

## Chapter 13

### Software-Related Inventions

#### ABSTRACT

This chapter examines the vacillating patentability standards that have characterised courts' treatment of software-related inventions under patent law in Europe and the US. Despite starting from opposing legislative bases – one specifically excluding computer programs when claimed as such and the other containing no explicit prohibition – the jurisprudence on both sides of the Atlantic has progressed along very similar lines. This chapter charts the development of the law in these jurisdictions and considers whether such incertitude is an inevitable consequence of software's duality as both text and machine.

#### INTRODUCTION

On 29 November 1972, Atari Inc., a newly incorporated Californian firm, announced the release of its first video arcade game: PONG.<sup>1</sup> The game required the player to control a simulated table tennis paddle, moving it vertically across the screen to intercept and return a ball to an opponent (either computer-controlled or another person). Although simplistic by today's standards, it was a roaring success – arguably laying foundations for a multi-billion dollar gaming industry and catapulting Atari to massive (albeit short-lived) riches.<sup>2</sup>

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<sup>1</sup> <http://www.computerhistory.org/tdih/November/29/>. Also Chapter 4 “And then there was Pong” in Steven Kent, *The Ultimate History of Video Games*, (Three Rivers Press 2010). PONG was designed and created by Allan Alcorn.

<sup>2</sup> The original Atari, Atari Inc., was founded in April 1972. Its assets were split and sold off in July 1984 – David E Sanger, ‘Warner Sells Atari to Tramiel’, *New York Times* 3 July 1984: <https://www.nytimes.com/1984/07/03/business/warner-sells-atari-to-tramiel.html>. The company had initially been sold to Warner Communications in 1978 and, according to the New York Times, in 1981 Warner's consumer electronics division, of which Atari was the star, accounted for 47% of the company's total sales (US\$511.8 million of US\$1.09 billion). See ‘Atari Swells Warner Profit’, *New York Times* 10 Feb 1982: <https://www.nytimes.com/1982/02/10/business/atari-swells-warner-profit.html>. By 1983 this had been transformed to a US\$538.6 million loss. See Associated Press, ‘Warner-Tramiel Talks on Atari Sale Reported’, *New York Times* 2 July 1984: <https://www.nytimes.com/1984/07/02/business/warner-tramiel-talks-on-atari-sale-reported.html>.

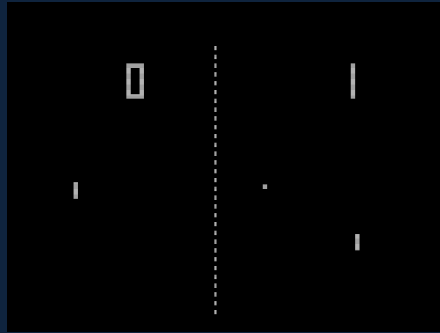


Figure 1: PONG<sup>3</sup>

As a technical creation, the PONG arcade cabinet was fascinating. The soul of the machine was held in the connection and arrangement of 66 chips of varying types.<sup>4</sup> Its experience – graphics, sounds and gameplay – were all a product of hardware: an example of transistor-transistor logic reliant upon the components’ relative configuration and the power supplied to them. There was no software. No writing of code. No instructions issued to the components other than by the machine’s physical controls. That an identical result can now be replicated in software – that a suitably programmed, off-the-shelf, computer can emulate this feat of wiring and solder – is testament to the boundaries that computer programs can cross. It also highlights the core of the problem with the law’s understanding and treatment of this subject-matter within the confines of intellectual property: software possesses a unique duality. It is, as Nack explains, “both the text description of a machine and the “machine” itself, ... no special physical device is needed to implement the algorithm – a standard computer will suffice.”<sup>5</sup>

On the one hand then, a computer program is the embodiment of an underlying algorithm; a sequence of technologically complex commands that dictate the operation of the machine. The self-same piece of hardware can, to all intents and purposes, be considered a different contrivance when running different programs. Software forms subject matter that, just like physical wiring (or even cogs, gears and sprockets), creates physical effects and causes pre-determined changes in operation. Within this context, solutions to particular problems can be

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<sup>3</sup> Originally uploaded at en.wikipedia.org by Bumm13. <https://commons.wikimedia.org/w/index.php?curid=799667>. Declared to be in the public domain. The score (0:1) is indicated by the numerals at the top of the screen. The paddles are the smaller vertical lines to the left and right of the dotted “net”. The square dot to the right of the net is the ball.

<sup>4</sup> A full .pdf of the schematics is available here: <http://ataribg.com/danb/files/PongSchematic.pdf>.

<sup>5</sup> Ralph Nack, ‘Catalogue of Exclusions: XI. Programs for Data Processing Equipment’, in Maximilian Haedicke & Henrik Timmann (eds) *Patent Law: A Handbook on European and German Patent Law*, (Hart 2014), 115.

achieved either by (a) creating separate, hard-wired, circuitry or machines for each and every algorithm required for the solution<sup>6</sup> (as with the PONG cabinet), or (b) by embodying those algorithms into a computer program to be run on standard machinery. The user's experience in each case would, in theory, be indistinguishable. We obviously have no problem considering the PONG circuitry as suitable subject matter for a patent – a series of components assembled in a manner that allows them to operate in a special way is an archetype patentable product, provided the machine is new, non-obvious, etc. If an instruction set enables the same, transforming the ordinary into the extra-ordinary in a manner that emulates physical wiring, then we might feel similar results should be forthcoming.

Nevertheless, the textual element of software invites us to see it in a different light: as an informational product of authorship. Creative and practical choices of a programmer expressed via keyboard and mouse: fashioned and formed of words, numerals, symbols and formulae – conveyed and recorded in notation and code. That these instruction sets are then compiled, transcribed and adapted – complex commands reduced to sequences of zeros and ones, the flicking of switches within an intricate system of parallel and serial instruction sets – does not change the expressive nature of the creative endeavour at their source. Seen in this light, software is the archetype of textual expression: something at the very core of copyright's paradigm. Naysayers may object that computer programs are intended to be read and executed by machine alone, but we could say the same of sound recordings and video footage encoded on suitable media.<sup>7</sup> For the latter enterprises the envelope of storage is accorded copyright protection in and of itself,<sup>8</sup> but the underlying content – the set of instructions, whether they be dialogue, lyrics, music, or stage directions etc. – can also enjoy separate protection.<sup>9</sup>

However, copyright is rather a poor tool with which to regulate the technical field of software development – or indeed to promote intellectual property's underlying goals of incentivizing the creation and dissemination of this particular subject-matter. Despite lasting for an inordinate

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<sup>6</sup> This point is made by both Peter Kirby, 'Industrial Property Protection for Software', (1974) 5 IIC 169, 169, and by Nack, *ibid*.

<sup>7</sup> Aspden makes a similar point: H. Aspden, 'Patentability of Computer Programs' in John A. Kemp (ed.), *Patent Claim Drafting and Interpretation* (Oyez Longman 1983), 174.

<sup>8</sup> In the UK by, respectively, s5A and s5B of the Copyright, Designs and Patents Act 1988.

<sup>9</sup> Provided, of course, that it complies with the requirements for subsistence contained within the Act.

time in relation to the viable lifecycle of a computer program,<sup>10</sup> its manifold limitations provide somewhat feeble, arguably inadequate, protection for elements lying behind the coded text. Copyright obviously protects only the expression of the author's creativity,<sup>11</sup> and as such if an underlying algorithm can be denoted using different text, or articulated in a functionally equivalent manner using different language, then this will evade the grip of the law. Accordingly, only the most egregious of infractions, facsimile reproduction of source code, will infringe the author's rights. Ideas, after all, sit outside of copyright's controlling influence.<sup>12</sup> Thus, similarities in the look and feel of a computer game<sup>13</sup> or replication of the functionality of an analytical system<sup>14</sup> will not infringe where there is no textual copying.

Patents do not suffer the same limitations. They protect features of technology: products and processes, which are new, useful and inventive.<sup>15</sup> Infringement is determined not by copying, but instead by whether a given embodiment falls within the scope of the earlier right.<sup>16</sup> The patent's duration also maps more accurately onto the effective life of software components.<sup>17</sup> Furthermore, the sort of intellectual flourishes in question – the contributions made to an art simply by doing something in a new way, combining known elements in an interesting and innovative fashion – are those which the patent system is specifically designed to promote. After all, these are the gears that drive industrial progress. Nevertheless, there are a number of practical problems that stand in the way of this conclusion. The remainder of this chapter is therefore dedicated to exploring these issues. We begin with the position in Europe.

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<sup>10</sup> The standard term under Art 7 of the Berne Convention 1886 (as amended) is life plus 50 years. In the context of computer-implemented inventions, even 50 years represents many product lifecycles.

<sup>11</sup> This principle is also embodied in Art 9(2) of the TRIPS Agreement: "Copyright protection shall extend to expressions and not to ideas, procedures, methods of operation or mathematical methods as such."

<sup>12</sup> *ibid.*

<sup>13</sup> E.g. *Nova v Mazooma* [2006] RPC 14 (HC); [2007] RPC 25 (CA).

<sup>14</sup> C-406/10 *SAS Institute Inc v World Programming Ltd* [2012] 3 CMLR 4.

<sup>15</sup> See e.g. s1 PA 1977. The Patents Act refers to capability of industrial application rather than an invention being useful. For current purposes the two are considered synonymous.

<sup>16</sup> See e.g. s60 PA 1977 in connection with s125(1) PA 1977.

<sup>17</sup> A maximum of 20 years protection from application – s25 PA 1977. 20 years is the shortest maximum term permitted by Art 33 of the TRIPS Agreement.

## **PATENT PROTECTION FOR COMPUTER PROGRAMS UNDER THE EUROPEAN PATENT CONVENTION**

On 8 December 1972, nine days after Atari Inc. announced PONG, the Government of the Federal Republic of Germany published the text of a Draft Convention establishing a European System for the Grant of Patents.<sup>18</sup> The wording of this Draft was derived from the output of a series of inter-governmental meetings, committees, sub-committees and working parties that had occurred over the preceding three-and-a-half years under the umbrella of the Council of Europe. The text was prepared so it could be considered by a Diplomatic Conference to be held in Munich from September to October 1973. The output of this Conference became the European Patent Convention (EPC).

As those familiar with the provisions of EPC will doubtless be aware, its drafters decided not to define the core subject-matter of a patentable invention in positive terms. Instead they preferred partial definition by the inclusion of a non-exclusive list of things that are “not... regarded as inventions” for the purposes of the legislation. Accordingly, under Art 52(2)(c) EPC this prohibition was (and remains) extended to “schemes, rules and methods for performing mental acts, playing games or doing business, and *programs for computers*.” (emphasis supplied) Thus, within the 38 States that currently subscribe to the European Patent Organisation (EPO) and who have harmonized their patent laws to accord to the provisions of the EPC,<sup>19</sup> one might be forgiven for thinking that protection of software-related inventions is impossible. If only things were this simple...

### **MUDDYING THE WATERS**

The most obvious difficulty with Art 52(2) EPC derives from the fact that it defines an invention by what it is not. The claims of a patent, under Art 69 EPC, determine the relevant scope of its protection and, according to Art 84, also define the matter for which protection is sought. The claims are drafted at the behest of the patentee – part of “a unilateral statement ..., in words of his own choosing ... [by which he states] what he claims to be the essential features of the new

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<sup>18</sup> *Draft Convention establishing a European System for the Grant of Patents* (Munich, 8 Dec 1972), Doc No. M/1.

<sup>19</sup> See <https://www.epo.org/about-us/foundation/member-states.html> for a list of the Member states and their respective dates of accession.

product or process for which the letters patent grant him a monopoly”.<sup>20</sup> In order, therefore, to consider the effect of the exclusions under Art 52(2) in any given case we must read the list of non-inventions onto the patentee’s own statement of what it is they have invented. It is therefore hardly surprising that applicants might go to great lengths to try and obfuscate the presence of a software-related element within their claims.<sup>21</sup>

However, the risk of concealment is actually the least of our worries. Far more troubling is the fact that the beguiling simplicity of Art 52(2) EPC is frustrated by the addition of a substantial caveat within the subsequent sub-article. Art 52(3) therefore adds that patentability of these prohibited subject-matters is only excluded to the extent that the patent or application relates to them “as such”. The inclusion of these weasel-words presents a headache. No longer are we simply concerned with the assessment of what a computer program is and, by extension, whether the thing under consideration falls within that definition. Instead, even if we detect that there is a computer program at play, we are forced to ask whether the patent (or application) relates to that computer program as a computer program, or whether it relates to the program as something else. This is not a straightforward enquiry. Not only are we left unclear as to what the ‘something else’ may legitimately be, but we are also not told precisely how any of this “excluded subject-matter” relates to the other requirements for patentability.

For a prospective applicant this lack of definitional clarity is further enhanced by the remainder of Art 52(2) EPC, for it is clear that the categories there mentioned are capable of overlap. Thus, even if the patent or application relates to a computer program as a carrier for something else, it may still fall into crisis if the thing it relates to is nevertheless also on the list of subject-matters that are “not ... regarded as inventions”. Prime candidates for substitution in this manner would be methods of doing business, presenting information or performing mental acts.<sup>22</sup> Scientific theories and mathematical methods may also be implicated in software, and also feature as ‘non-inventions’ for the purposes of the legislation.<sup>23</sup> However, while some of the exclusions under Art 52(2) appear to be closely related, others, “aesthetic creations”<sup>24</sup> for

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<sup>20</sup> Per Lord Diplock in *Catnic Components v Hill & Smith* [1982] RPC 183, 242. This statement has been cited with approval on many occasions including by the Supreme Court in *Schutz v Werit* [2013] RPC 16, [28].

<sup>21</sup> See, e.g. *Halliburton Energy Service Inc.’s Patent Application* [2012] RPC 12, [23].

<sup>22</sup> All under Art 52(2)(c) EPC.

<sup>23</sup> Under Art 52(2)(a) EPC.

<sup>24</sup> Under Art 52(2)(b) EPC.

example, seem to have been incorporated in the list of prohibited subject-matter for entirely unconnected reasons.<sup>25</sup>

Baillie once described the Protocol on the Interpretation of Article 69 EPC, which concerns the manner of approaching the determination of the scope of a patent's claims, as “a masterpiece of ambiguity”.<sup>26</sup> The same could easily be said of Arts 52(2) and (3) of the Convention. Lack of definitional clarity, and the consequent difficulty of divining the precise ambit of the exclusion of “programs for computers ... as such” is one of the reasons that the English courts have declared this subject to be “inherently difficult”.<sup>27</sup> It is therefore also the first port of call on our tour of the exclusion and the problems that it brings.

## **A LACK OF DEFINITIONAL CLARITY PART I: AN OPEN-ENDED EXCLUSIONARY PROVISION**

Part of the difficulty with the interpretation of Art 52(2) stems from the fact that it is not, and was never intended to be, exhaustive. The language of the provision is open ended: “[t]he following *in particular* shall not be regarded as inventions...” (emphasis supplied). During the drafting phase of the EPC, proposals to make the list closed were explicitly rejected by the Inter-Governmental Conference.<sup>28</sup> However, while expansion of the scope of prohibited matter was evidently envisaged by the Convention's drafters, there is nothing in the text or indeed the *travaux* that instructs anyone precisely how to do this. Sterckx and Cockbain envisage two methods: (1) expanding along the lines of equivalency and; (2) expansion on the basis of shared commonality.<sup>29</sup> Nevertheless, they profess no clear view as to how these possibilities might be applied.

According to the story promulgated by the European Patent Office in a series of decisions of the Technical Boards of Appeal (TBA), Art 52(2) EPC sets forth exclusions based on a central

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<sup>25</sup> Predominantly because these are the very things that should be protected by copyright.

<sup>26</sup> Iain C. Baillie, ‘Where Goes Europe? The European Patent’, (1976) 58 *JPOS* 153, at 167.

<sup>27</sup> Per Lord Neuberger, sitting in the Court of Appeal in *Symbian's Application* [2009] RPC 1, at [1].

<sup>28</sup> *Minutes of the 5<sup>th</sup> Meeting of the Inter-Governmental Conference for the Setting up of a European System for the Grant of Patents (Parts 1 and 3)* (Brussels, 15 Mar 1972), Doc No. BR/168/72, [26]

<sup>29</sup> Sigrid Sterckx & Julian Cockbain, *Exclusions from Patentability*, (CUP 2012), 68.



conception that these things are not inventions because they possess no technical character.<sup>30</sup> This idea of an underlying latticework tying the exclusions together can be traced back at least as far as the TBA's decision in *IBM/Document Abstracting and Retrieving*. Here the Board noted that: "Whatever their differences, these exclusions have in common that they refer to activities which do not aim at any direct technical result but are rather of an abstract and intellectual character."<sup>31</sup> By the time of the decision in *DUNS LICENSING ASSOCIATES/Estimating Sales Activity*<sup>32</sup> nearly a decade later, the mantra had taken on evangelical zeal. Thus, possession of "technical character" was stated to be "an implicit requisite of 'invention' within the meaning of Art 52(1) EPC"<sup>33</sup>, and was furthermore "the general criterion embodied in paras 2 and 3 of Art.52 EPC"<sup>34</sup>. In addition, the "mere fact" that the list of exclusions within Art 52(2) was non-exhaustive was considered "indicative of the existence of an exclusion criterion common to all those items and allowing for additions to the list that were thought possible."<sup>35</sup> While perhaps comforting to think that this might be the case, there is little, if any, evidence in the drafting history of the provision to support this view.<sup>36</sup>

The *travaux préparatoires* of the European Patent Convention reveal that Art 52(2) has an unusually complicated backstory. By the time the EPC deliberations began in earnest with the first meeting of the Inter-Governmental Conference for the setting up of a European system for the grant of patents in Brussels in May 1969,<sup>37</sup> the idea of European harmonization in this area was almost two decades old.<sup>38</sup> The idea of unpatentable subject matter had been extensively

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<sup>30</sup> See, for example, T\_154/04 *DUNS LICENSING ASSOCIATES/Estimating Sales Activity* [2007] EPOR 38.

<sup>31</sup> T\_22/85 *IBM/Document Abstracting and Retrieving* [1990] EPOR 98, 103.

<sup>32</sup> *Supra*, n30, above.

<sup>33</sup> *ibid.* [24].

<sup>34</sup> *ibid.* [28].

<sup>35</sup> *ibid.* [29].

<sup>36</sup> This point is made clearly by Pila when she remarks that "the prevailing construction ... [of the provision within decision of the EPO Boards of Appeal as] ... resolving to a single requirement for technical character" is simply not supported by the Convention's legislative history. See Justine Pila, 'Article 52(2) of the Convention on the Grant of European Patents: what did the framers intend? A study of the travaux préparatoires', (2005) 36 IIC 755, 755. See also Justine Pila, 'Dispute over the meaning of "invention" in Art.52(2) EPC – the patentability of computer-implemented inventions in Europe', (2005) 36 IIC 173.

<sup>37</sup> The minutes of this meeting can be found in the travaux préparatoires of the EPC 1973 as Doc No. BR/4/69.

<sup>38</sup> See further, Justine Pila, *The Requirement for an Invention in Patent Law* (OUP 2010), esp 126-45.



discussed and a draft framework concluded in 1965.<sup>39</sup> However, the exclusions found in the working draft Convention derived not from these earlier European discussions, but instead hailed from rule 39 of the draft Regulations applicable under the Patent Cooperation Treaty (PCT).<sup>40</sup>

The perceived need to harmonize with the PCT was a somewhat strange compulsion given the very different aims of the two Conventions. Whereas the EPC was intended to become a system for the centralized application, examination and grant of European patents, the PCT was simply designed to assist in the international protection of inventions by providing a unified procedure for filing applications. However, perhaps of more consequence than the incongruence of the decision to follow the PCT in this respect is the fact that the 1969 version of the Draft EPC text makes no mention of computer programs. In fact, in its very first meeting, Working Party I (responsible for the patentability elements under the Draft Convention) is recorded as wishing to “point... out that the text of paragraph 2 [of what was eventually to become Art 52 EPC] does not prejudice the question of whether computer programmes may be the subject of a European patent.”<sup>41</sup> Indeed, it was not until January 1971, when Working Party I (by then in its 7<sup>th</sup> Meeting) finally agreed<sup>42</sup> to adapt the language of the draft Article to include computer programs within the list of exclusions, and thereby to align the EPC with what had, in the interim, become the final version of the PCT Regulations.<sup>43</sup> Notwithstanding this agreement, the minutes of this meeting record that substantive discussion of the changes would still need to be entertained.<sup>44</sup>

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<sup>39</sup> As is clear from Doc No. BR/6/69, at 17, in which the 1965 version of the Draft Convention relating to European Patent Law (CEPL) established by the EEC Patents Working Party is compared to the initial draft of the EPC.

<sup>40</sup> A fact made clear in the *Minutes of the [First] Meeting of Working Party I – held in Luxembourg from 8-11 July 1969* (Brussels, 29 Jul 1969) Doc No. BR/7/69, [22].

<sup>41</sup> BR/7/69, op cit. [22].

<sup>42</sup> *Minutes of the 7<sup>th</sup> Meeting of Working Party I – held in Luxembourg from 26-29 January 1971* (Brussels, 6 Apr 1971), Doc No. BR/94/71 at [22].

<sup>43</sup> The PCT and its accompanying Regulations were agreed at a Diplomatic Conference in Washington DC in June 1970.

<sup>44</sup> BR/94/71, op cit. [22] and [23].

Turning to the PCT itself, the addition of the computer program exclusion was made on very precise grounds. The 1967 US Report of the President’s Commission on the Patent System<sup>45</sup> had highlighted the impossibility of establishing “appropriate search reports on software patent applications, as no classification system was available and as prior art was already too voluminous and moreover developing too quickly.”<sup>46</sup> Accordingly, as the representative of WIPO (which had taken over administration of the PCT in 1970) pointed out at the 9<sup>th</sup> Meeting of Working Party I: “the PCT gave little guidance on [the question of whether computer programs should be excluded from patentability] ..., as the criterion whether a computer programme fell under the PCT system depended only on the capacity of the international searching authority to conduct a search.”<sup>47</sup> Van Empel therefore notes: “It is clearly on this ground – and no other! – that PCT Rule 39.1 provides that no International Searching Authority shall be required to search ‘computer programs...’.”<sup>48</sup> The same can obviously not be said of the other exclusions. It is therefore very unlikely (at the very least) that all were incorporated for the same reason. This point is reinforced when it is appreciated that some of those originally found within the same PCT rule were subsequently moved into separate provisions of the EPC during the drafting process. Thus, “therapeutic or surgical methods for treatment of the human or animal body, and diagnostic methods”, are also derived from draft Rule 39.1 PCT. However, these later found their way into Art 52(4) EPC 1973, to be excluded on the basis of a lack of industrial application.

Unifying theory or no, this is clearly not the end of the exclusionary provision’s woes. As already noted, its clarity is further eroded by the addition of the “as such” limitation within Art 52(3). It is to this issue that we now direct our attention.

## **A LACK OF DEFINITIONAL CLARITY PART II: HALF A POUND OF TUPPENNY RICE...**

By the time of the EPC’s entry into force, computer programs were on their face excluded from patent protection along with schemes, rules and methods for performing mental acts, playing

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<sup>45</sup> Committee on the Judiciary of the United States Senate, Report of the President’s Commission on the Patent System: “To promote the progress of ... useful arts” in an Age of Exploding Technology, (US Government Printing Office 1967).

<sup>46</sup> M. van Empel, *The Granting of European Patents*, (Sijthoff 1975) at 33.

<sup>47</sup> *Minutes of the 9<sup>th</sup> Meeting of Working Party I – held in Luxembourg from 12-22 October 1971*, (Brussels, 17 Nov 1971), Doc No. BR/135/71, [96].

<sup>48</sup> Van Empel, *supra* n46, 33.

games or doing business; all under Art 52(2)(c). All, however, were only excluded to the extent that a patent or patent application related to them “as such”. The suggestion for the general application of this proviso, now found within Art 52(3) EPC, originated from a proposal put forward by the German Government in March 1973.<sup>49</sup> Prior to this point, limitation had been applied only to “discoveries, as such” and to “mere presentation of information”. The remainder of the exclusions, including computer programs were simply stated not to be inventions without more. Concern was expressed that this differential treatment may have led to “the erroneous conclusion that a broad interpretation should be given to items not limited in this way in paragraph 2.”<sup>50</sup> Accordingly, it was suggested that the restriction “be set forth in a general manner in a separate paragraph.”<sup>51</sup> This proposal was accepted by the Diplomatic Conference.<sup>52</sup> However, notwithstanding the German delegation’s overtures to the opposite effect, it is difficult to see how one can interpret the addition of this proviso as having anything other than a narrowing effect on the status of excluded subject matter.<sup>53</sup> It is therefore unsurprising that we would see an erosion of the prohibition and a consequent broadening of the scope of things that can be deemed patentable as time progressed.

### **THE SCOPE OF MEANINGS EMBRACED BY “AS SUCH”**

There are evidently numerous ways in which limitation of the exclusions to the subject-matter listed when claimed “as such” could influence their treatment. In particular, how are we to proceed when faced with mixed claims where programs are but one part of the inventor’s alleged contribution; where a novel invention that might, for example, be implemented in special circuitry is instead simply implemented in software? Sterckx and Cockbain outline a number of “obvious” potential approaches. At one end of the spectrum are situations in which we consider a claim ‘contaminated’ (and thereby completely prohibited) if it touches upon excluded matter. At the other lie those where a claim may be salvaged if it includes anything that is not excluded.<sup>54</sup> Between these extremes we could focus on the novel contribution made by an invention, asking whether this exists solely within excluded subject matter (if so what is claimed is not an

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<sup>49</sup> *Comments by the Government of the Federal Republic of Germany* (Munich, 29 March 1973) Doc No. M/11.

<sup>50</sup> *ibid.* [21].

<sup>51</sup> *ibid.*

<sup>52</sup> M/PR/I, op cit. at [42].

<sup>53</sup> Pila, *The Requirement for an Invention*, n38, above, makes the same point at 152.

<sup>54</sup> Sterckx & Cockbain, n29, above, at 68.

invention) or whether it lies elsewhere. We might also deem as acceptable a claim that “uses a generic definition that encompasses, but is not limited to, excluded subject-matter”, or perhaps even accept claims where the “subject-matter ... has a technical character, ...even if it belongs to an excluded class”.<sup>55</sup>

This panoply of potential constructions is not, however, the end of the problem. The fate of subject-matter that escapes Art 52(2)’s clutches is equally important in the definition of the provision’s scope. How, then, is novelty and inventive step assessed, and what limitations, if any, spill over from the consideration of whether subject matter is, or is not, an invention? Once more there are many different possible views. At the most restrictive, we could assess these elements based only on matter that does not fall into an exclusion, thereby excising all traces of a computer program (for example) from consideration. Alternatively, we could assess whether the claim, warts and all, makes a contribution to human knowledge that is novel and inventive. There are many subsidiary positions in between. It should therefore not surprise the reader that the majority of relevant jurisprudence that has emerged from under the wings of Arts 52(2) and (3) EPC over the past 40-odd years has focused not on the substantive issue of what a computer program is or does, but rather on the determination of these related matters. In historical overview, this began with a process of simplification under the banner of “technical contribution”.

### **THE ASCENDANCY OF THE TECHNICAL: IT ALL STARTS WITH A CONTRIBUTION**

The idea of using ‘technical contribution’ as a litmus test for non-excluded subject matter can be traced back to a series of decisions of the EPO’s Technical Boards of Appeal in the mid-late-1980s. The ascendancy of ‘technical means’ was initially promoted by drawing analogy between digital and analogue worlds. Thus, in *VICOM/Computer-related Invention*, the TBA explained that a method of digitally processing images through the application of a specific algorithm to an image file was a “real world” activity. The process was said to “start in the real world (with a picture) and end in the real world (with a picture)”. The intervening steps were therefore not abstract, but were rather “the physical manipulation of electrical signals representing the picture in accordance with the procedures defined in the claims.”<sup>56</sup> The TBA explained that “an invention ... should not be excluded from protection by the mere fact that for its

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<sup>55</sup> *ibid.*

<sup>56</sup> T\_208/84 *VICOM/Computer-related Invention* [1987] EPOR 74, 77.

implementation modern technical means in the form of a computer program are used. Decisive is what technical contribution the invention as defined in the claim when considered as a whole makes to the known art.”<sup>57</sup> Accordingly, while a *pure* algorithm might still be denied protection, one that was *applied* in a technical process could escape the exclusions’ clutches. The key it would seem was to identify the inventive contribution made by the alleged invention and then to revert to see if this resided purely in excluded subject matter. As Ballardini has noted, the legitimacy of this approach must be doubted, if only for the fact that inventive step assumes a double role. It is first used to identify whether there is an invention, which must then be seen to possess novelty, inventive step and industrial application in order to be patentable.<sup>58</sup>

Distilling the EPC’s list of excluded subject matter into a question of technical contribution offers convenient simplification of the unruly collection of elements contained in Art 52(2). However, substitution of one consideration for a collection of others obviously relies on the identification of a factor common to them all. As noted above, and notwithstanding assertions to the contrary, it is far from clear that this can be done. Furthermore, the translation of a multi-faceted provision into a simple, single-element, formulation also erodes the force of the exclusions themselves. This weakening is explicitly acknowledged by the Enlarged Board of Appeal in *PRESIDENT’S REFERENCE/Programs for computers*,<sup>59</sup> which notes that other factors, such as inventive step, will take up the slack. While this may be true – after all, a failure of patentability remains a failure whether an invention lacks inventive step or falls within excluded subject-matter – it is not really a satisfactory justification. Indeed, if we reach a position in which the exclusions are only paid lip-service then it does raise questions about why we bother with them at all.

Furthermore, by searching for a technical contribution to satisfy the requirement of ‘invention’ (and thereby avoid the exclusions) *VICOM* simply substituted one vague standard for another. Satisfaction of this new gatekeeper requirement relied upon an applicant identifying the correct kind of technical element. Merely using technical means to obtain a result would not be sufficient. Accordingly, pure mathematical manipulations (i.e. changes to outputs where those outputs were simply numerical) could not, of themselves, pass muster even if implemented by a

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<sup>57</sup> *ibid.* at 80-1.

<sup>58</sup> Rosa Maria Ballardini ‘Software Patents in Europe: The Technical Requirement Dilemma’, (2008) 9 *JIPLP* 563, 565.

<sup>59</sup> G\_03/08 *PRESIDENT’S REFERENCE/Programs for computers* [2010] EPOR 36 – esp [81].

computer.<sup>60</sup> However, if those manipulations resulted in a physical change outside of the computer then this could be used to support a claim to an invention.<sup>61</sup> Furthermore, in a move startlingly reminiscent of the “machine or transformation” test applied in the U.S.,<sup>62</sup> the Board explained that this change could occur in a physical object or, as in *VICOM*, in electrical data encoding an image.<sup>63</sup> With this the TBA had created what Cohen and Lemley have referred to in the context of US development on the same issue as a doctrine of magic words.<sup>64</sup> Framed in the correct way, effective protection for an algorithm having use only in the context of a machine could be achieved by merely claiming its functional output. Form replaced substance, and patentability essentially seemed to turn on questions of presentation alone.

### FROM CONTRIBUTION TO CHARACTER IN THE EPO

However, despite concerns being expressed over the vagueness of the *VICOM* standard,<sup>65</sup> the contribution approach was eventually displaced not due to any uncertainty in its application, but predominantly because of concerns raised about its application in light of the Agreement on Trade Related Aspects of Intellectual Property (TRIPs). The doctrine that replaced it – technical character – although arguably no more justified as an interpretation of the EPC’s text does at least enable TRIPs compliance.

Within the TRIPs Agreement, patents are dealt with in Articles 27 to 34; commencing with a broad definition of patentable subject matter. Accordingly, Art 27 famously dictates that “patents shall be available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application.”<sup>66</sup> The provision continues, explaining that States are free to adopt measures that exclude certain inventions from patentability where this is necessary to protect “ordre public or

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<sup>60</sup> T\_208/84 *VICOM/Computer-Related Invention* [1987] EPOR 74, 79.

<sup>61</sup> *ibid.*

<sup>62</sup> See “An Alternative Dimension” below.

<sup>63</sup> *VICOM*, *op cit.* 79.

<sup>64</sup> Julie E Cohen & Mark A Lemley, ‘Patent Scope and Innovation in the Software Industry’, (2001) 89 *Cal L Rev* 1, 9.

<sup>65</sup> For example, in *Fujitsu’s Application* it was noted that “in practice it is often very difficult to determine whether a particular invention does as a matter of fact involve the sort of technical contribution or result alluded to in the cases.” See *Fujitsu’s Application* [1996] RPC 511, 521.

<sup>66</sup> Art 27(1) TRIPs.

morality”.<sup>67</sup> States are also explicitly empowered to exclude certain other things from being subject to patent rights.<sup>68</sup> The list of this optionally prohibited subject-matter is very short, consisting only of medical methods for the treatment of humans or animals (by surgery, therapy and diagnosis), and plants, animals and essentially biological processes for their production. On other exclusions, TRIPs is silent. One may therefore be forgiven for assuming that “all fields of technology” means just that, and that inventions not featuring on its list of optional prohibitions, including computer software, are as patentable as anything else.

This was certainly one of the arguments deployed by the applicant in *IBM/Computer Programs*.<sup>69</sup> The case revolved around claims directed respectively to “a computer program product directly loadable into the internal memory of a digital computer (Claim 20) and to a computer program product stored on a computer usable medium (Claim 21)”.<sup>70</sup> Both were initially rejected on grounds that their only contribution was confined to excluded subject matter, as such – i.e. contributing to programs as programs. Before the TBA, IBM alleged that instead of focusing on contribution the Board should instead concentrate on the technical character of the invention. This was, it said, the more appropriate standard to be applied in light of TRIPs, as while this element of “an invention might result from its field of application, [it]... might equally well result from using information technology to solve a problem in a non-technical field.”<sup>71</sup> Accordingly, it was asserted that searching for a technical contribution alone would place the EPC in danger of being TRIPs non-compliant. The TBA, while not being “convinced that TRIPs may be applied directly to the EPC”<sup>72</sup> nevertheless thought that it would be “appropriate to take it into consideration”<sup>73</sup> as it gave “a clear indication of current trends”.<sup>74</sup> The Board also acknowledged the relative ease with which computer program products could be patented in the US and Japan. As Sterckx and Cockbain therefore explain, the maintenance of the “technical contribution

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<sup>67</sup> Art 27(2) TRIPs.

<sup>68</sup> Art 27(3) TRIPs.

<sup>69</sup> T\_1173/97 *IBM/Computer Programs* [2000] EPOR 219.

<sup>70</sup> *ibid.* 221-22.

<sup>71</sup> *ibid.* 224.

<sup>72</sup> *ibid.* 224.

<sup>73</sup> *ibid.*

<sup>74</sup> *ibid.*



approach risked both TRIPs non-compliance and the EPO becoming a backwater ... in the development of new technologies”<sup>75</sup>

With little ceremony, the Board therefore shifted focus: “Determining the technical contribution an invention achieves with respect to the prior art is ... more appropriate for the purpose of examining novelty and inventive step than for deciding on possible exclusion under Article 52(2) and (3)”.<sup>76</sup> Contribution therefore gave way to character. An invention with no technical character could obviously not be considered an invention in a field of technology (if an invention at all), and therefore the TRIPs point fell away. However, this move also opened the door to a more liberating approach in general.

### **...POP GOES THE WEASEL (WORDS)**

The ascendance of technical character as a determinant of a qualifying invention was further promoted three years later in *PBS PARTNERSHIP*.<sup>77</sup> Here the Board of Appeal decided that claims directed to an apparatus (as opposed to a program in the abstract) should automatically be considered inventions and overcome this first hurdle to patentability. It explained that “a computer system suitably programmed for use in a particular field, even if that is the field of business and economy, has the character of a concrete apparatus in the sense of a physical entity, man-made for a utilitarian purpose and is thus an invention within the meaning of Article 52(1) EPC”.<sup>78</sup> Claims to the method underlying the invention, however, were rejected. These simply consisted of “steps of processing and producing information having purely administrative, actuarial and/or financial character” and moreover were “typical steps of business and economic methods” which were additionally not technical.<sup>79</sup>

With this decision we see creation of a crude litmus test. Labels such as “concrete”, “physical” and “man-made” are used as proxies for the identification of an entity that evades the exclusions. The EPC’s negative definition of ‘invention’ (via the identification of things that it is not) had

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<sup>75</sup> Sterckx & Cockbain, *supra* n29, at 80.

<sup>76</sup> *IBM/Computer Programs*, *op cit.* 229. Sterckx & Cockbain refer to the OJ version of the case – [1999] OJ/EPO 619. In this version the quote appears at 623.

<sup>77</sup> T\_931/95 *PBS PARTNERSHIP/Controlling Pension Benefits Systems* [2002] EPOR 52.

<sup>78</sup> *ibid.* [5].

<sup>79</sup> *ibid.* [3].

already been replaced by a quest for the technical, and now this was supplanted by synonym. Any assessment of what Art 52(2) EPC's exclusions actually mean had been swapped for a far simpler tick-box exercise. Thus, the difficult question of whether the claims of the alleged invention relate to excluded subject matter 'as such', was replaced by simply asking if there is any hardware present.

This whirlwind of simplification was taken a step further in *HITACHI* the following year when the TBA determined that claims directed at the method itself when carried out on suitable hardware could possess technical character. The critical requirement could be "implied by the physical features of an entity or the nature of an activity, or may be conferred to a non-technical activity by the use of technical means."<sup>80</sup> Accordingly, even activities "so familiar that their technical character tends to be overlooked, such as the act of writing using a pen and paper"<sup>81</sup>, could be used to give character to a claim. Only "purely abstract concepts devoid of any technical implications"<sup>82</sup> would generally be considered to fall within the exclusion's grasp. The end result was the evisceration of Art 52(2). With it the transition under the doctrine of magic words was complete: the abracadabra of the 'technical' simply involved claiming some physical element. Once this was done, the subject matter hurdle was passed.

This approach was not, however, to everyone's liking. Perhaps most affronted by the modification in the treatment of the exclusions were the courts of England and Wales. Thus, in *Aerotel v Telco*<sup>83</sup> in the English Court of Appeal, Jacob LJ famously commented that while "conscious of the need to place great weight on decisions of the Boards of Appeal"<sup>84</sup>, he felt unable to do so in this instance as even under the technical character line of cases there were a number of "mutually contradictory"<sup>85</sup> variants. Moreover, the effects of *PBS* were said to lead one down a path that was "not intellectually honest"<sup>86</sup>. Thus, the Court of Appeal chose to follow its own line of precedent, considering itself bound by a triumvirate of cases: *Merrill*

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<sup>80</sup> T\_258/03 *HITACHI/Auction Method* [2004] EPOR 55, at [33].

<sup>81</sup> *ibid.* [34].

<sup>82</sup> *ibid.* [33].

<sup>83</sup> *Aerotel v Telco (including the Matter of Macrossan's Patent)* [2007] RPC 7.

<sup>84</sup> *ibid.* [29].

<sup>85</sup> *ibid.* [25].

<sup>86</sup> *ibid.* [27].

*Lynch*;<sup>87</sup> *Gale*;<sup>88</sup> and *Fujitsu*<sup>89</sup>, all decisions forged when *VICOM* was King. The Court adopted Pumfrey J’s reasoning in *Shoppalotto.com Ltd’s Application*<sup>90</sup> where he had opined that a “programmed computer, itself a machine that ex hypothesi has never existed before, is itself a technical article and so in principle the subject of patent protection.”<sup>91</sup> Accordingly, the real question must be whether such a creation possesses the right kind of technical effect – i.e. more than “that to be expected from the mere loading of a program into a computer?”<sup>92</sup> The correct approach, it said, was to identify the technical contribution made by the claimed invention, with the rider that “a novel or inventive purely excluded matter does not count as a “technical contribution”.”<sup>93</sup>

A four-stage test, consistent with previous authority, was suggested: “(1) properly construe the claim; (2) identify the actual contribution; (3) ask whether it falls solely within the excluded subject matter; (4) check whether the actual or alleged contribution is actual technical in nature.”<sup>94</sup> The first stage was considered uncontroversial – identifying the bounds of the monopoly must be integral to deciding if subject matter is excluded. The second stage involved identification of what the inventor had “added to human knowledge” – an approach which sought to consider the substance not the form of the claimed element. The third and fourth stages were presented as reflections of the “as such” qualification of Art 52(3). Stage 4 being an additional check in case something unreasonably evaded stage 3. While undoubtedly consistent with its own previous decisions, the Court of Appeal’s approach was self-assuredly out of step with that laid down by the TBA in *PBS* and *HITACHI*. It is difficult, if not impossible, to reconcile an approach that looks for the substance of the invention with one that accepts that the act of writing using pen and paper can confer technical character on an otherwise non-technical activity. It should therefore come as no surprise that in the next decision of the TBA *Aerotel* was singled out for criticism. And what criticism it was.

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<sup>87</sup> *Merrill Lynch’s Patent Application* [1989] RPC 561.

<sup>88</sup> *Gale’s Patent Application* [1991] RPC 305.

<sup>89</sup> *Fujitsu’s Application* [1997] RPC 608.

<sup>90</sup> *Shoppalotto.com Ltd’s Application* [2006] RPC 7.

<sup>91</sup> *ibid.* [9].

<sup>92</sup> *ibid.*

<sup>93</sup> *Aerotel*, *op cit.* [26].

<sup>94</sup> *ibid.* [40].

In an uncompromising opinion, the Board in *DUNS/Estimating Sales Activity* lambasted the English decision. The “technical effect approach” endorsed by Jacob LJ in *Aerotel* was stated to be rooted in “the layman’s ordinary understanding of invention as a novel, and often also inventive contribution to the known art”. The Board considered that while this might be understandable “given the shape of the old law” ... [it was] not consistent with a good-faith interpretation of the European Patent Convention.”<sup>95</sup> Technical character was stated to be an “absolute requirement that does not imply any new contribution to the prior art.”<sup>96</sup> As such, the approach laid down in *PBS* and *HITACHI* was unequivocally endorsed. The Board did, however, acknowledge that concurrent objections under the other heads of patentability (novelty, inventive step and industrial application) could still arise, and noted that it would be here that questions of contribution found their expression.

Subsequent decisions of the English courts made at least some attempt to pour oil on troubled waters. Thus, in *Symbian* the Court of Appeal opined that “as a matter of broad principle ... the approaches in [*DUNS* and *Aerotel*] ... are, on a fair basis, capable of reconciliation.”<sup>97</sup> The Board’s decision in *DUNS* was stated to involve explanation of the effect of the limitation “as such” within Art 52(3), and the Court considered the same principles underpinned *Aerotel* stage 3. “So far as we can see”, it noted, “there is no reason, at least in principle, why that test should not amount to the same as that identified in *Duns*, namely whether the *contribution* cannot be characterised as “technical””<sup>98</sup> (emphasis supplied). The reader will note that this statement entirely fails to engage with the criticism made in *DUNS* that the contribution approach was “not consistent with a good-faith interpretation of the European Patent Convention.”<sup>99</sup> The extent of reconciliation would therefore appear to consist of the Court of Appeal simply stating that the two approaches are essentially synonymous, coupled with an expectation that people would believe them.

Thus, despite the tests being characterized as amounting to essentially the same thing, the Court nevertheless declined to abandon *Aerotel* to follow *PBS* or *HITACHI*. In defence of this

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<sup>95</sup> *DUNS*, op cit. [40] and [41].

<sup>96</sup> *ibid.* [32].

<sup>97</sup> *Symbian v Comptroller General of Patents* [2009] RPC 1, [11].

<sup>98</sup> *ibid.*

<sup>99</sup> *DUNS*, op cit. [41].

decision,<sup>100</sup> it noted first of all that the Enlarged Board had not seen fit to provide judgment and therefore the question had not been conclusively determined. It also suggested that the decisions of the TBA following *HITACHI* demonstrated that the approach was still in flux, and that some moreover indicated that the computer program exclusion had essentially lost all meaning. Accordingly, there were not considered sufficient grounds to depart from the “previous, carefully considered, approach” laid down in *Aerotel*.<sup>101</sup> Therefore, even if reconciled as a “matter of broad principle” the details of the Court of Appeal’s approach still differed significantly from one in which technical means of storage would alone be sufficient to take a computer program outside of the grasp of Art 52(2).

### RESISTANCE IS FUTILE

At around the same time as the Court of Appeal was attempting its ‘reconciliation’ in *Symbian*, the (then) president of the EPO, Alison Brimelow, referred a number of questions to the Enlarged Board concerning Arts 52(2) and (3) EPC as applied to computer programs. The questions sought to explore the scope of the exclusion: whether a computer program was only excluded if the claim was explicitly directed to it; whether the exclusion could be avoided by claiming the program on storage media; whether a claimed feature must have a real world effect in order to provide technical character; and whether the activity of programming a computer necessarily involves technical considerations?<sup>102</sup> The EBA noted that a referral was only justified if at least two Board of Appeal decisions come into conflict with the principle of legal uniformity, and that the process could not be used to interfere with “mere legal development”. Accordingly, the questions would be inadmissible unless such conflict could be found and there was a consequent “need for correction to establish legal certainty.”<sup>103</sup> Following consideration of the circumstances, no such need was discovered.

Notwithstanding this conclusion, the Board went on to consider the substance of the questions. While doing so, it clearly reiterated the position adopted in the *PBS* and *HITACHI* line of cases. Thus, while resisting the temptation to provide definition of the word “technical”, it nevertheless explained that “‘a computer-readable data storage medium’ and a cup [both] have technical

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<sup>100</sup> *Aerotel*, op cit. [46].

<sup>101</sup> *ibid.* [46].

<sup>102</sup> G\_03/08, op cit. Question 1 is presented at [10], question 2 at [11], 3 at [12] and 4 at [13].

<sup>103</sup> *ibid.* [7.3.8].

character”,<sup>104</sup> and that this was indication of a non-excluded invention. Therefore “a claim to a computer implemented method or a computer program on a computer-readable storage medium will never fall within the exclusion of claimed subject-matter under Articles 52(2) and (3) EPC, just as a claim to a picture on a cup will also never fall under this exclusion.”<sup>105</sup> The transformation of the exclusions to mere formalities would seem to be made complete by this finding. Nevertheless, the EBA also stressed that this would not mean that the list of exclusions in Art 52(2) had no effect on such claims, as the requirement of inventive step would fill the gap – the list of non-inventions being stated to “play a very important role in determining whether claimed subject-matter is inventive.”<sup>106</sup>

## AN ALTERNATIVE DIMENSION

The law’s crisis of confidence over the protection of computer software within the patent system is not something that is of uniquely European origin. Computer software appears, as Burk has noted, to simply be one of “patent law’s problem children”.<sup>107</sup> Thus, while the language of Art 52(2) and (3) EPC is undoubtedly responsible for a degree of uncertainty, it cannot be blamed for everything. Simply put, the duality of software as both the carrier and embodiment of a series of instructions specifying a method is itself problematic. Seeing the program as an algorithmic set of mathematical and/or logical steps or seeing it as a technical list of instructions that embody and specify a method of manufacture may lead one to differing conclusions about its viability as patentable subject matter. The discomfort that one naturally feels with monopolizing concepts that are too abstract is evidently not shared as a matter of principle with methods of manufacture. It is therefore interesting to compare the approaches taken in Europe under the EPC’s explicit exclusionary framework with that of the US where more general principles are applied to much the same end. What follows is necessarily a rather brief overview of a very complex area of the law. The main peaks and troughs are sketched to provide a sense of the overall landscape and to highlight the courts’ vacillation over the question of how best to police the computer program issue.

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<sup>104</sup> *ibid.* [9.2].

<sup>105</sup> *ibid.* [10.13.1].

<sup>106</sup> *ibid.* [10.13.1].

<sup>107</sup> Dan L. Burk, ‘Patent Law’s Problem Children: Software and Biotechnology in Transatlantic Context’, Chapter 7 in Margot Bagley & Ruth L. Okediji, *Patent Law in Global Perspective* (OUP 2014).

## THE US POSITION PART I: THE FORMATIVE DECISIONS

The US Patents Act 1952 (title 35 of the US Code (USC)) contains no explicit exclusions from patent protection on the ground of prohibited subject matter. 35 USC 101 details patentable inventions in the following terms: “Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.” The subsequent sections of the Act, sections on the remaining “conditions for patentability”, simply stress the need for the invention to possess novelty and to be a non-obvious improvement over the state of the art at the priority date of the application. Subject matter discussions have therefore revolved around the meaning of “process, machine, manufacture, or composition of matter”. Given the difference in language, it is odd how closely the development of US law in this area parallels that of the EPO.

When considering the scope and effect of the patent eligibility elements within 35 USC 101, the US courts have relied upon a number of subsidiary doctrines developed in case law. Of these, three prohibitions are particularly pertinent to the patentability of computer software: laws of nature;<sup>108</sup> abstract ideas;<sup>109</sup> and mental steps.<sup>110</sup> In relation to the latter, Samuelson explains that it is “the measurements, calculations, and interpretations of data [which] are the “mental processes” or “mental steps” to which the cases refer.”<sup>111</sup> These are obviously concepts relevant to the subject-matter under consideration.

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<sup>108</sup> See, e.g., comments in *Funk Brothers Seed Co. v Kalo Inoculant Co.*, 333 U.S. 127, 130 (Sup Ct. 1948), explaining that “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.” Also *Le Roy v Tatham*, 14 How. 156, 175 (Sup Ct. 1853) discussing the fact that while “powers of nature” should be left free for all to use, the practical application of that power or principle could form the basis for the “construction of a useful article of commerce or manufacture” which may itself be patentable.

<sup>109</sup> See, e.g., *Rubber-Tip Pencil Co. v Howard*, 20 Wall. 498, 507 (Sup Ct. 1874): “An idea of itself is not patentable”. Alternatively, *Le Roy v Tatham*, *ibid.*: “A principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right.”

<sup>110</sup> In *Diamond v Diebr*, 450 U.S. 175, 196-7 (Sup Ct. 1981), the Supreme Court explained that the doctrine “applied against patent claims in which a mental operation or mathematical computation was the sole novel element or inventive contribution; it was clear that patentability could not be predicated upon a mental step.” It referred to a series of decisions of the Court of Customs and Patent Appeals in support of this proposition.

<sup>111</sup> Pamela Samuelson, ‘Benson Revisited: The Case Against Patent Protection for Algorithms and Other Computer-Related Inventions’, (1990) 39 *Emory LJ* 1025, 1035.



Early appellate decisions relating to the patentability of computer programs focused on the identification of the novel contribution made by the invention. If this lay purely in a “mental step” then, according to the rules by which the application of the doctrine was governed,<sup>112</sup> the patent was invalid – an approach that has many similarities with the search for the technical contribution under early EPO jurisprudence. It was only in cases where both mental and physical steps were claimed, and innovation could be found in the physical, that a patent could in principle be forthcoming – subject, of course, to the other patentability criteria.<sup>113</sup> In such cases, the “mental steps” were merely “incidental parts to the process” and could be ignored.<sup>114</sup> Accordingly, the Court of Customs and Patent Appeals (CCPA)<sup>115</sup> initially upheld software claims that restricted the scope of the patent to “machine implementations of the process”,<sup>116</sup> as in such cases infringement could not simply occur in the mind.<sup>117</sup> Nevertheless, in much the same manner as occurred in the EPO some decades later, this soon shifted to an arguably simpler question of whether the claimed process was part of the “technological arts”.<sup>118</sup> The precise area that the court considered would be occupied by such arts is somewhat difficult to divine from the decided cases. However, on at least one reading of *Musgrave* it is possible to conclude that this would be satisfied by the mere fact that that the process was implemented by machine.<sup>119</sup> Again, the parallels with the later approach of the EPO in this area are striking.

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<sup>112</sup> Derived from cases such as *Re Abrams*, 188 F.2d 165 (CCPA. 1951).

<sup>113</sup> *ibid.* 166.

<sup>114</sup> *ibid.* The list comes from submissions of counsel, but was endorsed by the court as an accurate statement of the law.

<sup>115</sup> The CCPA was the forebear of the Court of Appeals for the Federal Circuit (CAFC) and operated as the first stage of the appellate process following the first instance decisions of the Patent Office Board of Appeals concerning the grant or refusal of a patent.

<sup>116</sup> Samuelson, *supra* n111, at 1045, referring to cases such as *Prater I*, 415 F.2d 1378 (CCPA. 1968), and *Prater II*, 415 F.2d 1393 (CCPA. 1969).

<sup>117</sup> Under the EPC, of course, “methods of performing mental acts” are explicitly excluded from protection under Art 52(2)(c) to the extent that they are claimed “as such”.

<sup>118</sup> *In re Musgrave*, 431 F.2d 882 (CCPA. 1970), see particularly the comments of Judge Baldwin (concurring) at 894: “All that is necessary, in our view, to make a sequence of operational steps a statutory ‘process’ within 35 U.S.C. §101 is that it be in the technological arts so as to be in consonance with the Constitutional purpose to promote the progress of ‘useful arts.’ Const. Art. 1, sec. 8.”

<sup>119</sup> As Samuelson notes, this is arguably the reading adopted by the Supreme Court in *Gottschalk v Benson*, 409 U.S. 63 (Sup Ct. 1972) – See Samuelson, *supra* n111, at 1047.

The invocation of rhetoric concerning the “technological arts” has a further consequence. The label implies something both reliant for its existence upon human interaction and specifically (and clearly) delineated. It thus invites consideration of the remaining categories of excluded subject-matter noted above: laws of nature and abstract ideas. In relation to the former, the US courts have consistently drawn distinctions between naturally occurring and human-made subject matter; while the latter is prima-facie patent eligible, the former falls outside of the patent’s grasp.<sup>120</sup> Perhaps the most famous decision to make the point is that of the Supreme Court in *Diamond v Chakrabarty*.<sup>121</sup> Here, when considering the scope of inventions embraced by the Patents Act, the Court explained that the Committee Reports accompanying the 1952 Act made clear that Congress had “intended statutory subject matter to ‘include anything under the sun that is made by man.’”<sup>122</sup> While *Chakrabarty* itself concerns a biotechnological invention, specifically a microorganism engineered to digest components of crude oil, the Supreme Court’s statement of principle has repercussions that reach far beyond this specific sphere, seeming on their face even to cover computer software. The instruction sets recorded in such programs are reliant upon human coding. The natural principles underpinning the operation of the machine – algorithms and processes – must also have been tamed and confined in order to place them in a machine readable format. Given these factors, computer software would seem to fall squarely within the category of things that should be considered patent-eligible. Nevertheless, as Burk has explained: process-based inventions such as these “implement general principles in a manner that tends to implicate the division between the natural and the artificial.”<sup>123</sup> In other words, the meniscus between the underlying algorithm and its implementation in the computer program may be sufficiently thin that a patent over the latter effectively forecloses the former.

This fear prompted the Supreme Court in *Gottschalk v Benson*<sup>124</sup> to reject claims directed to a computer-implemented method for converting binary-coded decimal numerals into pure binary numerals. Justice Douglas, giving the opinion of the Court explained that the claim was “so abstract and sweeping as to cover both known and unknown uses of the [algorithm]”<sup>125</sup>. Thus,

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<sup>120</sup> See, for example, *Parker v. Flook*, 437 U.S. 584 (Sup Ct. 1978) and the cases referred to in note 108, above.

<sup>121</sup> *Diamond v Chakrabarty*, 447 US 303 (Sup Ct. 1980).

<sup>122</sup> *ibid.* 309, referring to Senate Report No. 1979, 82<sup>nd</sup> Congress, 2<sup>nd</sup> Session, 5 (1952); and House of Representatives Report No 1923, 82<sup>nd</sup> Congress, 2<sup>nd</sup> Session, 6 (1952).

<sup>123</sup> Burk, ‘Problem Children’, supra n107, at 196.

<sup>124</sup> *Gottschalk v Benson*, 409 U.S. 63 (Sup Ct. 1972).

<sup>125</sup> *ibid.* 68.

despite taking the form of a “sequence of coded instructions for a digital computer” the claimed invention had no dependence on the apparatus used for its performance. Indeed, it could be “performed through any existing machinery or future-derived machinery or without any apparatus.”<sup>126</sup> Moreover, the end use could vary greatly depending on the purpose to which it was put. All of these things suggested the principle sought to be protected essentially took the form of a general idea. It was thus a claim to a “pure” software process – to a computer program, as such. Accordingly, like Morse’s much maligned attempt to patent the “use of electromagnetism, however developed for marking or printing intelligible characters, signs, or letters at any distances”,<sup>127</sup> the claim was thought too broad. *Benson’s* message is therefore clear: a mathematical algorithm per se, even if embodied in computer code, could not itself be considered a product of human intervention. However, this approach still raised a question: if such “pure” software was unpatentable under *Benson*, what were the limits of this principle? Did it also apply to exclude machines or processes that included computer programs in their operation? As Cohen & Lemley note: “The prototypical application in this category was for a “new” machine or process in a familiar art, in which the only point of novelty was the use of a computer program to run the machine or implement the process.”<sup>128</sup> How, then, to deal with such claims?

This question was addressed in *Parker v Flook*<sup>129</sup> some years later. The decision concerned a method for updating alarm limits during a catalytic conversion process; the only novel feature of which was a mathematical formula embodied in a computer program. As the reaction progressed various readings were fed into the computer which then used the formula to calculate its progress and trigger alarms when certain levels were reached. The Supreme Court noted that “the discovery of [a phenomenon of nature or mathematical formula] cannot support a patent unless there is some other inventive concept in its application”.<sup>130</sup> Thus, for the purposes of assessing eligibility of subject matter, the novel algorithm was to be “treated as though it were a familiar part of the prior art”.<sup>131</sup> As the dissent from Justice Stewart explains, this formulation seems to import questions of novelty and inventive step into that of eligibility whereas the

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<sup>126</sup> *ibid.*

<sup>127</sup> *O’Reilly v Morse*, 15 How (56 U.S.) 62, 14 L.Ed. 601 (Sup Ct. 1853).

<sup>128</sup> Cohen & Lemley, *supra* n64, 9.

<sup>129</sup> *Parker v Flook*, 437 U.S. 584 (Sup Ct. 1978).

<sup>130</sup> *ibid.* at 593.

<sup>131</sup> *ibid.* at 592.

enquiry should only really be a gatekeeper provision for these other considerations: “Section 101 is concerned only with subject-matter patentability. Whether a patent will actually *issue* depends upon the criteria of §§102 and 103, which include novelty and inventiveness, among many others.”<sup>132</sup> Once more we therefore see parallels between the development of the US approach to the subject-matter debate and those that were later to develop in Europe. The idea of a technical contribution under *VICOM* clearly suffers from the same defects as the majority view in *Flook*, but equally the minority’s idea of the exclusions having simple “gatekeeper” status is also enlightening. It suggests that the heavy-lifting should take place elsewhere within the framework of provisions that govern patentability. Again, this is a sentiment that has become embedded in the European approach as the jurisprudence has matured. The rejection of this position by the majority in *Flook* is clear – giving broad application to the patent-ineligible subject-matters themselves. In the Court’s view, adopting a narrower approach would have made “the determination of patentable subject matter depend simply on the draftsman’s art”,<sup>133</sup> this was rejected, as Samuelson notes, “as exalting form over substance.”<sup>134</sup>

Nevertheless, just as in Europe some years later, this position was soon relaxed. Thus, merely months after the court in *Chakrabarty* had declared that “anything under the sun that is made by man” ought to be prima facie patent eligible, the Supreme Court was once more called upon to consider the effect of these standards in relation to a computer-implemented invention. *Diamond v Diebr*<sup>135</sup> concerned a method of curing synthetic rubber. The patented process required the use of apparatus to constantly monitor the temperature inside a rubber mould, feeding this information to a computer that would then recalculate the cure time using the well-known Arrhenius equation.<sup>136</sup> The similarities with the invention rejected in *Flook* are noteworthy. Justice Stevens, in a powerfully worded dissent in *Diebr*, makes the point well: “[the] essence of the claimed discovery in both cases ... was an algorithm that could be programmed on a digital computer.”<sup>137</sup> Moreover, in both cases the only element possessing novelty was the algorithm/computer program itself. However, in contrast to *Flook*, the majority in *Diebr*

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<sup>132</sup> *Parker v Flook*, 437 U.S. 584, 600 (Sup Ct. 1978).

<sup>133</sup> *ibid.* 593.

<sup>134</sup> Samuelson, *supra*, n111, at 1080.

<sup>135</sup> *Diamond v Diebr* 450 U.S. 175 (Sup Ct, 1981).

<sup>136</sup> For detailed explanation of the Arrhenius equation see Topic 17D in Peter Atkins, Julio de Paula & James Keeler, *Atkins’ Physical Chemistry* (11<sup>th</sup> edn, OUP 2017), 741 et seq.

<sup>137</sup> *Diebr*, *op cit.* at 209. Justice Stevens in dissent.

considered the invention eligible for patent protection. Thus, while the Arrhenius equation would not have been patentable in the abstract, an industrial process that incorporated the equation in reaching a more efficient solution should not be considered “barred at the threshold by §101.”<sup>138</sup>

The majority in *Diehr* therefore endorsed what would appear to be a ‘whole-contents’ approach to the determination of patent-eligibility. It held that “a claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula, computer program, or digital computer.”<sup>139</sup> Under the guise of assessing the substance of the invention, however, the determinative enquiry had become one of seeking what the claim was directed towards. Critical in the Court’s view was the fact that: (a) the patentee did not claim all applications of the underlying equation, only those that were within the specific context of this industrial process; and (b) that there was significant “post-solution activity” outside of the computer program.<sup>140</sup> Once more, the parallels with the approach later adopted by the EPO are apparent. Despite being guided by an altogether different framework, elements such as mathematical methods, scientific principles and phenomena of nature, found themselves patent ineligible due to their abstract character. Nevertheless, claims encompassing these same subject matters but implementing or employing them “in a structure or process which, then considered as a whole, is performing a function which the patent laws were designed to protect (e.g. transforming of reducing an article to a different state or thing)”<sup>141</sup> would satisfy the requirements of §101. This decision, according to Cohen and Lemley, marks the beginning of the reign of the “doctrine of magic words”. Accordingly: “software was patentable subject matter, but only if the applicant recited the magic words and pretended that she was patenting something else entirely.”<sup>142</sup> Mirroring, therefore the ascendancy of the technical in EPO jurisprudence, the *Diehr* approach encouraged the patenting of software-implemented inventions by focusing on the physical elements of the claim (apparatus or physical steps in the process).

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<sup>138</sup> *ibid.* 188.

<sup>139</sup> *ibid.* 187.

<sup>140</sup> *ibid.* 191-2. Inferred from the following statement: “insignificant post-solution activity will not transform an unpatentable principle into a patentable process.”

<sup>141</sup> *ibid.* 192.

<sup>142</sup> Cohen & Lemley, *supra*, n64, at 9.

## THE US POSITION PART II: INFLATING THE BUBBLE

The *Diehr* decision can be seen as liberating the software industry from the spectre of patent ineligibility. Indeed, as Hall and MacGarvie explain, there is a marked increase in both the number and share of software patents granted following the case.<sup>143</sup> Thus, as the standard remained essentially unchanged throughout the remainder of the 1980s and into the early 1990s, applications for relevant patents spiralled.<sup>144</sup> This process was accelerated following a number of liberating decisions of the Court of Appeals for the Federal Circuit (CAFC) that commenced with *In re Alappat* in 1994.<sup>145</sup> Here the Court decided that the principle of ineligibility should only apply where the claimed software (as a whole) represented “a disembodied mathematical concept ... which in essence represents nothing more than a ‘law of nature,’ ‘natural phenomenon,’ or ‘abstract idea.’”<sup>146</sup> If, by contrast, a patent claimed a “specific machine to produce a useful, concrete, and tangible result”, then it passed the hurdle. Thus, in much the same manner as occurred in Europe under *PBS*, the Court considered that even trivial physical steps could signify that an applicant had successfully evaded the prohibitions on patentability. Programs embodied in the envelope of machine apparatus would therefore never be caught by the gatekeeper of patent ineligibility. Subsequently, the Commissioner of Patents issued new guidelines for the examination of computer software<sup>147</sup> that “opened the existing doorway to patentability so wide that inventors ... [could], in effect, patent any computer software provided that it is embodied in a medium such as a diskette.”<sup>148</sup> As Sterne and Bugaisky note, for all practical purposes this change essentially reversed the decision in *Benson* noted above.

However, the high-water mark of patent eligibility was arguably reached with the infamous decision in *State Street Bank*<sup>149</sup> in 1998. Here the CAFC essentially opened the doors to the patenting of pure software by dispensing with the requirement of claiming a physical structure.

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<sup>143</sup> “[T]he growth of software patenting increased from a 5–10% level prior to 1981 to a 15% level afterwards”. Bronwen H Hall & Megan MacGarvie, ‘The Private Value of Software Patents’, (2010) 39 *Research Policy* 994, 996.

<sup>144</sup> Noel & Schankerman explain that the annual year-on-year growth for patent applications in all fields between 1986 and 1999 was 6.7%. In the software field (up to 1996) it was 21%. Michael Noel & Mark Schankerman, ‘Strategic Patenting and Software Innovation’, (2013) 61 *Journal of Industrial Economics* 481 at p.482.

<sup>145</sup> *In re Alappat*, 33 F.3d 1526 (CAFC. 1994).

<sup>146</sup> *ibid.* p.1544.

<sup>147</sup> Examination Guidelines for Computer Related Inventions, 61 *Fed. Reg.* 7478 (1996).

<sup>148</sup> Robert G Sterne & Lawrence B Bugaisky, ‘The Expansion of Statutory Subject Matter Under the 1952 Patent Act’, (2004) 37 *Akron L Rev* 217, 223.

<sup>149</sup> *State Street Bank & Trust v Signature Financial Group*, 149 F.3d 1368 (CAFC. 1998).

Instead, the Court focused on the presence of a useful process or idea. Purportedly applying *Diebr* and *Alappat*, it held that “the transformation of data ... by a machine through a series of mathematical calculations ... constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces ‘a useful, concrete and tangible result’”<sup>150</sup> In coming to this conclusion, the Court was quick to note that it did not therefore matter which of the statutory species of acceptable subject matter (process, machine, manufacture, or composition of matter) the invention actually belonged to as long as it possessed the required utility.<sup>151</sup> The focus was therefore placed on the “essential characteristics of the subject matter” and the result of the claimed invention. The hurdle of ineligibility could be surmounted by either claiming a machine (physical, concrete) or by highlighting the transformation of data itself. The first of these elements should be startlingly familiar to those versed in the relevant jurisprudence of the EPO. However, the second, purely transformative, indicium of eligibility – divorced entirely from any requirement of tangibility – far exceeds anything thus far advanced under the European Patent Convention.

### THE US POSITION PART III: EVERY BUBBLE HAS TO BURST

Barriers to patenting software were not the only things to have dissolved with *State Street*, as it also opened up the possibility of protecting pure business methods as well. For the next decade the law in both of these areas appeared relatively well-settled, if startlingly broad. The bar of patent eligibility had been set at such a low level that, as Thomas was to note, “After *State Street*, it is hardly an exaggeration to say that if you can name it, you can claim it.”<sup>152</sup> The question of whether ineligibility had any influence on the decision to issue a patent was seen as closed. Put simply: it was irrelevant.<sup>153</sup>

This all changed, however, with another trio of Supreme Court cases, starting with *Bilski*<sup>154</sup> in 2010, that bookended the CAFC’s expansionist efforts and resurrected patent eligibility standards; returning directly to *Benson*, *Flook* and *Diebr*. Suddenly, therefore, following years of

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<sup>150</sup> *ibid.* 1373.

<sup>151</sup> *ibid.* 1375.

<sup>152</sup> John R Thomas, ‘The Patenting of the Liberal Professions’, (1999) 40 *Boston College L Rev* 1139, 1160.

<sup>153</sup> See, e.g. Mark Lemley et al., ‘Life After *Bilski*’, (2010) 63 *Stan L Rev* 1315, who note at 1318 that “For a decade after 1998, patentable subject matter was effectively a dead letter.”

<sup>154</sup> *Bilski v Kappos* 561 U.S. 593 (Sup Ct. 2010).



claiming freedom, patentees were once more subject to the zombie hand of §101. The *Bilski* decision itself is noteworthy for the Supreme Court's rejection of the machine-or-transformation test as the only indicium of patentable subject matter.<sup>155</sup> However, while accepting that the question of patent eligibility provided only a threshold test – any invention passing this standard would still need to be “new and useful” – the Court also stressed the importance of considering the repercussions that passing this threshold would have. *Bilski* itself concerned a business method – a method of hedging risk – reduced to mathematical formula. This was, according to the Supreme Court, “an unpatentable abstract idea, just like the algorithms at issue in *Benson and Flook*.” Furthermore, “[a]llowing petitioners to patent risk hedging would pre-empt use of this approach in all fields, and would effectively grant a monopoly over an abstract idea.”<sup>156</sup> Thus, in a return to the more substantive examination of claimed subject matter from the pre-*Alappat* era, the Court explained that *Flook* had “established that limiting an abstract idea to one field of use or adding token postsolution components did not make the concept patentable”.<sup>157</sup> Accordingly, merely placing the claim in the correct form could no longer be seen as an automatic guarantee of eligibility.

This process of rowing back from *State Street's* high-water mark was taken further in *Mayo v Prometheus*,<sup>158</sup> decided a couple of years after *Bilski*. Despite not involving a software patent (the case concerned claims relating the use of thiopurine drugs to treat autoimmune diseases),<sup>159</sup> the methodology laid down by the Supreme Court has nevertheless become dominant in the field of computer program patents. The relevant elements of the decision essentially revert to the application of *Diehr* and *Flook* with the Court noting that steps adding nothing to the “specific laws of nature other than what is well-understood, routine, conventional activity, previously engaged in by those in the field”<sup>160</sup> could not rescue a *prima facie* ineligible claim. Accordingly, the addition of “conventional steps, specified at a high level of generality, to laws of nature, natural

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<sup>155</sup> *ibid.* 604. The CAFC decision in the case had held that machine-or-transformation should be the sole test to govern the §101 analysis. See *In re Bilski*, 545 F.3d 943 (CAFC, 2008), 954-5.

<sup>156</sup> *Bilski v Kappos*, *op cit.* 611-12.

<sup>157</sup> *ibid.* 612.

<sup>158</sup> *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66 (Sup Ct. 2012).

<sup>159</sup> In particular “to the relationships between concentrations of certain metabolites in the blood and the likelihood that a thiopurine drug dosage will prove ineffective or cause harm”. *ibid.* 77.

<sup>160</sup> *Mayo*, *op cit.* 82.

phenomena, and abstract ideas cannot make those laws, phenomena, and ideas patentable.”<sup>161</sup> We therefore see a return to a position where the underlying program is, once more, treated as part of the prior art and the contribution made by the implementation of the claimed subject matter is the determinative factor in its eligibility.

The final chapter, for the moment, in this eligibility *danse macabre* came in 2014 with the Supreme Court decision in *Alice v CLS Bank*.<sup>162</sup> Here the Court used the analysis laid down in *Mayo* to hold that “merely requiring generic computer implementation fails to transform [an]... abstract idea into a patent-eligible invention.”<sup>163</sup> With this statement, the US “any hardware” era was firmly over. A structured approach was extracted from the earlier case, with the Court distilling a framework for the determination of matters of eligibility. Accordingly, the first stage of the assessment is to determine whether the claims are directed towards one of the ineligible concepts (laws of nature, natural phenomena, or abstract ideas). If they are, then the Court asks itself “what else is there in the claims...?” The elements of the claims are then considered both individually and “as an ordered combination” in order to assess “whether these additional elements ‘transform the nature of the claim’ into a patent-eligible application.”<sup>164</sup> The search for this extra-something finds its basis in *Flook* where the court insisted upon the presence of an “inventive concept”,<sup>165</sup> an element described in *Mayo* as something that was “sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the natural law itself”.<sup>166</sup>

Following *Alice*, therefore, the law finds itself in much the same position as it was left in following the Supreme Court’s original trifecta of decisions on this matter. Having come full circle from the *State Street* excesses, the doctrine of magic words is once again in effect. Software can be claimed provided the patentee pretends that they are claiming something else.

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<sup>161</sup> *ibid.*

<sup>162</sup> *Alice Corp Pty v CLS Bank* 134 S. Ct. 2347 (Sup Ct. 2014).

<sup>163</sup> *ibid.* 2352.

<sup>164</sup> *ibid.* 2235.

<sup>165</sup> *Flook*, op cit. 594.

<sup>166</sup> *Mayo*, op cit. 73.

## ROUND AND ROUND THE MULBERRY BUSH: SOME CONCLUDING COMMENTS

Despite starting from completely different positions – one having a defined list of non-inventions embodied in statutory language, the other possessing no inherent limitations but instead extracting principles from a series of eligible subject matters – it is striking how the development of excluded subject matter/patent eligibility jurisprudence in Europe and the US has progressed along very similar lines. Not only are the core principles developed by the courts practically identical, but they have also gone through analogous changes in a similar pattern. Furthermore, in neither jurisdiction do the decision-making bodies appear entirely at ease with these particular issues. We therefore see a somewhat idiosyncratic ebb and flow of protection that has led to significant flex in the envelope of patentability within even a single patent generation.

In Europe, the Boards of Appeal's approach to the software exclusion, slowly whittling it away until practically nothing is left, would seem to go directly against the Convention itself. If flexibility was maintained within the EPC by insisting that the list of excluded subject matter was non-exhaustive,<sup>167</sup> then we might also assume it was intended that standards should be heightened as time went on rather than relaxed: adding 'bananas' to an open list that contains apples, oranges and pears, is obviously a very different proposition to removing one of the three examples already present. Nevertheless, the general trend within the EPO's Boards has been to marginalise the exclusions, making them ever easier to circumvent, and placing more weight upon the remaining elements of patentability. Some blame for this must lie at the feet of the Convention's drafters. It is accepted that whatever approach was taken there were likely to be problems: any designation of 'invention' or 'computer program' expressed positively would, for example, have suffered from issues of abstraction or obsolescence. However, negative definition when combined with a statement that such things are only excluded to the extent they are claimed "as such" results in what Von Hellfeld describes as: 'an empty phrase, meaningless and devoid of content'.<sup>168</sup> He continues, prophetically noting that such empty vessels can be filled

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<sup>167</sup> A proposal to make the list exhaustive was rejected at the 5<sup>th</sup> Meeting of the Inter-Governmental Conference. See *Minutes of the 5<sup>th</sup> Meeting of the Inter-Governmental Conference for the Setting up of a European System for the Grant of Patents (Parts 1 and 3)* (Brussels, 15 Mar 1972), Doc No. BR/168/72, at [26].

<sup>168</sup> Axel von Hellfeld, 'Sind Algorithmen schutzfähig?' [1989] GRUR 471, 475.

with practically anything at all.<sup>169</sup> And so they were. Initial statements from the Boards of Appeal that “it cannot have been intended by the Contracting States to the EPC that express exclusions from patentability could be circumvented simply by the manner in which the invention is expressed in a claim”,<sup>170</sup> were cast aside. What replaced them – *HITACHI*, *PBS* and their progeny – allowed precisely this.

However, the shifting sands that have characterized the courts’ understanding of software patents on both sides of the Atlantic suggest something deeper is at play. The US Court’s oscillation between extremes – from restrictive through expansive, topping out for some time at a position where ineligibility had practically no presence within the system before rapidly shrinking back to a more conservative approach – tells us a great deal about the incertitude that ineligible subject matter engenders. While it is not necessarily possible to divorce the treatment of computer programs from the broader subject-matter question per se, it is also remarkable that so many of the cases that define the general approach to eligibility come from the software field. It cannot be coincidence that this is also a subject-matter that straddles two zones of creativity – that is both technological and authorial – and which overlaps so heavily with other products of human ingenuity that one feels would also be problematic to monopolize. Thus, while copyright avoids inhibiting reutilization of the mere ideas of the author, so patent law attempts to distance itself from tying up the fundamental building blocks of technological thinking. Regulating the frontier between these two zones of protection and navigating their attendant exclusions is therefore no easy task. The mere fact that alternate protection may be gained under copyright, for example, may lead some to question the scope that should be given by patent law, and vice versa.

The duality of computer code as both text and machine and the reproducibility of effect in both hardware and software only add to the problems of conceptualization. Returning to the example with which we started this chapter, if the cabinet that became PONG is acceptable as an invention when comprised of wired components, but a functionally identical piece of software would not be, then we have to ask what element of ingenuity the patent system is actually seeking to promote. Perhaps the key is to accept that the linguistic elements of software are simply tools, equivalent of the mechanist’s alphabet of expression: cogs, gears, springs and

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<sup>169</sup> *ibid*, 476.

<sup>170</sup> T\_22/85 IBM/Document Abstracting, op cit, [12].

sprockets. We have no problem seeing the artistic accumulation of such functional artefacts as works of sculpture, but there seems to be more resistance when the tables are turned and it is language that adopts a functional aspect. Possibly then it is software's overlap with undeniably human concepts, such as mental acts and methods of doing business, as well as the underlying reliance upon algorithmic and mathematical methods that is fundamentally responsible for the uncertainty that we have seen in judicial responses to such inventions. As time progresses, and computer-implemented innovation, data manipulation and artificial intelligence become even more prevalent than they are now, these problems of conceptualization will only increase. Difficult questions will eventually have to be asked about the very fundamentals of patent law and the bases for the systems currently in existence. After all, the closer 'software' comes to mirroring the mental processes of creativity – eventually perhaps lifting itself from mere subject of creation the object creating – then the more challenging it will become to separate patentable from unpatentable technology. Until then, in Europe at least, computer programs as such are excluded as a matter of legislation, and as Birss HHJ (as he then was) noted in *Halliburton*: it should not be “for any court to interpret that that exclusion out of existence.”<sup>171</sup>

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<sup>171</sup> *Halliburton*, op cit, at [79].