any hardware" approach makes the EPO system very similar to the Japanese one, some differences can still be noted in the "inventive step" analysis. At such a stage, all the (once) patent-eligibility considerations deriving from the Article 52.2 EPC exclusions are revived: the invention's inventive part must have technical character, *i.e.* it must produce an overall technical effect or some technical effects must be produced from the effect of the software on the computer. In other words, the invention must represent a "technical solution to a technical problem", which means that only the features contributing to the technical characters of the invention must be considered when assessing the inventive step, be they technical or non-technical ones. Those features that do not contribute to that technical character cannot be considered[67].

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[64] *See* G 03/08, p. 53 at 13.5. *See also* G 03/08, pp. 53 and seq. *See*, for a more critical comment, J. Pila, *Software Patents, Separation of Powers, and Failed Syllogism: a Cornucopia from the Enlarged Board of Appeal of the European Patent Office*, in *Cambridge Law Journal*, 2011, v. 70. *See also* J. Pila, *The requirement for an invention in patent law*, Oxford, 2010.

[65] *See ex multis* T 0313/10 *Item matching/AMAZON*; T 0573/12, *Automated process flow/SAP;* T 1755/10, *Software structure/TRILOGY*; T 1385/12; T 1370/ 11, *On-demand property system/MICROSOFT*; T 1789/11, *Clipboard formats I/MICROSOFT*; T 1463/11 *Universal Merchant Platform/Cardinal Commerce*.

[66] *See* EPO, Guidelines for Examination, 2019. *See also*, for a comprehensive analysis and reporting of the case law, EPO, *Case Law of the Boards of Appeal of the European Patent Office*, 2016 (https://www.epo.org/law-practice/case-law-appeals/case-law.html).

[67] *See* EPO Guidelines for Examination, Part G, Chapter VII.5.4.1: "[i]n the case of claims directed to a technical implementation of a non-technical method or scheme, in particular of a business method or game rules, a modification to the underlying non-

IV. The United States

US statutory law, unlike the EPC but similarly to Japan, never contained an explicit list of "excluded subject matters", *i.e*. categories of inventions (or "non-inventions") that are excluded from patentability. As a consequence, in the US there was no explicit exclusion of "software patents" from the scope of the Patent Act. However, a less specific (if compared to the EPC) list of "excluded categories" has been created through a series of judicial precedents. This situation may be seen as the product of a legislative and political choice as well as due to the fact that the US is a common law country.

In this regard, the US courts, through a series of decisions interpreting the US Patent Act and, in particular, USC 35 § 101, began to exclude '*abstract ideas, natural phenomena or natural laws*' from the scope of patentable subject matter.

The bare text of the current USC 35 § 101 merely states that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." The other conditions that the invention must satisfy are novelty, non-obviousness, and industrial applicability. Additionally, the invention must be described in an enabling and

technical method or scheme aimed at circumventing a technical problem, rather than addressing this problem in an inherently technical way, is not considered to make a technical contribution over the prior art (T 258/03, T 414/12)." *See also* A. Strowel and S. Utku, *The trends and current practices in the area of patentability of computer implemented inventions within the EU and the U.S.*, 2017, *available at* https://ec.europa.eu/digital-single-market/en/news/report-trends-and-current-practices-area-patentability-computer-implemented-inventions-within.

sufficiently clear manner. It is evident that the black letter law makes no reference to the abovementioned judicial exclusions.

The first decisions mentioning this triad of exclusions are not related to software patents, but they are still worth mentioning because the same principles are applicable when dealing with computer program inventions, with the additional complication that software programs are a difficult, constantly evolving, subject matter.

The very first case that makes clear reference to the aforementioned exclusions is the *Morse* case[68], where the US Supreme Court stated that "the mere discovery of a new element, or law, or principle of nature without any valuable application of it to the arts, is not subject of a patent. But he who takes this new element or power, as yet useless, from the laboratory of the philosopher, and makes it the servant of man; who applies it to the perfecting of a new and useful art, or to the improvement to one already known is the benefactor to whom the patent law tenders its protection"[69]. Such a conclusion is related to the concept that "an idea of itself is not patentable, but a new device by which it may be made practically useful is", provided that the device is not only useful but also new, non-obvious etc.[70]

The Morse case was later fine-tuned by many other decisions, including in particular *Mackay Radio v. Radio Corp. of America*[71] and *Funk Brothers v. Kalo Inoculant*[72].

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[68] *See O'Reilly vs. Morse*, 56 U.S. (15 How.) 62, 131 (1853) (Grier, J. dissenting).

[69] *See also* J.A. SHERIDAN, *Patent Protection of Computer Software – Practical Insights*, in *Santa Clara Law Review*, 1983, vol. 4, pp. 989 and seq. According to the Author and to the *Morse* case, Morse was granted a patent for a process using electromagnetism to produce distinguishable signs for telegraphy but the Court did not consider valid those claims in which Morse claimed the use of "electromagnetism, however developed for marking or printing intelligible characters, signs, or letters, at any distances."

[70] *See Rubber-Tip Pencil Company v. Howard* - 87 U.S. 498 (1874).

[71] *See Mackay Radio & Telegraph Co. v. Radio Corp. of America*, 306 U.S. 86, 306 U.S. 94 (1939): "while a scientific truth, or the mathematical expression of it, is not a patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be".

[72] *See Funk Brothers Seed Co. v. Kalo Inoculant Co.* - 333 U.S. 127-130 (1948): "He who discovers a hitherto unknown phenomenon of nature has no claim to a monopoly of it which the law recognizes. If there is to be invention from such a discovery, it must come from the application of the law of nature to a new and useful end".

1. A first line of recent decisions related to software patenting: *Gottschalk vs. Benson* and *Parker vs. Flook*.

We have to wait until the Seventies for some judicial precedents dealing specifically with software patents[73].

The first one is *Gottschalk vs. Benson*,[74] which involved a method for converting binary-coded decimals into pure binary numerals. The US Supreme Court found that the invention was not related to any particular machine or apparatus, art or technology, but it was an attempt to obtain a "broad and sweeping" patent on any possible, known and unknown, use of the binary-coded decimals to pure binary numerals conversion method. The justices also added that a process patent should be tied to some particular machine or apparatus, or at least contribute to the changing of articles or materials to a different state or thing[75] (the so called "machine or transformation" test), and the method described in the patent application failed to do so. And in fact, the claimed method, in the opinion of the Court, was nothing more than a mathematical calculation that could be performed mentally by humans without the help of any machine (computer or otherwise).

A second relevant case is *Parker vs. Flook*[76], where a divided Supreme Court struck down another software patent, affirming that it was directed to non-statutory subject matter. This time, the invention was about a method to automatically re-calculate alarm limits in an alarm system, and

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[73] *See* Martin Campbell-Kelly, *Not All Bad: An Historical Perspective on Software Patents*, 11 MICH. TELECOMM. & TECH. L. REV. 191 (2005), and Edward R. Hyde, *Legal Protection of Computer Software*, 59 CONN. B.J. 298, 302–03 (1985).

[74] *See Gottschalk vs. Benson,* 409 U.S. 63 (1972), No. 71-485 *available at* https://supreme.justia.com/cases/federal/us/409/63/case.html. See also Michael A. Duggan, *Patents on Programs? The Supreme Court Says No*, 13 JURIMETRICS J. 135 (1973)

[75] See 409 U.S. 63, 67-72.

[76] *See Parker vs. Flook,* 437 U.S. 584 (1978)

the Supreme Court found that the invention could not be considered patentable. In the opinion, the Court explained the claimed invention merely consisted of a new formula to update such alarm limits. In other words, the algorithm was its only new and useful characteristic, which is not patent-eligible and, in any case, should be considered as part of the prior art as a mere mathematical, abstract, discovery. The decision was not taken unanimously by the Court and this intermingling of patent-eligibility and patentability elements (which the Court denied it was performing) was heavily criticized thereafter[77].

These first two cases can be seen as the first phase of the Supreme Court's decision making about patent-eligibility, and in particular about software's inherent patentability, in which § 101 is read in a more restrictive way.

2. A second round of patent-eligibility decisions: *Diamond v. Chakrabarty* and *Diamond vs. Diehr*.

While in the meantime the CCPA was dealing with software patentability issues in a partially different way[78], another case regarding patent-eligibility was decided by the Supreme Court: *Diamond v. Chakrabarty*. This case was not about software inventions or algorithms but about a genetically engineered micro-organism. The CCPA found that this invention was patentable

[77] *See* 437 U.S. 584, 590, 594, 595, 596.

[78] *See* K.A. Andresen, *Law and Business of Computer Software*, USA, 2012, p. 146 and *Application of Freeman*, 573 F.2d 1237, 1243-45, 197 U.S.P.Q. 464 (C.C.P.A. 1978). It should also be noted that once again the Court of Customs and Patent Appeals was in contrast with the Supreme Court, as it is apparent from the decisions post-*Benson*, in which the Supreme Court's approach was relied upon but at the same time, sometimes lightly sometimes fiercely, criticized. See, *ex multis*, *In re Christensen*, 478 F.2d 1392 (1973), *In re Johnston*, 502 F.2d 765 (1974), *In re Chatfield*, 545 F.2d 152 (1976), cert. denied, 434 U.S. 875 (1977), *In re Flook*, 559 F.2d 21 (1977); *In re Toma*, 575 F.2d 872, 877 (CCPA 1978), *In re Sarkar*, 588 F.2d 1330 (1978); *In re Gelnovatch*, 595 F.2d 32 (1979), *In re Bergy*, 596 F.2d 952 (1979).

notwithstanding that its subject was a living organism, and the Supreme Court affirmed. The Court held that this invention was the product of human ingenuity, and different from anything else that could be found in nature. Therefore, it deserved patent protection and it is not the Court's task to arbitrarily limit the broad scope of patentability that § 101, as enacted by Congress, has envisaged. As already mentioned, this case is not specifically about a computer-related invention, but it can be seen as one of the first cases of the Supreme Court to interpret § 101 and its judicially created limitations in a broader way.

The second case of this round of decisions about patent-eligibility, *Diamond vs. Diehr*[79], is instead specifically referred to a software program. In dealing with the patent at issue, the justices reaffirmed that the transformation and reduction of an article to a different state or thing was the clue to the patentability of a process claim which does not mention or include particular machines (again, the "machine or transformation test"). Therefore, they found that, since the patent at hand involved physical and chemical processes for molding precision synthetic rubber products, it fell within the categories of patentable subject matter[80]. The Court also underlined that the conclusion reached with regard to "respondents' claims is not altered by the fact that in several steps of the process a mathematical equation and a programmed digital computer are used. […] The respondents here do not seek to patent a mathematical formula. Instead, they seek patent protection for a process of curing synthetic rubber. Their process admittedly employs a well-known

[79] *See Diamond vs. Diehr*, 450 U.S. 175 (1981). *See also*, for different points of view, Julie E. Cohen & Mark A. Lemley, *Patent Scope and Innovation in the Software Industry*, 89 CALIF. L. REV. 1, 9 (2001) and Kevin Emerson Collins, *Propertizing Thought*, 60 SMU L. REV. 317 (2007).

[80] See 450 U.S. 175, 185, where the Court further clarifies "That respondents' claims involve the transformation of an article, in this case raw, uncured synthetic rubber, into a different state or thing cannot be disputed. The respondents' claims describe in detail a step-by-step method for accomplishing such, beginning with the loading of a mold with raw, uncured rubber and ending with the eventual opening of the press at the conclusion of the cure. Industrial processes such as this are the types which have historically been eligible to receive the protection of our patent laws."

mathematical equation, but they do not seek to pre-empt the use of that equation. Rather, they seek only to foreclose from others the use of that equation in conjunction with all of the other steps in their claimed process[81]". The Court also observed that curing natural or synthetic rubber does not need a computer, but if a computer and a computer program are involved in such a process and they contribute to improving it when considered as a whole, this factor does not change the patent-eligibility of the invention.

The *Diehr* decision is interesting also from another point of view: While in Europe the contribution approach and the whole content approach were being conceived, remaining at the center of a multi-decennial jurisprudential debate, the US Supreme Court immediately intervened to clarify a similar matter, which had been raised in *Parker vs. Flook*. More precisely, the majority of the justices in *Diamond vs. Diehr* stated that "in determining the eligibility of respondents' claimed process for patent protection under § 101, their claims must be considered as a whole. It is inappropriate to dissect the claims into old and new elements and then to ignore the presence of the old elements in the analysis. This is particularly true in a process claim, because a new combination of steps in a process may be patentable even though all the constituents of the combination were well known and in common use before the combination was made. The 'novelty' of any element or steps in a process, or even of the process itself, is of no relevance in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject matter". And, continuing to use the words of Court, "in this case, it may later be determined that the respondents' process is not deserving of patent protection because it fails to satisfy the statutory conditions of novelty under § 102 or nonobviousness under § 103. A rejection on either of these grounds does not affect the determination that respondents' claims recited subject matter which was eligible for patent

[81] See 450 U.S. 175, 188-189.

protection under § 101." Apparently, the Supreme Court seems to solve the problem of what exactly must be considered when dealing with the patent-eligibility analysis, but subsequent cases reveal that the issue was far from solved.

3. The After-*Diehr* through the decisions of the CAFC.

In 1982, the CCPA was substituted by the Court of Appeal for the Federal Circuit (CAFC, or simply the "Federal Circuit") as the court having exclusive appellate jurisdiction for patent cases. This specialized court dealt with software patent-eligibility issues for almost thirty years without any interference by the Supreme Court which, after *Diehr*, did not hear any other patent-eligibility cases.

Through a series of decisions, the Federal Circuit started from *Diehr*'s more permissive approach towards software patent-eligibility (and patent-eligibility in general) and developed it even further. In particular between the end of the Eighties and the beginning of the Nineties[82], the CAFC decided a few cases that can be clearly read as pro software patent-eligibility[83].

In the *In re Alappat* case[84], in particular, the Federal Circuit strongly underlined that an invention

[82] See *In re Grams*, 888 F. 2d 835, 12 U.S.P.Q. 2D 1824 (Fed. Cir. 1989); *In re Iwahashi*, 888 F.2d 1370, 12 U.S.P.Q.2d 1908 (Fed. Cir. 1989); *Arrhythmia Research Technology, Inc. vs. Corazonix Corp.*, 958 F.2d 1053, 22 U.S.P.Q.2d 1033 (Fed. Cir. 1992); *In re Schrader*, 22 F.3d 290, 30 U.S.P.Q.2d 1455 (Fed. Cir. 1994); *In re Warmerdam*, 33 F.3d 1354, 31 U.S.P.Q.2d 1754 (Fed. Cir. 1994); *In re Trovato*, 42 F.3d 1376, 33 U.S.P.Q.2d 1194 (Fed. Cir. 1994); *In re Alappat*, 33 F.3d 1526, 31 U.S.P.Q.2d 1545 (Fed. Cir. 1994).

[83] Whether this was the right approach has been subject of debate for decades. *See generally* Michael Risch, *Everything Is Patentable*, 75 TENN. L. REV. 591 (2008); Peter S. Menell, *A Method for Reforming the Patent System*, 13 Mich. Telecomm. Tech. L. Rev. 487 (2007); F. Scott Kieff, *The Case for Registering Patents and the Law and Economics of Present Patent Obtaining Rules*, 45 B.C. L. REV. 55, 107–08 (2003); Dan L. Burk, Mark A. Lemley, *Is Patent Law Technology Specific?*, 17 Berkeley Tech. L.J. (2002).

[84] *In re Alappat*, 33 F.3d 1526, 31 U.S.P.Q.2d 1545 (Fed. Cir. 1994)

must be always considered "as a whole" while determining its patent-eligibility and only if the claimed invention "as a whole" is a "disembodied mathematical concept, whether categorized as a mathematical formula, mathematical equation, mathematical algorithm, or the like, which in essence represents nothing more than a 'law of nature,' 'natural phenomenon,' or 'abstract idea'", then the invention is not patentable. The CAFC, however, states that in that particular case it is true that almost all the components of the invention perform mathematical calculations, but "as a whole" they combine to form a machine which produces a useful, concrete and tangible result".

A similar principle is expressed in *In re Lowry*[85], where the CAFC also clarifies that "if a machine is programmed in a certain new and unobvious way, it is physically different from the machine without that program; its memory elements are differently arranged. The fact that these physical changes are invisible to the eye should not tempt us to conclude that the machine has not been changed"[86].

However, the landmark case that has been said to open the doors to software patent-eligibility is *State Street Bank & Trust Co. vs. Signature Financial Group, Inc*[87]. In this decision, the CAFC clarified that some types of subject matter, standing alone, represent no more than abstract ideas unless they are reduced to a practical application. Even an algorithm, in itself patent-ineligible, can become eligible if applied in a "useful" way[88]. In *State Street* the Federal Circuit held that the

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[85] *See In re Lowry*, 32 F.3d 1579, 32 U.S.P.Q.2d 1031 (Fed. Cir. 1994)

[86] *Id*.

[87] See *State Street Bank & Trust Co. vs. Signature Financial Group, Inc*., 149 F.3d 1368, 47 U.S.P.Q.2d 1596 (Fed. Cir. 1998).

[88] The CAFC further stated that "In Alappat, we held that data, transformed by a machine through a series of mathematical calculations to produce a smooth waveform display on a rasterizer monitor, constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it produced "a useful, concrete and tangible result"--the smooth waveform. Similarly, in Arrhythmia Research Technology Inc. v. Corazonix Corp., 958 F.2d 1053, 22 USPQ2d 1033 (Fed.Cir.1992), we held that the transformation of electrocardiograph signals from a patient's heartbeat by a machine through a series of mathematical calculations constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it corresponded to a useful, concrete or tangible thing--the condition of a patient's heart. Similarly, in Arrhythmia Research Technology Inc. v. Corazonix Corp., 958 F.2d 1053, 22 USPQ2d 1033 (Fed.Cir.1992), we held that the transformation of electrocardiograph signals from a patient's heartbeat by a machine through a series of mathematical calculations constituted a practical application

transformation of data, through a machine governed by an algorithm, into other data (amounts of dollar into final share prices) can be seen as the practical application of a mathematical formula, which produces a "useful, concrete and tangible result". Such an invention is therefore patent-eligible.

State Street is relevant also because it managed to reinforce the "useful, concrete and tangible result" test as the standard to assess patent-eligibility, subsequently adopted also by the USPTO[89].

4. The Supreme Court decides again on patent-eligibility after almost thirty years: *Bilski, Mayo* and *Alice.*

Between 2010 and 2014, a trilogy of Supreme Court decisions completely changed the landscape of patent-eligibility in the US. After thirty years the justices decided to again hear patent cases, with debatable results[90].

The first decision is *Bilski vs. Kappos* (2010), where the Supreme Court began demolishing the existing system by questioning the validity of both *State Street*'s "useful, concrete and tangible result" test and the older (but still in use) "machine-or-transformation" test[91]. The Court stated that

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of an abstract idea (a mathematical algorithm, formula, or calculation), because it corresponded to a useful, concrete or tangible thing--the condition of a patient's heart.".

[89] *See* John R. Allison & Starling D. Hunter, *On the Feasibility of Improving Patent Quality One Technology at a Time: The Case of Business Methods*, 21 BERKELEY TECH. L.J. 729, 730–31 (2006) and Julie E. Cohen & Mark A. Lemley, Patent Scope and Innovation in the Software Industry, 89 CALIF. L. REV. 1, 46 (2001)

[90] *See* John F. Duffy, *Rules and Standards on the Forefront of Patentability*, 51 WM. & MARY L. REV. 609, 612 (2009). *See also* Mark A. Lemley, *Software Patents and the Return of Functional Claiming*, 2013 WIS. L. REV. 905 (2013); Abby Bhattacharayya, *Implementation, or the Possible Lack Thereof, of the Bilski Supreme Court Decision*, 6 J. BUS. & TECH. L. 103 (2011); Mark A. Lemley, *Ignoring Patents,* 2008 MICH. ST. L. REV. 19, 21 (2008).

[91] See *Bilski v. Kappos*, 561 U.S. 593. See also P.S. Menell, *Forty Years of Wondering in the Wilderness and No Closer to the Promised Land:* Bilski'*s Superficial Textualism and the Missed Opportunity to Return Patent Law to Its*

both tests can be useful tools to assess the patent-eligibility of a claimed invention, but they are not absolute, and a case-by-case approach is preferable. However, in denying the patent-eligibility of the claimed invention, the Supreme Court slightly mixed patent-eligibility criteria (natural laws, natural phenomena and abstract ideas) with some of the patentability concepts. The Court talks about "well-known" methods intermingling two separate analyses: the factual one regarding non-obviousness and novelty with the legal one regarding eligibility. The relevant explanations from *Benson*, *Flook* and *Diehr* do not eliminate the confusion and confirm that the invention is not considered "as a whole" when determining its patent-eligibility: what seems to be the novel/non-obvious part is severed from the rest, and evaluated separately.

The second case about patent-eligibility is *Mayo Collaborative Services vs. Prometheus Laboratories*[92]. This case is not about software patents but involves a claimed invention regarding a method to identify the correct dosage of a medicine to administer to patients. The Supreme Court explained that such an 'invention' is not an application of a law of nature, but rather an attempt to monopolize it entirely. The case involved applicants trying to secure a patent on a natural law involving the correct dosage of a drug that had been known for many years. In this decision, the Supreme Court also admits that the §102 novelty enquiry might sometimes overlap with the §101 patent-eligibility analysis, but that this is not a good reason to eliminate the Section 101 investigation entirely in favor of a "patentability-oriented" approach. Such a solution, proposed by a US Government amicus brief, would entail considering automatically obvious and not novel any laws of nature or abstract ideas, artificially considering them as part of the prior art. According to

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Technological Mooring, 63 *Stan. L. Rev.* 1289, 2011; Mark A. Lemley et. al., *Life After* Bilski, 63 STAN. L. REV. 1315 (2011); P. Samuelson, J. Schultz, *Clues for Determining Whether Business Methods and Service Innovations Are Unpatentable Abstract Ideas*, 15 LEWIS & CLARK L. REV. 109 (2011); D. Crouch, R.P. Merges, *Operating Efficiently Post*-Bilski *by Ordering Patent Doctrine Decision-Making*, 25 BERKELEY TECH. L.J. 1673 (2010).

[92] See *Mayo Collaborative Services vs. Prometheus Laboratories, Inc,* 566 U.S. 66 (2012). See also R.S. Eisenberg, *Prometheus Rebound: Diagnostics, Nature, and Mathematical Algorithms*, 341Yale L. J. Online 122 (2013)

Supreme Court, such a practice would not only deprive §101 of its implicit meaning but also increase the risk that many, if not all, inventions could be considered unpatentable because they can be reduced to an underlying idea or principle of nature.

The third case about patent-eligibility, *Alice Corporation vs. CLS Bank International*[93], is once again directly related to software patents. In particular, in *Alice*, the Supreme Court had to deal with four patents regarding an automated platform for mitigating settlement risk, *i.e*. the risk that one of the parties will not comply with its obligations. In examining the patents and in confirming the patent-ineligibility findings of the Federal Circuit, the Supreme Court reorganized some of the concepts already expressed in *Mayo* and tries to create a more defined test to assess patent-eligibility. This is what the subsequent literature and the courts call the *Mayo-Alice* two-step test: "*First, we determine whether the claims at issue are directed to one of those patent-ineligible concepts. If so, we then ask, "[w]hat else is there in the claims before us?" To answer that question, we consider the elements of each claim both individually and "as an ordered combination" to determine whether the additional elements "transform the nature of the claim" into a patent-eligible application. We have described step two of this analysis as a search for an "'inventive concept'"—i.e., an element or combination of elements that is "sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.*"[94]

Following this test, the Supreme Court determined that all the claims of the inventions have to be considered directed to a patent-ineligible concept (more precisely, an abstract idea) notwithstanding they mention computer parts (usually patent-eligible) and are tied to a computer machine (also usually patent-eligible). Turning to the second part of the aforementioned investigation, the Supreme Court found that mere generic computer implementation of an abstract

[93] See *Alice Corp. Pty Ltd. v. CLS Bank Int'l*, 134 S.Ct 2347 (2014)
[94] 134 S.Ct. 2347 (2014), page 7 of the decision.

idea fails to show any "inventive concept", *i.e.* an application of the idea that goes beyond simply reciting "apply it" with a computer involved, constituting an improvement to an existing technological process. In other words, the Supreme Courts rejected any sort of "any hardware approach", clarifying that the interaction of software with physical components is not enough, in itself, to make an invention patent-eligible: a reference to hardware-software interaction only limits the invention to a particular technological environment, without adding anything "of substance" to the underlying abstract idea, but this is was deemed not enough to pass the just coined *Mayo-Alice* test[95].

(1) The current situation after *Alice.*

After *Alice* was decided by the Supreme Court, the US witnessed a tremendous increase in the invalidation of software patents, both at the district court level and at the appeal (Federal Circuit) level[96]. Such a trend started to be seen in a less "pessimistic" way after the opinion of the CAFC in *DDR Holdings, LLC v. Hotels.com*[97] and seemed to decrease starting in 2016, when three cases about software-related inventions were decided in favor of the patentee: *Enfish, LLC v. Microsoft Corporation*[98], *Bascom Global Internet Services*[99]*, Inc. v. AT&T Mobility LLC* and *McRO Inc. v.*

[95] 134 S.Ct. 2347 (2014), pages 15 and 16 in particular.
[96] *See generally* Robert R. Sachs, Two Years After Alice: A Survey of the Impact of a "Minor Case" (Part 1), 2016 *available at* http://www.bilskiblog.com/blog/2016/06/two-years-after-alice-a-survey-of-the-impact-of-a-minor-case.html (last visited on November 14, 2016) for a review and some statistics on this trend, as well as http://www.uspto.gov/patent/laws-and-regulations/examination-policy/2014-interim-guidance-subject-matter-eligibility-0 (last visited on November 14, 2016).
[97] *DDR Holdings, LLC v. Hotels.com, L.P.,* 773 F.3d 1245, 1255 (Fed. Cir. 2014).
[98] *Enfish, LLC v. Microsoft Corp.*, 2016 U.S. App. LEXIS 8699, 2016 WL 2756255 (Fed. Cir. May 12, 2016).
[99] *BASCOM Global Internet Services, Inc. v. AT&T Mobility LLC*, No. 15-1763 (Fed. Cir. June 27, 2016).

Bandai Namco Games America Inc[100].

In those cases, the Federal Circuit recognized the sometimes confusing intermingling of the revised Section 101 analysis with the Section 102 and 103 assessments, but also made reassuring statements: An invention's ability to run on a general purpose computer does not doom its patent-eligibility (*Enfish*); not all the computer-related inventions have to fail the first step of the *Mayo-Alice* test since some of those inventions are related to computer-related technology and there can be no need to proceed to step two of said test (*Enfish*); improvements to computers' functionality and/or specific implementation of solutions to problems in the software arts might well be a sign of patent-eligibility (*Enfish*; *Bascom*); claims having a broad scope are not banned per se, since some inventions could have a broader scope than others and the level of preemption is not, in itself, an indicator of patent-eligibility (*McRO*); the interaction between rules created by a patentee and a general purpose computer is something that could be patent-eligible (*McRO*).

It was immediately clear, however, that these new decisions could not be seen as a fundamental change in the Federal Circuit's approach towards software patents or patent-eligibility in general. Just a few days after *McRO* was decided, the CAFC rendered another opinion in *Intellectual Ventures v. Symantec Corp.*[101] in which it clarified once again that inventions merely embodying abstract ideas but that do not teach a specific, non-conventional way to apply such ideas do not deserve the monopolistic protection granted by the patent system. Moreover, the CAFC once again clarified a few key points of the new approach created under *Mayo* and *Alice*: 1) mentioning physical components, such as a computer, is not enough to pass the patent-eligibility test, otherwise an expert draftsman could always go past Section 101; 2) linking the invention to a particular technological environment, such as the Internet, a computer network, a telephone network etc. is

[100] *McRO, Inc. v. Bandai Namco Games America, Inc.*, No. 15-1080 (Fed. Cir. Sept. 13, 2016).
[101] *Intellectual Ventures I LLC v. Symantec Corp.*, 838 F.3d 1307, 120 U.S.P.Q.2d 1353 (Fed. Cir. 2016)

similarly not enough for an invention to be qualified patent-eligible; 3) if the claims are directed to an abstract idea, a specific, non-routine, method through which such idea is applied must be claimed. As is evident from the *Intellectual Ventures* case, *Mayo-Alice'*s two-step test is fundamentally based on a case by case approach. Furthermore, as the Federal Circuit incidentally pointed out in *Enfish*, since discerning abstract ideas from their application is quite a hard task, it is often necessary to rely on comparisons with previously decided cases[102].

The situation has not changed much during the course of 2017, 2018 and 2019, as the majority of the patent applications have been declared ineligible, especially in the software field[103], with only a few cases[104] where patents concerning computer software managed to pass successfully *Alice*'s two-step test. Such cases include: i) *Trading Technologies International Inc. v CQG, Inc.*[105] where the CAFC confirm the patent-eligibility of a graphical user interface under *DDR Holdings*, *McRO* and *Enfish*, and stated that "*for some computer-implemented methods, software may be essential*

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[102] *Enfish, LLC v. Microsoft Corp*, *supra* note 98, at page 9. *See* for some statistics about patent invalidations after Alice and some comments thereto K. Madigan, A. Mossoff, *Turning Gold to Lead: How Patent Eligibility Doctrine is Undermining U.S. Leadership in Innovation*, George Mason Law & Economics Research Paper No. 17-16, 2017. See also J.A. Lefstin, P.S. Menell, D.O. Taylor, *Final Report of the Berkeley Center for Law & Technology – Section 101 Workshop: Addressing Patent Eligibility Challanges*, Berkeley Technology Law Journal (forthcoming 2018), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3050093.

[103] *Intellectual Ventures I LLC v. Erie Indemnity Co*. CAFC Appeals Nos. 2016-1128 and 2016-1132 (March 7, 2017) (where the Court underlines once again that limiting the scope of the application to a precise technological environment or field does not make an abstract idea less abstract); *Intellectual Ventures I LLC v. Capital One Financial Corp.*, CAFC Appeal No. 2016-1077 (where the Court highlighted that the claims were directed to an abstract idea without reciting significantly more then the idea itself, and that at most the claims regarded a "*result-oriented solution, with insufficient detail for how a computer accomplishes it*"); *Return Mail, Inc. v. United States Postal Service*, CAFC Appeal No. 16-1502 (August 28, 2017); *Secured Mail Solutions LLC v. Universal Wilde, Inc.*, CAFC Appeal No. 2016-1728 (October 16, 2017); *Smart Systems Innovations, LLC v. Chicago Transit Authority*, CAFC Appeal No. 2016-1233 (October 18, 2017). *See also*, although non-precedential and amongst many non-precedential cases, *Clarilogic, Inc. v. FormFree Holdings Corp.*, No. 2016-1781 (March 5, 2017); *Reese v. Spring Nextel* (Fed. Cir. 2019); *In re Greenstein* (Fed. Cir. 2019). *See also Berkheimer v. HP Inc*., 881F.3d1360 (Fed. Cir. 2018), where the CAFC decided that step 2 of the Mayo-Alice test required an evaluation of fact and therefore, while considering some claims as directed to more than an abstract idea, whether they still referred to some routine applications of the abstract idea or not was deemed a question of fact. *See also Cellspin Soft v. Fitbit, Moov, Nike, Fossil, etc.*, 17-cv-05934-YGR (Fed. Cir 2019).

[104] We might also consider the case *Thales Visionix Inc. v. U.S.*, 850 F.3d 1343, 121 U.S.P.Q.2d 1898 (Fed Cir. 2017), which is about using a mathematical equation to improve the efficiency of movement sensors. *See also*, even if relating to other fields of technology, *Vanda Pharmaceuticals Inc. v. West-Ward Pharmaceuticals,* 887 F.3d 1117 (Fed. Cir. 2018) and *Exergen Corp. v. Kaz USA, Inc*., 725 F. App'x 959, 966 (Fed. Cir. 2018).

[105] See *Trading Technologies International Inc. v CQG, Inc.*, CAFC Appeal No. 2016-1616 (January 18, 2017).

to conduct the contemplated improvements"; ii) *Visual Memory LLC v. Nvidia Corp*[106], where the CAFC, quoting *Enfish* and *Thales*[107], underlined that the invention is patent-eligible because it claims a technological improvement whose advantages are discussed and explained in the specification of the patent; iii) *In Finjan Inc. v. Blue Coat Systems, Inc.*[108], where the CAFC considered the invention patent-eligible because the claims - directed to a method of virus scanning that scans an application program, generates a security profile identifying any potentially suspicious code in the program, and links the security profile to the application program - relate to an invention capable of realizing an improvement in computer functionality; iv) *Core Wireless Licensing S.A.R.L., v. LG Electronics, Inc.*[109], where the CAFC stated that an invention concerning a graphical user interface (GUI) for mobile devices indeed contains claims which are directed to an improved user interface for electronic devices, making it more efficient to use mobile devices; v) *Uniloc USA, Inc. v. ADP, LLC*[110] where two out of four patents were held to be directed to applications of abstract ideas.

In other words, notwithstanding that the USPTO continues to issue guidelines and examples regarding patent-eligibility that sometimes conflicts with CAFC precedent[111], there seem to be no

[106] *Visual Memory LLC v. Nvidia Corp,* CAFC Appeal No. 16-2254 (August 15, 2017).
[107] *See supra* note 104.
[108] *In Finjan Inc. v. Blue Coat Systems, Inc.*, 879 F.3d 1299 (Fed. Cir. 2018)
[109] *Core Wireless Licensing S.A.R.L., v. LG Electronics, Inc.*, 880 F.3d 1356 (Fed. Cir. 2018)
[110] *Uniloc USA, Inc. v. ADP, LLC, No. 18-1132 (Fed. Cir. 2019)*. The CAFC in this case finds two software-related patents to be patent-eligible and two others to be patent-ineligible (because the claims would be directed to abstract ideas).
[111] See *Cleveland Clinic Found. v. True Health Diagnostics LLC*, No. 18-1218 (Fed. Cir 2019) (non-precedential) where the Federal Circuit points out that "*While we greatly respect the PTO's expertise on all matters relating to patentability, including patent eligibility, we are not bound by its guidance. And, especially regarding the issue of patent eligibility and the efforts of the courts to determine the distinction between claims directed to natural laws and those directed to patent-eligible applications of those laws, we are mindful of the need for consistent application of our case law*".

bright line rules regarding the patent-eligibility of software patents; instead, a case-by-case approach using the *Mayo-Alice* test has been adopted. It is true, however, that cases like *DDR Holdings*, *Enfish*, *Bascom*[112], *McRO, Trading Technology International* and *Visual Memory* are some sort of reassurance that software patents are not "doomed" or "dead", as some have argued, and that there is still hope for patenting software. Moreover, looking at cases like *DDR Holdings*, *Uniloc* or *Bascom*, the threshold does not even seem very high[113]. Despite what the CAFC and the Supreme Court are saying, an expert draftsman can still increase dramatically the chances of being awarded or successfully defending a software patent.

Finally, once the patent-eligibility test is passed, the next steps are novelty and non-obviousness, which are not analyzed very differently from what the patent law and the USPTO guidelines instruct. The real hurdle for software patents is now the patent-eligibility phase.

V. A comparison between the current Japanese, US and European approaches to software patent-eligibility and patentability

1. A comparison with regard to software inventions' patentability and patent-eligibility

[112] *See also* the PTAB decision in the case *Ex Parte Flitcroft* (May 30, 2017), quoting *Bascom*.

[113] And that luckily not all the patents where something is said to be implemented by a computer can pass the patent-eligibility threshold even if there is no connection whatsoever with the computer and no real software invention, as in recent *In re: Morinville*, No. 18-1895 (Fed. Cir. 2019).

As mentioned, the Japanese system is the only one, amongst the legal three systems that have been analyzed, that explicitly, and statutorily, recognizes patent protection for software (even as a product). There are deeper and more significant differences between the three jurisdictions with regard to software patenting. Such differences, which can be found either at the patent-eligibility phase or at the patentability phase, or at both, influence the general level of protection.

(1) Software Patent-Eligibility

As the previous paragraphs highlight, at the patent-eligibility phase inventions are treated slightly differently in Japan, Europe and the US. Of course, this discrepancy is not something unique to software-related inventions. However, due to the peculiarities of computer program inventions, some of the most debated and problematic aspects of the patent-eligibility analysis are indeed related to software patents.

Japan.

Starting with Japan, we have seen that the invention (*i.e.* every single claim) is examined as a whole in order to assess whether we are dealing with a creation of technical ideas utilizing laws of nature. This expression means that an invention must not be just a mere idea, but it has to use "the laws of nature", not only some economic, mathematical, natural or abstract laws alone. Japanese courts, as well as the JPO Examination Guidelines and Handbook, clarify that mentioning some hardware in the patent application is not enough to pass the patent-eligibility test and that in order to have an "invention" according to Article 2 of the JPA, a technical problem must be established

and a technical means of solving the problem must be used[114].

Translating the above into software-specific terminology, when a computer program is present in the claims, it is not enough to recite general hardware components to make the computer program patent-eligible, but it must be clear from the claims that hardware and software work together or, to use the words of the JPO Guidelines, that there is a specific interaction between software and hardware components. If such specific interaction is carefully indicated (or clearly implied) in the claims, sometimes with the help of the specifications, then a software-related invention is usually patent-eligible. This does not mean that a computer program must necessarily be tied to some machine or hardware. Article 2 of the JPA recognizes that software programs can be patented even "per se" (as product inventions), as long as they utilize the laws of nature. Specifically tying hardware resources to the computer program is however the most common way to show the necessary use of the laws of nature, required by law.

However, before concluding the patent-eligibility test, there is another aspect to keep in mind. A specific interaction between software and hardware is usually enough for the invention to be considered eligible, but in some cases the courts and the examiners look for the "essence" of the invention. Especially when mental steps are involved, after the analysis of each single claim "as a whole", if the "essence" of the invention is a mental activity or a human action, then the invention cannot be deemed patent-eligible.

This "essence of the invention" evaluation appears to be a general approach to try and exclude those inventions which mention some "technical means" but without reciting more than an ineligible idea [this sentence is unclear as written; revise for clarity]. In performing this "essence of the invention" evaluation, some inventiveness and novelty elements might be taken into account,

[114] See *Dental Treatment* decision, Intellectual Property High Court, First Division, June 24, 2008, 2007 (Gyo-Ke) 10369.

since there is no clear standard on how to perform such a test. However, the "core of the invention" examination, as explained in *Dental Treatment*, should be performed as follows. First of all, the problem to be solved is isolated; secondly, the means to solve such a problem are found in the patent and they represent the "real" invention (its essence); thirdly, components/features that are not part of the solution to the problem are considered ancillary and therefore excluded (not before being carefully analyzed together with all the other elements). After this process, if the means to solve the problem are mere mental acts or categories excluded from patentability because they do not use the laws of nature, then there is no patent-eligible invention.

Finally, practitioners in the patent field confirm that the essence of the invention is taken into account in rare cases, and that artful patent application drafting is usually able to get the invention past the patent-eligibility phase.

Europe.

With regard to Europe, software as such is specifically excluded from patentability. In practice, however, software inventions are commonly patented, and only if the invention "as a whole" points to an excluded category (such as computer programs), then such an invention may not be patent-eligible. However, both the case law and the most recent EPO Guidelines confirm that computer programs may be patent-eligible even when claimed "as such", provided that they produce "further technical effects", *i.e*. effects that go beyond the normal software-hardware interaction (passage of electric current in the computer etc.). Those effects do not need to be novel or inventive by themselves.

It should also be noted that the technical Boards of Appeal of the EPO have recently adopted a so called "any hardware approach", meaning that, except for when a computer program is claimed

"as such", it is usually sufficient to mention some sort of hardware in connection with the software to make the computer program invention patent-eligible (a medium on which the software is recorded is enough). In such a case, no further investigation is needed, and the patentability phase can start.

The European approach is therefore very similar to the Japanese one: attaching some hardware components to software is usually enough to pass the patent-eligibility examination. The Japanese standard, though, seems slightly stricter, since it requires a specific interaction between software and hardware, and an "essence of the invention" analysis might take place in some particular instances.

United States.

In the US, from 2010 to the present, there have been several changes with regard to patent-eligibility. The current standard is the so called "Mayo-Alice test", which is best expressed by quoting the words of the Supreme Court: "*First, we determine whether the claims at issue are directed to one of those patent-ineligible concepts abstract* [abstract ideas, laws of nature, natural phenomena]. *If so, we then ask, "[w]hat else is there in the claims before us?" To answer that question, we consider the elements of each claim both individually and "as an ordered combination" to determine whether the additional elements "transform the nature of the claim" into a patent-eligible application. We have described step two of this analysis as a search for an "'inventive concept'"—i.e., an element or combination of elements that is "sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.*"[115]

[115] 134 S.Ct 2347 (2014), page 7 of the decision.

This newly coined test, interpreted many times (and in slightly different ways) though the case law of district courts and, more significantly, of the Federal Circuit, goes directly to the "essence" of the invention, making novelty and non-obviousness considerations a recurrent part of this analysis. As a consequence, mentioning technical/physical components or linking the claimed invention to a particular technological environment (computer network, telephone network etc.) is not enough to pass the new test, even when an interaction between software and hardware is clearly specified. When claims are "in substance" directed to an abstract idea, a specific, non-routine, method through which the idea is applied must be claimed.

This test seems significantly harder to pass than its European and Japanese equivalents. Moreover, there seems to be no specific criterion based on which one can predict the outcome of a decision. Courts use a case-by-case approach and rely on precedents to try to set the standard, so that flexibility is accompanied by some degree of confusion and uncertainty. In my opinion, and as highlighted before, even patents that do not seem very different one from another are treated quite differently.

(2) Software Patentability

As a natural consequence of the different treatment that inventions receive at their patent-eligibility phase, it is not surprising that claimed inventions are dealt with in slightly different ways when going to the next step: the analysis of the patentability requirements of novelty, inventive step, industrial applicability, etc. Amongst these requirements, the most important one is non-obviousness/inventive step, since novelty and industrial applicability are rarely a problem and

easier to meet.

Japan.

In Japan, once the patent-eligibility analysis is successfully passed, the inventive step is of course the next hurdle for software patents. The invention in this phase is once again examined "as a whole". So, once the eligibility has been determined, if the solution which is offered to the problem is inventive (non-obvious), the invention is granted a patent. Therefore, it does not matter whether the physical components are obvious and the core of the invention resides in some abstract ideas, in new information, etc. If the patent-eligibility analysis has determined that the interaction between software and hardware was a meaningful one, every overall inventive (non-obvious) solution is potentially patentable.

Of course it is not enough to automate some well-known method through computer processing to make it patentable, because lack of inventive step (obviousness) is around the corner, but when the underlying idea is not known or obvious, then the chances of patentability can be high. This is not the case in Europe, for example.

Europe.

As already mentioned, since the patent-eligibility standard in the EPC system has become quite relaxed (even though a few cases are still discussed by the BoAs), the most important part of software patent examination is the analysis of the inventive step[116]. Even here, the EPO guidelines specify that an invention must be considered as a whole. However, since the invention is

[116] *See* Article 56 of the EPC: "An invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art. If the state of the art also includes documents within the meaning of Article 54, paragraph 3, these documents shall not be considered in deciding whether there has been an inventive step."

considered to be a technical solution to a technical problem, only the features that contribute to the "technical character" of the invention can be taken into account. It does not matter whether those features are technical or non-technical when considered individually (*e.g*. a mathematical equation, a computer program etc.), but it does matter that, considered together, they contribute to the technical character. For example, modifying an underlying business method to solve a technical problem does not mean having found a "technical solution" to a "technical problem". Since the business method is non-technical, the solution also is, unless the technical components of the inventions or their interactions are modified. Similarly, automation of known techniques or methods through computer programs does not automatically constitute a "technical improvement". However, it seems that the case law sometimes separates "technical elements" from "non-technical elements", independently of whether they contribute to the technical character of the invention or not. This sentence is emblematic: "only those features that have technical character are to be taken into account when assessing the inventive step"[117]. The EPO Guidelines, however, are very clear in following the first approach, which is also the one adopted in the 2010 EBA landmark opinion (G 03/08).

If compared to Japan (and the US), the European approach is quite peculiar: when assessing inventive step (non-obviousness), only the technical features, or those that contribute to the technical character of the invention, are taken into account. The invention is not really examined "as a whole" (the expression might be misleading) but differentiating between elements pertaining to EPC Article 52.2 excluded categories, and all the rest. This means that, in general, if the inventive part of the invention resides in an underlying idea or method only, although a meaningful interaction between hardware and software is present, such an invention is likely to be considered

[117] See T 1385/12. See also T 0313/10.

obvious, *i.e*. lacking the inventive step.

United States.

In the US, the non-obviousness analysis is conducted in a way which is quite similar to the Japanese system. In other words, the invention is examined "as a whole", an expression which is specifically mentioned by the relevant statute[118], to see whether it was obvious for the PHOSITA or not. Several criteria and tests are used by examiners and judges depending on the situation[119]. What is important is that, in contrast to the European approach, there is no separation between technical and non-technical elements in this phase. The separation between abstract/non abstract and between natural laws or phenomena and their application is done at the patent-eligibility phase. Therefore, once the eligibility for patent protection has been established, the non-obviousness analysis is done based on the overall invention. This means that in the hypothetical scenario where an underlying idea is at the core of the invention while all the rest of the invention is comprised of ordinary physical components, if such an invention has already passed the eligibility test there is

[118] See also 35 U.S.C. 103: "A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made"

[119] *See* for example the USPTO Manual of Patent Examining Procedure, Section 2141 and seq., and in particular where it enlists some of the possible tests: "(*A) Combining prior art elements according to known methods to yield predictable results;*
(B) Simple substitution of one known element for another to obtain predictable results;
(C) Use of known technique to improve similar devices (methods, or products) in the same way;
(D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
(E) "Obvious to try" – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
(F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;
(G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.
Note that the list of rationales provided is not intended to be an all-inclusive list. Other rationales to support a conclusion of obviousness may be relied upon by Office personnel. Any rationale employed must provide a link." between the factual findings and the legal conclusion of obviousness.

no subsequent separation between excluded and non-excluded subject matter to determine eligibility. Therefore, at this point it is not relevant anymore whether the only "inventive" part of the invention resides in the underlying idea, although such an invention is unlikely to survive the *Mayo-Alice* test.

(3) Software Patenting

For organizational and clarity purposes, as well as for a more logical analysis, the present work separates patent-eligibility and patentability. The first goal, however, is to ascertain the overall level of protection for software inventions in Japan, Europe and US and to verify whether there are substantial differences amongst the three legal systems that have an impact on such protection. And subsequently the end goal is to see whether said "level", or perceived level, of protection has an impact on patenting strategies and behaviors.

So, for example, there might be a system in which passing the patent-eligibility examination is easy, but then proving a software invention's inventiveness is a lot harder. In other words, in trying to assess which system is the most or least protective, a balance must be struck between the two phases of patent examination.

The clarity of patentability and patent-eligibility criteria as well as the predictability of patent office examinations and court outcomes are also factored into this evaluation.

The analysis of the (scarce) case law and of examination practices and guidelines, in addition to interviews with many patent professionals and academics, confirmed that Japan is a very good venue for obtaining software patents. One of my interviewees even called it "the paradise of

software patents".

As highlighted before, a specific software-hardware interaction is enough to pass the patent eligibility test, and a careful draftsman can avoid any or at least most of the "essence of the invention" considerations.

Once eligibility for patent protection is established, the solution to the problem must be inventive. In this phase, the invention is considered as a whole, without any differentiation between technical/abstract and non-technical/non-abstract components. At this point, it does not matter "where" the inventive sparks reside, be it in a new abstract idea, in newly processed information, or in a new business method. If the overall invention/solution is not obvious to the person having ordinary skill in the art, then it is patentable.

Some of my interviewees even confirmed that a very skilled draftsman can obtain patent protection for every kind of software, because also the patentability phase is not difficult to pass. Maybe there can be difficulties in enforcing the patent due to a narrow interpretation of its scope, but patenting in and of itself is, in principle, quite easy to perform.

While this consideration might have a negative connotation to it, there is also an upside: there is clear guidance about how to obtain patent protection, allowing those companies or individuals who invest in patent protection for software can predict the result of their actions.

With regard to the situation in the US, after the *Bilski, Mayo* and *Alice* cases were decided, the patent-eligibility analysis at the court level seems to have become increasingly complex and difficult to pass. Old software patents are now often invalidated in court or in post-grant proceedings.

Moreover, the new *Mayo-Alice* test intermingles patent-eligibility and patentability criteria: this

makes the test quite unpredictable, especially in a common law system. In other words, the approach is so case-by-case that it is difficult to make a prediction about outcomes. It is my impression, however, that a skillfully drafted patent application is protected from an easy invalidation under *Alice*, even though the threshold is now higher and the process (especially when it leaves the hands of the examiner of the USPTO) full of uncertainties. Some cases (such as *DDR Holdings*) highlight that it is still possible to obtain patent protection for inventions that seem to be based strongly on abstract ideas and reveal very little about a new and non-obvious way to implement them. At the very least, extremely broad and abstract "inventions" have a hard time getting a patent and even a harder time defending one in trial.

Finally, if focusing on patent-eligibility serves the purpose of avoiding long and expensive jury trials because non-obviousness and novelties are questions of fact, conducting an eligibility analysis which imports elements from both novelty and non-obviousness investigations does not seem in line with the whole system. If questions of fact are in principle triable by jury, novelty and non-obviousness considerations should be left to the judge of facts. Or jury trials might be reviewed for patent lawsuits if they are deemed redundant and not really favoring a healthier innovation system.

Coming to Europe, the EPC system seems to be where software inventions have the hardest time obtaining patent protection. In contrast to the US and more similarly to Japan, the patent-eligibility phase is not difficult to pass in Europe. On the contrary, mentioning some hardware components in the claims is usually enough to pass the patent-eligibility phase and go to the patentability one. Some recent cases, however, highlight that failing to pass the patent-eligibility test is still

possible[120], and that once again much depends on how well drafted the patent is.

However, when the inventive step is considered, the EPC exclusion of computer programs "per se" from the patent protection revives. As a consequence, features contributing to the technical character and those that do not contribute to it are separated. In other words, the invention is only apparently examined as a whole: the non-technically relevant features are ignored and only the remaining ones are considered when determining the inventive step. As a consequence, if the only inventive part is a mathematical expression or some abstract idea or a presentation of information etc., and there would be nothing else which is inventive, then the patentability is denied. Therefore, even if the problem to be solved is a technical one, the solution cannot be non-technical; the problem must be solved from a technical point of view and not circumvented through some abstract method or other non-technical solution or scheme. The threshold is quite high, because "mixed inventions", *i.e.* those that combine technical and non-technical elements, are often the reality in the software field, and it is not easy to separate those features that contribute to the technical character and those that do not. Such a standard can hardly be said to be totally predictable. Probably there is a bit more certainty than in the US, as well as a reduced risk that inventions having at their core a mere mathematical equation, abstract idea etc., can obtain patent protection. All the same, prerequisites are not entirely clear and surely not very easy to meet.

The above notwithstanding, I think that despite the many differences between the three systems, there are also more similarities than one might first imagine.

Japan is without doubt the jurisdiction where software inventions can most easily obtain a patent. The "essence of the invention" analysis that is performed by the JPO and by Japanese courts,

[120] See T 1370/ 11, *On-demand property system/MICROSOFT.*

however, is very similar to what happens in the EPC system in the inventive step examination phase. The technological problem is found and the means to solve such a problem are isolated: if such means do not make use of any laws of nature, then the invention is not patentable. This is not very far from what happens in the EPC inventive step analysis: the problem-solution approach (which is the main although not unique method of assessing the inventive step) is similarly applied, with the difference being that in Japan novelty and non-obviousness considerations are usually not made in conjunction with this step, although patent practitioners confirm that there is no clear guidance and they might sometimes be performed.

With regard to a Europe-US comparison, it seems that the US is now following the long abandoned European "contribution approach", where only the non-obvious part of the invention is taken into consideration at the patent-eligibility phase; if such non-obvious part is merely made up of excluded subject matter, then the invention would not be patentable.

When the US courts talk about "inventive concept", they are reviving a sort of "contribution approach", that tries not only to find what the "core" invention is (the solution to the problem, Japanese style) but also what is really "inventive" in the invention. In doing so, inventiveness is necessarily taken into account, mixing patent-eligibility with patentability, which was the reason why the EPO Boards of Appeal abandoned this approach, originated from the national practice of a few European states.

The *Mayo-Alice* approach looks at the "essence" of the invention, but in a slightly deeper way than the Japanese system does, reminding us of the first US cases about software patents and of the forgotten "contribution approach".

Once again, however, the US practice seems rather distinct from the European one, but it is not. Applying the *Mayo-Alice* test is not so different from what the EPO and its boards do when

assessing the patentability of the invention, but without artificially extracting the inventive part of the invention before assessing the patent-eligibility of the same. If some "further technical effects" are produced or, alternatively, some kind of hardware is mentioned, the invention is patent-eligible, but if its "inventive"/"non-obvious" aspect resides in a non-patentable element, then the invention cannot be considered to be "non-obvious", because excluded subject matter as per Article 52.2 EPC would dictate so. And the inventive part is evaluated by taking into account only those elements that contribute to the technical character of the invention.

In other words, in Europe this separation between "inventive" and "non-inventive" occurs at a later, maybe more appropriate, stage, but the general criterion used to deal with "excluded subject matter" does not seem so different.

In the end it is a composite evaluation of what is "inventive" and what patent policy wants to be "excluded subject matter". Such evaluations take place at different stages: patent-eligibility, for the US and Japan, and inventive step, for the EPC system.

The above described are three different ways to perform a similar analysis, *i.e.* trying to decide whether the invention is merely represented by some abstract concept that should not be preempted or whether there is something more to it.

VI. Impacts and correlations between the stance adopted by administrative, legislative and judicial authorities and patenting trends

1. Introduction and methodology

As indicated in the preceding paragraphs, it seems easier to obtain software patents in Japan than in Europe or in the US. More broadly, there seem to be different degrees of predictability (regarding whether a patent will be awarded or will be enforceable in court[121]) in the three legal systems which have been analyzed. It is also the opinion of the author that, in the end, the differences between the US, Europe and Japan are a bit exaggerated and that in the end they are less significant than one might think. A skillful draftsman may overcome most of the issues deriving from the slightly different approaches of courts and patent offices.

However, it remains to be seen whether, and to what degree, changes of policy, case law and statutes influence patenting trends and the perception that patentees or potential patentees have of the patent system itself.

For instance, the Japanese pro-software approach dates back to the early 2000s/end of the Nineties, and it increases from 2002, when even Japanese Patent Law was changed to incentivize the protection of software inventions though patents. From 2002 onwards, it can be expected that in Japan the number of software patent applications and granted patents increases each year, in line with this "pro-software patent" stance of the Japanese government, the JPO, and the courts. It might also be reasonable to expect that such hypothetical increase eventually stops, and the number of applications and grants remains stable.

As explained above, Europe and the US seem to have adopted a stricter approach to software patenting.

[121] Of course, these are difficult comparisons to make. For example in Japan only a very small number of patents (and an even smaller number of software patents) is reported litigated, and not many of them are found to be enforceable for a variety of reasons (validity, non-infringed etc.), so that it is difficult to make an estimate of how many Japanese software patents would survive judicial or administrative proceedings if the same number of patents as in the US or Europe were litigated. Also for Europe we do not have complete data either, since the cases we refer to are only oppositions and appeals of the EPO and European patents are then litigated at state level, where there is no "unified" system (yet) of dispute resolution. For now, however, we will stick to these assumptions.

We however know that the approach of the EPO has not changed much since the early 2000s, especially after 2010 as a consequence of the famous EBA decision on software patent-eligibility/patentability discussed in the previous paragraphs. We also know that even though the EPO is quite severe when it comes to patent-eligibility and patentability, between 1998 and 2003 a series of decisions made the requirements to obtain patents for software less strict and confusing than in the past. Therefore, we can expect that European software patent applications and patent grants have increased from early 2000 onwards.

We also know that in the US, the approach to software patenting has recently taken a different turn. Before 1998, software was patentable, but from 1998 onwards, after the *State Street* case, patenting of software became much easier than in the past. This lasted until 2010, when through the *Bilsky* case the US Supreme Court started to question the tests used until then to assess software patent-eligibility. From 2010 to 2014, with *Bilsky*, *Mayo* and *Alice*, the patent landscape partially changed: it became less easy to demonstrate patent-eligibility and also the outcome of a patent-eligibility case started to become less predictable. We can therefore expect to witness a decrease in patent applications and patent grants, and an increase in patent invalidations from 2010 (but especially from 2014) onwards. Given the resonance that *Alice* has had in the US and around the world, it should not come as a surprise if a chain-effect as the one just described has happened, maybe also involving other countries. Given that it is often not easy to enforce software patents and that the standard of patent-eligibility is now stricter, one can expect that patenting software has become less appealing – and, therefore, that there has been a decrease in patent applications - and that as a consequence of the hypothetical decrease in patent applications and of the newly adopted (stricter) criteria to assess eligibility, also the number of granted patents (both deriving from pre-*Alice* and post-*Alice* patent applications) has diminished considerably.

Has it been so? Are the above predictions correct? Has the development of case law, policies and statutes had consequences on (or has at least influenced) how companies shape their patenting strategy? Since at the time this paper is being written we are halfway into 2019, there are some data to use for this purpose.

Assessment of this kind of data is not easy because there is no precise definition of, or category for, "software" patents. Especially with the evolution of IoT and many related technologies, software can be embedded everywhere and there is no reliable cross-technology "filter" (existing today) that is able to extract all software-related patents.

Moreover, the analysis is difficult because it must (or should) take into account other factors that might increase or decrease the appeal of the patent system for prospective patentees. In other words, the willingness of an applicant to apply for a patent may not depend only upon a judgment rendered by a given court or the stance of a particular government body but also on other factors. Such factors include: the expansion or contraction of the economy, incentives to pursue patent protection in a given country (*e.g.*, tax reductions, government funds for innovation), expansion or shrinking of a given sector as compared to others (*e.g.*, CDs or DVDs are a dead business and current patents correlated to technologies which exploit them are non-existent), the influence of a change to administrative or legal provisions (*e.g.*, an increase in patenting fees, more procedural hurdles to obtain patents, increasing legal costs because of a change in the procedure etc.), and many other facts.

Drawing conclusions by taking into account only a limited number of variables is of course risky, but the Author thinks there is value in that anyway.

The following part of this paragraph will then compare and take into account:

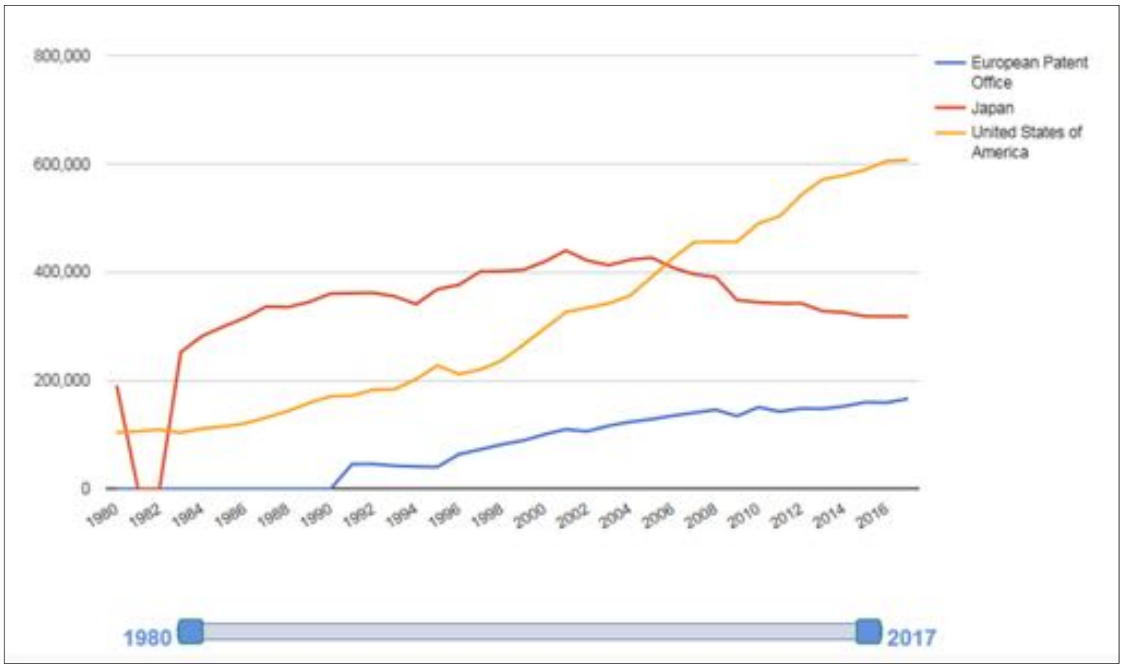
1. The number of patent applications in a given year;
2. The number of patent grants in a given year;
3. The number of software-related patent applications in a given year;
4. The number of software patents granted in a given year;

The intervals of time which will be taken into account will be as follows: (1) pre-1998/2000 (a period in which there was a clear openness towards software patents in all three jurisdictions US, Europe and Japan), and (2) post-1998/2000 until today. For this second interval of time, it will be particularly interesting to understand whether there are significant changes after 2010 in Europe, as a consequence of decision G03/08 of the EBA of the EPO, and in the US, following the *Bilsky* case. It will also be interesting to see whether in the US there will be further changes in the patenting practice also after 2012 (*Mayo*) and especially after 2014 (*Alice*).

2. The data

The chart below, which relies on WIPO statistics[122], shows the number of resident and non-resident patent applications filed by the US, EPO and Japanese patent offices from 1980 to 2017. As can be seen in the chart, the overall number of patent applications has been constantly increasing for the US and EPO legal systems, while a steady decline can be noticed after 2006 in Japan.

[122] WIPO Statistics Database, *available at* https://www3.wipo.int/ipstats/ipstableval.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Code	Origin	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
EP	Total	18.596	24.119	27.422	30.664	35.982	36.916	41.342	45.069	49.774	55.774	60.754	55.984	58.896	56.974	57.642	60.569	64.036	72.904	82.087
JP	Total	191.020	218.261	237.513	262.686	282.314	299.851	316.162	336.884	335.709	345.140	360.704	361.590	362.197	366.500	341.201	368.831	376.674	401.618	402.095
US	Total	104.329	106.413	109.625	103.703	111.284	115.235	120.916	131.837	143.636	158.707	171.163	172.115	183.347	184.196	202.755	228.142	211.946	220.496	236.979

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
82.087	89.359	100.692	110.027	106.243	116.604	123.701	128.713	135.231	140.763	146.150	134.580	150.961	142.793	148.560	147.967	152.662	160.028	159.358	166.585
402.095	404.457	419.543	440.248	421.805	413.093	423.081	427.078	408.674	396.291	391.002	348.596	344.596	342.610	342.796	328.436	325.989	318.721	318.381	318.479
236.979	265.763	296.896	326.471	334.445	342.441	356.943	390.733	425.966	456.154	456.321	456.106	490.226	503.582	542.815	571.612	578.802	589.410	605.571	606.956

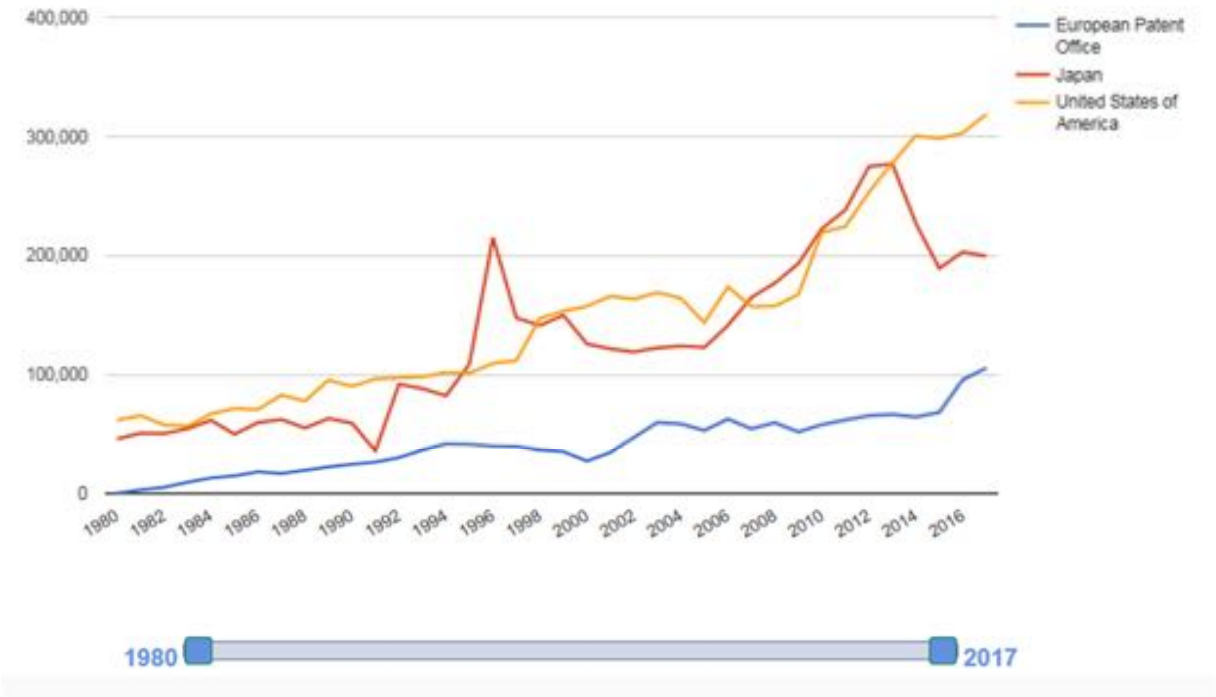
The chart below, once again based on WIPO Statistics Database, shows the number of patents granted per year by the EPO, USPTO and the JPO. Consistently with the numbers of patent applications, patent grants increase year after year at the USPTO and EPO while they decrease at the JPO. Interestingly, in Japan a surge in patents granted can be noticed between 2005 and 2013, when granted patents go from around 120.000 to around 280.000, and in percentage from around 30% of patents applications to around 75% are converted into patents[123]. This peak of grants slowly

[123] Since patents are usually granted after a three-year period of time, the comparison between granted patents and their applications has been done considering 2002 applications for 2005 granted patents and 2010 applications for 2013 granted patents. Of course this is not 100% accurate since examining patent applications often takes more than three years (rarely less), sometimes from one applications there are many resulting divisional applications examined much later etc. Many variables, but the three-year period seems a balanced average, and is in line with the objective

decreases, and in 2017 we have in Japan around 200.000 granted patents on 325.000 patent applications (around 60% success rate). We can also notice that before 2006 the JPO received more patent applications than did the USPTO (and the farther we go in time, the wider the gap), while from 2006 onwards the USPTO increasingly received a more applications than the JPO. By considering the numbers and the proportion between granted patents in Europe and in the US, we also discover the following: in 2006 the EPO received around 135.000 patent applications, of which around 60.000 were granted (around 45% success rate) in 2009; in 2010 it received around 150.000 patent applications, of which around 60.000 were granted (around 40%) in 2013, while in 2014 the EPO received around 150.000 applications of which 105.000 were granted (70%) in 2017. So there is a very modest increase in patent applications in Europe (from 135.000 to 150.000, around 10%) but a significant increase in patent grants, which goes from 40% to 70% in about a decade.

In 2006 the USPTO received around 425.000 patent applications, of which around 150.000 became patents (35%) in 2009; in 2010 it received around 450.000 patent applications, of which about 275.000 became patents (61%) in 2013, while in 2014 the USPTO received around 580.000 patent applications, of which 320.000 became patents (55%) in 2017. In the US there is a significant increase in patent applications in the decade considered (from 425.000 to 580.000, around 27%), followed by a significant (but not as significant as in Europe and Japan) increase in patent grants (55%).

of the patent offices to try not to grant patents in more than three years.



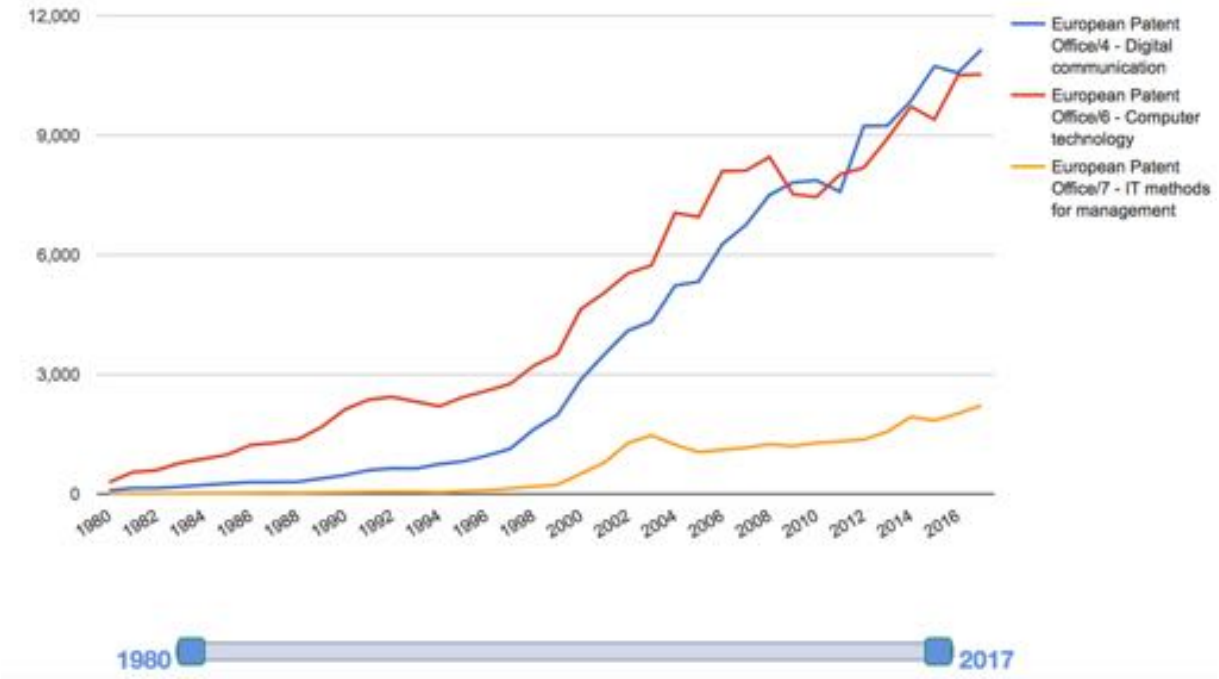
Ideally, we would now need patent applications and granted patents divided by technological field in order to understand whether, after a few key events, there have been consequences not only with regard to patents granted but also with regard to the number of patent applications. While it might be expected that granted patents increase or decrease after a change of case law or patent policy that directly influences patentability and/or patent-eligibility requirements, it cannot be taken for granted that the same consequences occur at the patent application level. In fact, while patent offices immediately update their guidelines after a change of case law, legislation or policy, applicants may not know of such changes or may anyway act independently from such changes.

Unfortunately, WIPO does not provide statistics regarding patent applications divided by technology sector. This is probably because patent offices around the world provide to WIPO (or make publicly available) statistics regarding granted patents and "patent publications", but not about patent applications. The USPTO, for example, is one of those offices that does not offer such

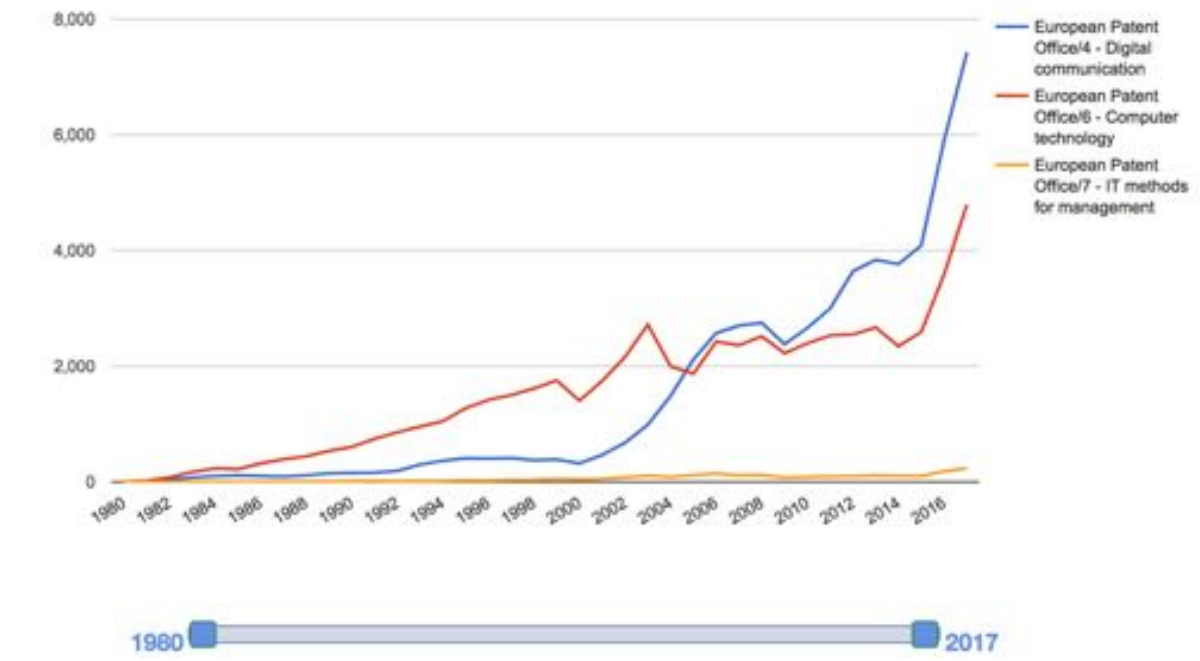
statistics on its website. This is especially unfortunate because it would have been extremely interesting to assess the direct consequences of *Bilski-Mayo-Alice* on patent application rates. In fact, as discussed below regarding the US, statistics and data about office actions may be not enough to draw conclusions. This is true especially if one does not know whether an increase in office actions (and/or rejections/withdrawals after an office action) might be correlated (also) to an increase in patent applications and therefore (at least in part) proportional to such increase.

The graphics below show the number of patent publications and of granted patents in technology fields relating to software from 1980 to 2017.

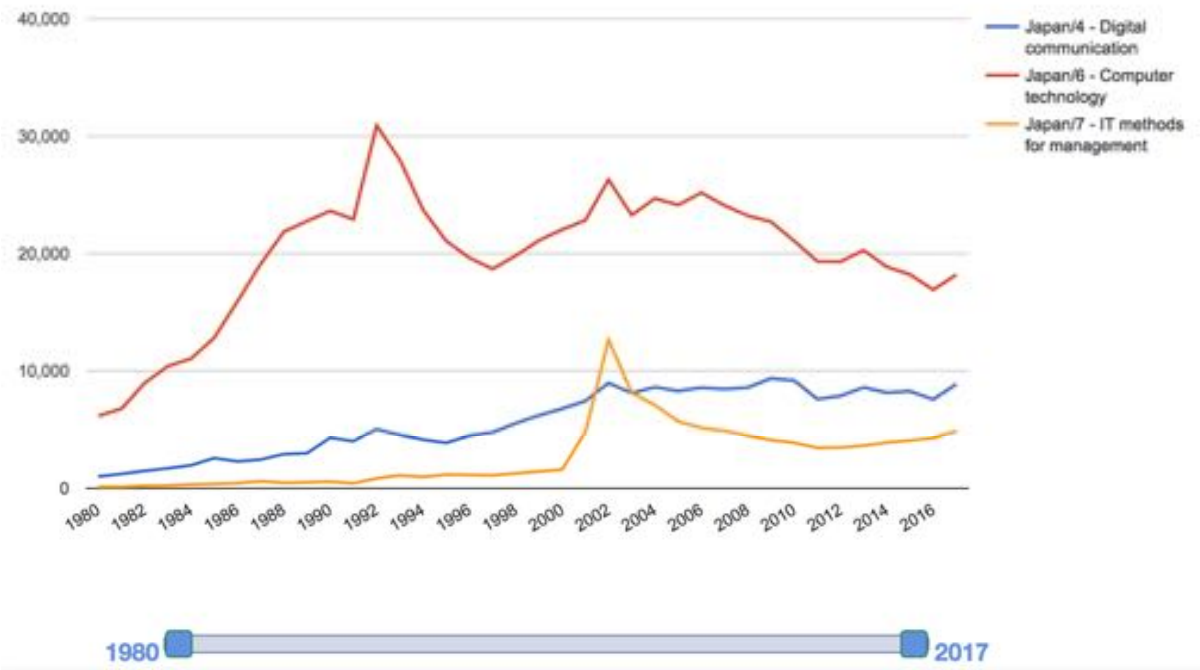
Patent Publications by the EPO relating to software



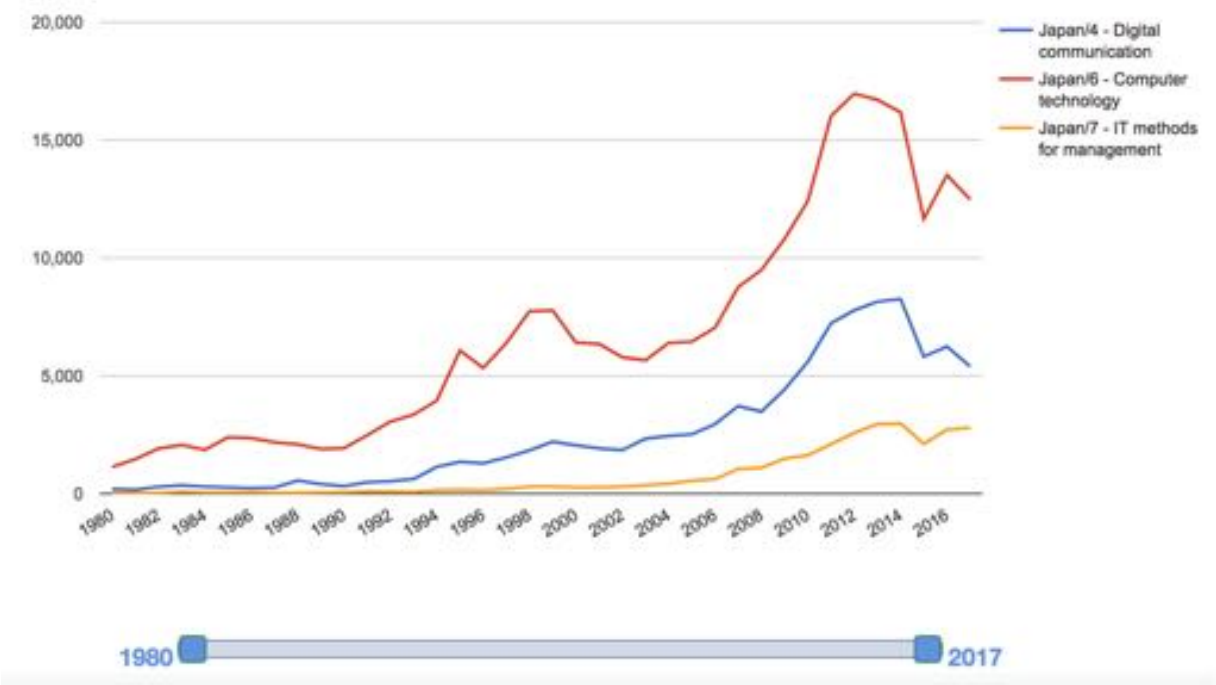
Patent Granted by the EPO relating to software



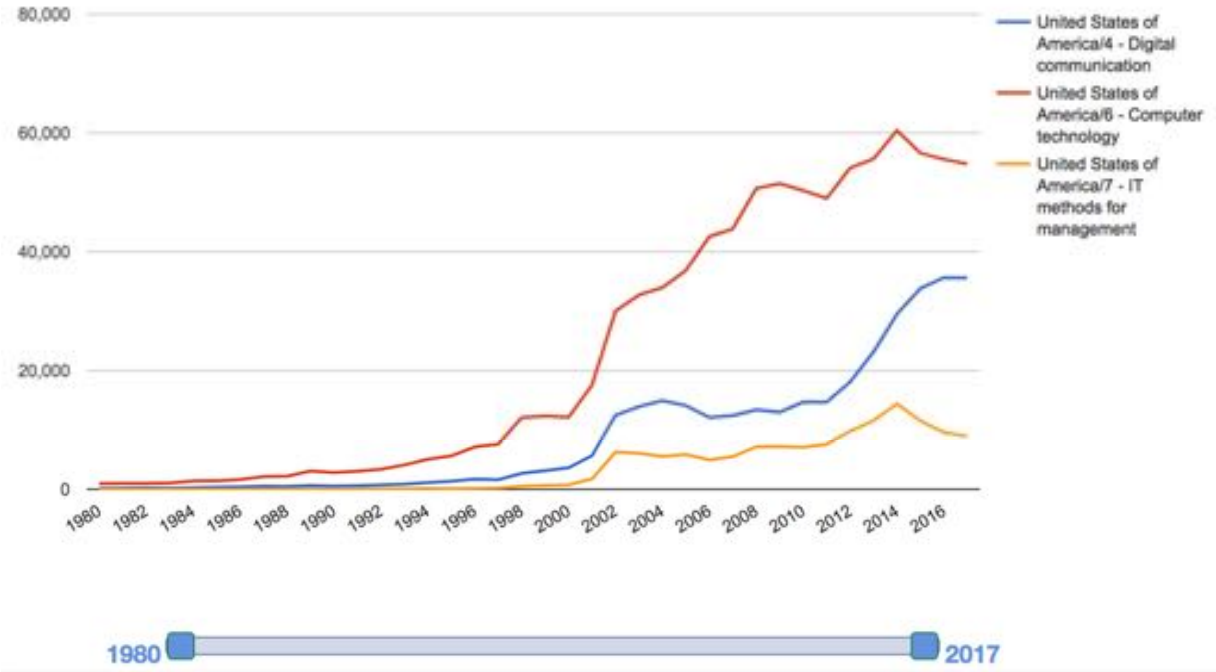
Patents Publications by the JPO relating to software



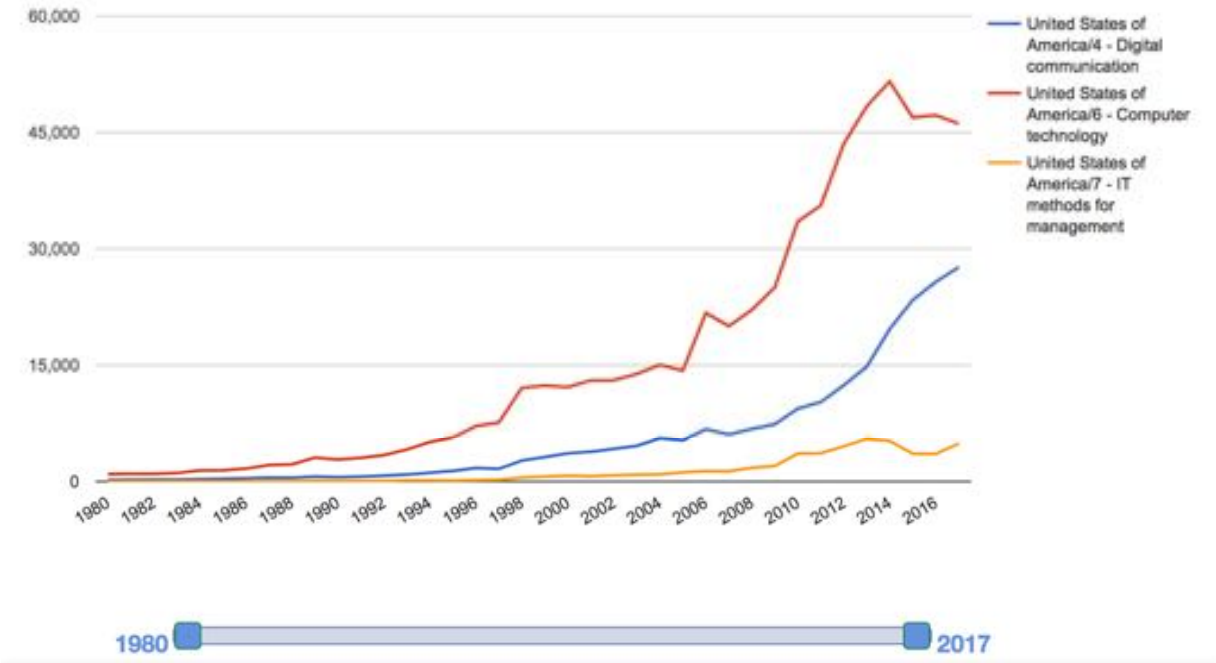
Patents Granted by the JPO relating to software



Patent Publications by USPTO relating to software



Patent Granted by the USPTO relating to software



As stated above, data regarding patent publications does not directly correspond to data about patent applications. Applications are often filed even though they will eventually be withdrawn and so they never reach the publication stage, which usually occurs 18 months after filing. However, those applications that are published are those that aspiring patentees are at least more serious in pursuing, and therefore can be at least partially a good indicator of patenting trends.

Looking at the patent publications and granted patent data in the three technology fields that the author of this paper has selected as most related to software (*i.e.*, Digital Communication, Computer Technology, IT Methods for Management), we can make interesting inferences.

First of all, at the EPO, consistently with the openness towards software patent-eligibility in 1998-2000 and a general increase in patent applications overall, the number of software patent publications and granted patents has been steadily increasing since the end of the Nineties.

At the JPO, it is interesting to note that there was a peak of software-related patents around 1992, followed by an increase in patent grants few years later, even as the proportion between patent publications and patent granted remained low until 2000-2002. From that moment onwards, the number of patent publications (and we assume applications) surprisingly diminishes overall, including for software-related technology. However, the number of granted patents increases, at first slowly and then dramatically. For example, in 1992, only in the field of "Computer Technology", there have been more than 30,000 patent publications which resulted around three years later in slightly more than 5,000 granted patents (16% of granted patents if compared to published patent applications). In 2012 there have been more than 15,000 granted patents out of slightly more than 20,000 published patent applications (75% of patent grants).

Finally, by looking at USPTO statistics we discover with no surprise that patent publications and granted patents increase substantially from 1998-2000 onwards, in line with an increased request for patent protection overall and, presumably, with the new *State Street* case law. Considering next the period of time from 2010 onwards, statistics become even more interesting. The number of US patent publications increases rapidly until 2010, and it diminishes slightly after 2010; then it increases again between 2011 and 2014, when it slowly decreases. For only the (most representative) field of "Computer Technology", there were around 50,000 patent publications in 2010 (the highest number until that moment), around 60,000 patent publications in 2014 and around 55,000 in 2017. Three years after *Alice*, the number of patent publications has slightly diminished as compared to 2014, but it is still at very high rates. The same situation can be noticed for the field of IT Methods for Management, while Digital Communication patent publications increase steadily even after 2014. Interestingly, when we look at granted patents, it can be noticed that their number for the "Computer Technology" field has continued to increase

3. Additional statistics regarding the US system

In November 2017, the USPTO Digital Services and Big Data (DSBD) unit, in collaboration with the Office of the Chief Economist (OCE) released a massive amount of data regarding office actions of the USPTO (USPTO Dataset). This release of data was accompanied by an official paper by the USPTO explaining the content of the dataset and providing some statistics[124]. Such data

[124] Lu, Qiang and Myers, Amanda and Beliveau, Scott, *USPTO Patent Prosecution Research Data: Unlocking Office Action Traits* (November 20, 2017). USPTO Economic Working Paper No. 10. Available at SSRN: https://ssrn.com/abstract=3024621 or http://dx.doi.org/10.2139/ssrn.3024621 . See also Graham, Stuart J.H. and

was then further analyzed through partially automated methods and discussed in a scholarly paper published at the end of 2018. This paper gives us another invaluable point of view regarding the impact of §101 case law on patenting practices[125].

The USPTO Dataset "*consists of three data files derived from 4.4 million Office actions mailed from 2008 through mid-July 20172 for 2.2 million unique patent applications*"[126]. This means that it is a good combination of post-*State Street* and pre-*Bilski* office actions and of post-*Bilski*, post-*Mayo* and, above all, post-*Alice* office actions.

While presenting in general the USPTO Dataset, the accompanying paper explains that it has been hard to distinguish § 101 office actions from the others because there is no specific category regarding §101-specific office actions. Moreover, of course, an office action may be based on multiple grounds, *e.g.*, lack of patent-eligibility and also lack of novelty. The paper nonetheless states that it is reasonable to say that "*about 11 percent* [of the office actions], *contain a rejection related to patent subject matter eligibility* [§ 101]*, statutory double patenting, utility, or inventorship*".

With regard to §101 rejections, the paper clarifies that "*about 13 percent of Non-Final Rejections and 7 percent of Final Rejections include a 101 rejection*". Of course, this is a percentage of the overall rejections which does not take into account or distinguish between different phases of US case law and does not distinguish between categories of patents (software patents, biotech patents etc.).

Marco, Alan C. and Miller, Richard, The USPTO Patent Examination Research Dataset: A Window on the Process of Patent Examination (November 30, 2015), available at SSRN: https://ssrn.com/abstract=2702637 or http://dx.doi.org/10.2139/ssrn.2702637, for an explanation of the PAIR dataset already disclosed in 2015 and updated from time to time.

[125] Chien, Colleen V. and Wu, Jiun Ying, Decoding Patentable Subject Matter (October 16, 2018). Patently-O Patent Law Journal 1, 2018; Santa Clara Univ. Legal Studies Research Paper. Available at SSRN: https://ssrn.com/abstract=3267742 or http://dx.doi.org/10.2139/ssrn.3267742

[126] Lu, Qiang and Myers, Amanda and Beliveau, Scott, *USPTO Patent Prosecution Research Data: Unlocking Office Action Traits* , supra note 124, p. 2.

This is where Colleen and Wu's paper fills the gap. The authors have further divided the USPTO into classes and subclasses and have isolated the office actions coming from the examiners employed by the art units responsible for examining software and business methods. By isolating these specific categories of patent applications, the authors were able to analyse whether the new §101 case law had an impact on the amount of office actions and on the amount of rejections as a consequence of said office actions.

Their findings show the following with regard to software and business method patents: 1) before *Bilski* a particularly small number of office actions concerned software and business methods patents; 2) after *Bilski* the number increased steadily month after month until the end of 2011, while it remained almost stable through *Mayo* and until *Alice*; 3) after *Alice* there was a tremendous increase of §101-based office actions, and the number grew exponentially until the first months of 2015, while slowly decreasing to more or less pre-*Alice* levels between the end of 2016 and the beginning of 2017; 4) of such office actions, the share containing a §101 subject matter rejection increased from about 25% to almost 50% after *Bilski* and slowly returned back to 25% just before *Alice* was decided; 5) the share of §101-based rejections went up to 75% immediately after *Alice* and remained between 75% and 85% from October 2014 to January 2017; 6) also the share of abandoned applications after a §101-based rejection had a similar fluctuation: it was around 50% before *Bilski*, it remained stable for a few months decreasing to 25% before *Alice* was decided and then it went to an average of 80% in the post-*Alice* scenario (until January 2017).

Colleen and Wu's paper concludes that while for medical patents and software/business methods patents §101-based rejections increased significantly, other sectors have been almost unaffected. The number of §101-based rejections went from 8% to 15% after *Alice* but it still remains an exceptional ground for rejection overall. It has also to be considered that a rejection on §101

grounds may not be the only cause of rejection.

Interesting data about the US system can be found in another recent paper, based on a survey to which 231 patent attorneys participated. According to the survey, the system is more predictable than many commentators have argued. The author of the paper asked the survey participants to guess the outcome of subject matter evaluations in patent cases by reading claim 1 of the invention under scrutiny. The survey suggests that in most of the cases where the court found the patent invalid because of patent-ineligibility, the attorneys guessed right. When the cases were more difficult and articulated, the percentage of correct guesses dropped considerably. This would imply that it is not so difficult to say when a patent is clearly invalid as per *Alice* two-step test, although it is not easy to distinguish valid patents from invalid patents in more complex cases.

Finally, another interesting set of data once again relating to the US legal system may be found in a survey[127] conducted by Prof. Taylor, who interviewed 475 venture capitalists and private equity investors. In the course of the survey, Prof. Taylor adopted the following approach: First, he asked directly whether the Supreme Court's decisions on patent-eligibility have impacted the surveyed entity's decisions to invest and, if so, how; secondly, since such a question implied familiarity with at least one of the Supreme Court's decisions, Prof. Taylor asked more indirect questions in order to understand whether, independently of the direct knowledge of the Supreme Court's case law, the surveyed entity was influenced by an alleged decreased availability of patents, by any other news about patents or had changed its behaviour based on other circumstances.

The paper is long and complex (more than 90 pages) and it exceeds the scope of the present work to summarize in detail its content and its methodology. However, in brief, the paper explains that:

[127] D.O. Taylor, *Patent Eligibility and Investment*, Cardozo Law Review, Forthcoming; SMU Dedman School of Law Legal Studies Research Paper No. 414. Available at SSRN: https://ssrn.com/abstract=3340937 or http://dx.doi.org/10.2139/ssrn.3340937 (February 24, 2019)

i) 62% of the interviewed firms were not familiar with the Supreme Court's case law on patent-eligibility; ii) most of the firms invest in, and are focused on, IT applications, software and the Internet (percentages are not indicative since firms have multiple "foci" and lines of investment, but the mentioned fields represent the majority of the firms' activities); iii) with regard to such fields of technology, the reduced availability of patents due to a stricter approach to patent-eligibility would not influence much investment decisions (only a small percentage responded that it would). So while the paper offers a much more comprehensive and complex view on investors' reaction to patent-eligibility case law and patent-eligibility in general, with specific regard to software patents we can infer that most of the investors are not even aware of the Supreme Court's decisions and therefore they are not particularly influenced by it. On the contrary, investors - who invest extensively in software-related companies - do not value patents in the software field and they usually do not base decisions upon the likelihood of a patent grant.

4. First conclusions regarding patenting trends

After having analysed legislations and case law of the US, Europe and Japan, and after having taken into account the above statistics about patent applications and granted patents, the author makes the following considerations.

First of all, it seems that by looking at the general statistics on patent applications, both in Europe and in the US, the number of patent applications has grown considerably since the Eighties until now, while Japan, which had the greatest number of patent applications a few decades ago, is

experiencing a progressive decrease in new filings.

The rate of patents granted has grown progressively over the years, even in Japan (and even in absolute numbers), but following a different trend. Instead of increasing at the same percentage as the patent applications have (or decreasing, with regard to Japan), the proportion "patent applications-granted patents" has doubled in the last ten or fifteen years (going from around 30% to around 60-70% - close to 75% in Japan, around 55% in the US). So either there are more quality patent applications, or the patent offices have become less severe over the years as part of a strategy to promote internal innovation by not rejecting too many patents, or both. There are probably also other reasons.

In any case, and going back to the initial questions about how case law, policies and changes in the statutes are affecting patenting trends and strategies, it seems that there is a lot of "trust"[128] in the patent systems in all the three systems considered. This is true even in the US notwithstanding the new *Mayo-Alice* 2-step test, given that the "demand" for patents is very high. This trust is "rewarded" with a lot more granted patents than in the past.

Secondly, by looking at the data regarding software patents more specifically, we notice that the number of their patent publications (we do not have complete, comparable data for applications here) and patent grants: i) in Europe, have both increased substantially every year, and have dramatically increased since the end of the Nineties; ii) in Japan, patent publications have been decreasing as have the total number of patent applications, while granted patents have increased substantially in the last few years, with a peak around 2012, and their proportion with regard to patent applications has been - with some ups and downs - increasing; iii) in the US patent

[128] Trust of course might imply many things, including "necessity" to have some patents in a company's portfolio to be competitive, as further elaborated below.

publications have increased substantially in the last few years and so have patent grants, with some relatively minor ups and downs.

These data reveal that software patent publications (and we assume applications) and patents are increasing, probably due to the growing importance of software in every industry. They also reveal that, notwithstanding the pro-software policy in Japan, the number of patent applications (once again inferring from the number of publications) are anyway decreasing along with the totality of patent applications, while patent grants have indeed increased. This might mean that while the pro-patent policy with regard to software was not perceived as such (or enough) by the business players, such a policy was followed by the JPO, which adopted a more generous approach toward software patents, whose grants increased substantially from the early 2000s.

These data also show that in the US the number of software patent publications and granted patents after *Alice* has slightly decreased, but not so significantly as one would expect. This might mean, first of all, that the influence of the Supreme Court case law - as highlighted by the study of Prof. Taylor referenced to before - might be strong on the practitioners of law but it does not really influence business choices. Secondly, it also means that the standards of examination, despite some uncertainties, have not become so difficult that they cannot be overcome, or we would have a dramatic decrease in granted patents, which we do not have.

The above situation might also depend on the fact that in the US having a weak patent in a company's portfolio (independently of its strength in court) is better than having none, in a world where patent portfolios are used more and more for marketing (to attract investments, obtain financing, interest consumers etc.) and defensive purposes than to be enforced against competitors. Maybe the situation is different - or has changed - in Japan, and this could be one of the possible explanations for the recent trends noticed in such country and reported above.

European data seem to be more in line with the expectations the author had: the more permissive approach since late Nineties is accompanied by an increase of patent applications and an increase of granted patents. It is hard to tell if the surge in patent application is dependent on European businesses knowing about the EPO's change of approach. Also at the EPO we notice an increase in the proportion of granted patents/patent applications in the last 10-15 years, which might also be related to a more favourable software-patent approach and increased clarity, especially since 2010, with regard to the requirements to obtain a software patent.

Thirdly, but no less importantly, the above considerations and findings can be read together with the considerations expressed above regarding the possibility of a well drafted patent application to get past the examination procedure. It is the author's opinion that in all three jurisdictions, a carefully drafted patent application (if the invention has some novelty and non-obviousness to it) does not have difficulties in passing the examination. The most affected software patents - especially in court or in post-grant proceedings where they are put under stricter scrutiny - are those that were already poorly drafted or concerned non-inventive disclosures, and therefore could not be saved by any skilful draftsman. As above demonstrated, even the new approach of the *Mayo-Alice* test is not so different from previous or current approaches in Europe and in Japan, and all three approaches, despite their nominal differences, have a lot more in common than one would expect. The author therefore thinks that it is not credible that the new requirements set forth by the new American case law can be so surprising, especially for companies and patent attorneys that are used to pursuing patents all around the world. In those cases, an application has to be drafted "well" from the beginning, so that it is suitable to be used not only in one country but (without expensive and risky changes) potentially in many others when the patent application, thanks to the

relevant international conventions (and especially the Patent Cooperation Treaty), is “extended” to countries beyond the first one.