(2021) 33 SAcLJ 870
(Published on e-First 31 August 2021)

WHITHER SINGAPORE'S HARBOUR FOR PATENTING COMPUTER-IMPLEMENTED INVENTIONS?

Patentability of computer-implemented inventions can be highly contentious. This is so in the US despite its courts treading carefully to develop this area of patent law and cautioning, in *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 (2014), that otherwise it could "swallow all of patent law". The court scene on computer program patentability in Singapore is much more muted, and important legal questions relating to the subject matters of exclusion and the exclusion test await a clear answer. This article examines the legal developments in subject-matter patentability of computer-implemented inventions, particularly in the US, the UK and the European Patent Office, for insights that may provide an answer.

NG Chong Yuan
JD (Singapore Management University),
MEng, BEng (National University of Singapore);
Advocate and Solicitor (Singapore);
Faculty, IP Academy, IPOS International.

I. Introduction[1]

1 We live in what is known as the "Information Age" where digital computers are indispensable to human society. Even social activities are increasingly reliant on computers.

2 A computer is, however, merely a tool for some other purposes. It is the computer program, being coded with instructions for the computer, and the associated data, that represents human intellectual output. The value of computer programs was also emphasised in a 2017 report published by the European Patent Office ("EPO"), where it was suggested that software innovation has increasingly outpaced hardware innovation.[2]

1 All views from the author in this article are solely expressed in his personal capacity.

2 European Patent Office, *Patents and the Fourth Industrial Revolution* at p 20 <http://documents.epo.org/projects/babylon/eponet.nsf/0/17FDB5538E87B4B9C12581EF0045762F/$File/fourth_industrial_revolution_2017__en.pdf> (accessed 1 June 2020).

3 A computer program, in any language, code or notation, is already protected in Singapore as a literary work under the Copyright Act.[3] This can be one reason to deny general patent eligibility to computer-implemented inventions.

4 There has been much contention in this area of patent law in some countries, including the US. It is so in the US despite the US Supreme Court treading carefully to develop this area of patent law and cautioning that otherwise it could "swallow all of patent law".[4]

5 It has been suggested that during the early days of the development in this area of patent law, the ontological question "*what is a computer program*" was not properly addressed, and seeds for much flux in the law were thus sowed.[5]

6 One reason computer programs are difficult to analyse for patent-eligibility purposes is that they have a duality nature – intangibles in so far that they exist as a series of instructions intended to be carried out by a machine, but also embodying tangibles where the palpable effects from the execution of the series of instructions are concerned. Matthew Fisher attributed a duality nature to computer programs in that they are both "the carrier and the embodiment of a series of instructions specifying a method".[6] Beyond this simple dichotomy based on tangibility, commentators have adverted to a multidimensional nature in that computer programs exist as coded instructions (two-dimensional), as programmed physical machines (three-dimensional) and, finally, as "social-technical" processes in the effluxion of time (four-dimensional).[7] The fourth dimension of computer programs has become increasingly significant with the pervasiveness of computerisation (digitisation), and the case illustrations set out in this article do support this view.[8]

7 With a multidimensional character, it is little wonder that computer programs were also known as the "problem children" of modern

3 Cap 63, 2006 Rev Ed. See ss 7A and 7.

4 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2354 (2014).

5 Brad Sherman, "Intangible Machines: Patent Protection for Software in the United States" (2019) 57(1) *History of Science* 18 at 20–21.

6 Matthew Fisher, "Software-related Inventions" in *Research Handbook on Intellectual Property and Digital Technologies* (Tanya Aplin ed) (Edward Elgar Publishing, 2020) ch 13, at p 292.

7 Brad Sherman, "Intangible Machines: Patent Protection for Software in the United States" (2019) 57(1) *History of Science* 18 at 21.

8 Also see Trevor Cook, "The Prejudice Against Patenting Business Methods" in *Research Handbook on Intellectual Property and Digital Technologies* (Tanya Aplin ed) (Edward Elgar Publishing, 2020) ch 14, at p 303.

patent law[9] that one cannot disown but may wish to exclude. It has been difficult to rein in the problem children, and that may be because judges were asked to formulate subject-matter exclusions which the statutes have provided only a vague idea for.[10] And as each additional dimension of the computer program seemingly came to light, the problems returned, and new formulations were provided.[11]

8 With each seemingly new formulation, it was observed that the bars of exclusion in the US and Europe were raised and lowered in a state of flux. In the US, the peaks and troughs of the bars of exclusion may be traced out in the following sequence of cases: *Re Abrams* (1951)[12] (a peak); *State Street Bank & Trust Co v Signature Financial Group Inc* (1998)[13] (a trough); *Parker v Flook* (1978)[14] (a peak); *Diamond v Diehr* (1981)[15] (a trough); and *Alice Corp v CLS Bank International* (2014)[16] (a peak).[17] In Europe, the flux may be traced out as follows: *VICOM* (1986)[18] (a peak); *IBM* (1998)[19] (a trough); and *PBS Partnership* (2000)[20] (a trough).[21]

---

9 See Dan L Burk, "Patent Law's Problem Children: Software and Biotechnology in Transatlantic Context" in *Patent Law in Global Perspective* (Margo A Bagley & Ruth L Okediji eds) (Oxford University Press, 2014) ch 7.

10 See Dan L Burk, "Patent Law's Problem Children: Software and Biotechnology in Transatlantic Context" in *Patent Law in Global Perspective* (Margo A Bagley & Ruth L Okediji eds) (Oxford University Press, 2014) ch 7, at pp 189–198, for a US perspective and Matthew Fisher, "Software-related Inventions" in *Research Handbook on Intellectual Property and Digital Technologies* (Tanya Aplin ed) (Edward Elgar Publishing, 2020) ch 13, at pp 281–285, for a European perspective.

11 Matthew Fisher has helpfully traced the history of the shift in the related European and US jurisprudences in Matthew Fisher, "Software-related Inventions" in *Research Handbook on Intellectual Property and Digital Technologies* (Tanya Aplin ed) (Edward Elgar Publishing, 2020) ch 13, at pp 285–292 and pp 292–299, respectively.

12 188 F 2d 165 (1951).

13 149 F 3d 1368 (Fed Cir, 1998).

14 437 US 584 (1978); 98 S Ct 2552.

15 450 US 175 (1981); 101 S Ct 1048.

16 134 S Ct 2347 (2014).

17 See Matthew Fisher, "Software-related Inventions" in *Research Handbook on Intellectual Property and Digital Technologies* (Tanya Aplin ed) (Edward Elgar Publishing, 2020) ch 13, at pp 293–299. *Re Abrams* 188 F 2d 165 (1951) and *State Street Bank & Trust Co v Signature Financial Group Inc* 149 F 3d 1368 (Fed Cir, 1998) highlight a tussle between eligibilities that are based on form *versus* substance. In *Re Abrams*, eligibility was based on the substance (novelty) of the invention, whereas in *State Street Bank* the claim inclusion of a concrete machine or data transformation would suffice.

18 T 208/84, EP:BA:1986:T020884.19860715.

19 T 1173/97, EP:BA:1998:T117397.19980701.

20 T 931/95, EP:BA:2000:T093195.20000908.

21 See Matthew Fisher, "Software-related Inventions" in *Research Handbook on Intellectual Property and Digital Technologies* (Tanya Aplin ed) (Edward Elgar Publishing, 2020) ch 13, at pp 285–288. In *VICOM*, T 208/84, EP:BA:1986:T020884.19860715, the

(cont'd on the next page)

9 The description "magic words" has been coined to describe the doctrine that was developed in the trough cases allowing claim recitation of any hardware element, even generic hardware such as a computer disk, to render eligibility.[22] The "magic words" approach cannot be more different from approaches that focus on the substance of the invention.

10 While it is easy to rue the flux in this area of patent law and fear that the flux may become the only constant, it must be remembered that computer programming has had an oversized impact on modern society over a relatively short history of 60 years.[23]

11 Case law development requires time; it is submitted that the worst may be over, and a relatively steady period of development has been reached, particularly for jurisdictions which have had their share of hard cases.[24]

12 Despite the multidimensional nature of computer programs, it is submitted that the real concern lies not in the nature of computer programs but in the rapidly expanding fields of computer program implementation.[25] New questions relating to different aspects of patentability are sure to arise with the advent and development of new technologies; however, from what follows in this article, it is presumptuous to think that the problem children would not grow up.

---

substance of the invention was decisive whereas by the time of *PBS Partnership*, T 931/95, EP:BA:2000:T093195.20000908 it was the form of the claim.

22 Julie E Cohen & Mark A Lemley, "Patent Scope and Innovation in the Software Industry" (2001) 89 *California Law Review* 1 at 9. The description was subsequently referred to in Matthew Fisher, "Software-related Inventions" in *Research Handbook on Intellectual Property and Digital Technologies* (Tanya Aplin ed) (Edward Elgar Publishing, 2020) ch 13, at pp 286–287.

23 Based on the timeline starting from the 1960s. The 1960s were identified as the early years of the software industry in Brad Sherman, "Intangible Machines: Patent Protection for Software in the United States" (2019) 57(1) *History of Science* 18, citing Kurt Hensch *et al*, "IBM History of Far Eastern Languages in Computing, Part 2: Initial Efforts for Full Kanji Solutions, Early 1970s" (2005) 27(1) *IEEE Annals of the History of Computing* 1 at 31–37 and Kurt Hensch *et al*, "IBM History of Far Eastern Languages in Computing, Part 3: IBM Japan Taking the Lead, Accomplishments through the 1990s" (2005) 27(1) *IEEE Annals of the History of Computing* 1 at 37–45.

24 Also refer to the Opinion of the Enlarged Board of Appeal of 12 May 2010, *Programs for Computers*, G 0003/08, EP:BA:2010:G0000308.20100512, para 7.3.8, where the EPO's highest tribunal ruled that there were no divergent decisions on the computer program issue that were not part of "mere legal development", which may justify its intervention for correction of case law development.

25 Similar views were expressed in Brad Sherman, "Intangible Machines: Patent Protection for Software in the United States" (2019) 57(1) *History of Science* 18 at 36–37.

13 What follows from here are five parts: a brief on Singapore's position on subject-matter exclusion (Part II); policy objectives relating to subject-matter exclusion (Part III); an examination, with case illustrations, of the current approaches towards computer program exclusions in the US, the UK and the EPO (Part IV, Part V and Part VI, respectively); an evaluation of these approaches (Part VII); and finally some concluding remarks (Part VIII).

II. Excluded inventions in Singapore

14 Before 1996, s 13(2) of the Patents Act[26] specified a non-exhaustive list of subject matters that were excluded from patent protection, including a method for doing business, a program for a computer, a discovery, scientific theory or mathematical method, a literary work and the presentation of information ("s (13)(2) List").[27] An invention would be excluded from patent protection to the extent that it relates to any of these excluded matters *as such*. The description "as such" was not given a statutory meaning.

15 However, the s 13(2) List was subsequently expunged by Parliament in order to comply with Singapore's international obligations under the Agreement on Trade-Related Aspects of Intellectual Property Rights[28] ("TRIPS").[29] During the second reading of the relevant Bill, the then Parliamentary Secretary to the Minister for Law, Associate Professor Ho Peng Kee, explained:[30]

> The deletion of section 13(2) is intended to conform to Article 27(3) of TRIPS which does not provide for such a listing….
>
> Sir, this deletion will not limit our flexibility in rejecting any subject-matter which is non-patentable under section 13(1). The existing provisions are sufficient to enable Singapore to keep up with advances and changes in science and technology.

Article 27(1) of TRIPS provides 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

26 Cap 221, 1995 Rev Ed.

27 Section 13(3) of the Patents Act (Cap 221, 1995 Rev Ed) also provided that "[a]n invention the publication or exploitation of which would be generally expected to encourage offensive, immoral or anti-social behaviour is not a patentable invention".

28 Marrakesh Agreement Establishing the World Trade Organization, Annex 1C (signed 15 April 1994) ("TRIPS").

29 Patents (Amendment) Act 1995 (Act 40 of 1995).

30 *Parliamentary Debates, Official Report* (1 November 1995), vol 65 at col 37 (Ho Peng Kee, Parliamentary Secretary to the Minister for Law and Minister for Home Affairs).

industrial application" [emphasis added], while Art 27(3) provides an optional short list of exclusions relating to medical methods and plants, animals and essentially biological processes. There is, in fact, no guidance in TRIPS on what an invention in a "field of technology" refers to.

16 Taken at face value, it is arguable that some excluded categories in the deleted list are outside the description "field of technology" in TRIPS, while others, including computer programs and scientific theories, are within it.[31] Interpreting this TRIPS provision can be tricky, and multiple interpretations are possible.[32]

17 A wide interpretation is that inventions that belong to a field of technology, including software, are generally permissible. In other words, the "magic words" doctrine of the trough cases[33] would be most welcomed under this interpretation. Proponents of this interpretation have argued that a literal interpretation is acceptable, especially since some exclusions are already specified in Art 27(3) of TRIPS. This view was also favoured by the EPO in *IBM* (1998).[34] Professor Ng-Loy Wee Loon, on the other hand, cautioned against such an all-encompassing interpretation which would eliminate a fundamental distinction between discovery and invention.[35]

18 On the other hand, one may take a narrow interpretation of Art 27(3) of TRIPS by requiring that the substance of the invention, *ie*, its inventive contribution, must fall in a field of technology. This is virtually the interpretation favoured by the UK courts.[36] Professor Ng-Loy opined that while, under such an interpretation, the expunged s 13(2) List may still be referred to for guidance on what subject matters to exclude, it may not be advisable to do so in light of the uncertainties in interpreting such a list of exclusions.[37]

19 There is a third interpretation that is a variant of the narrow interpretation. It gives effect to a list of subject-matter exclusions but

31 According to the UK Court of Appeal in *Aerotel Ltd v Telco Holdings Ltd; Macrossan's Application* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [16].

32 One may wonder whether, in the first place, the expungement was necessary in order to comply with TRIPS obligations. The position before expungement is precedential in that the UK and the EPO have long maintained a similar list of excluded matters in their patent statutes, albeit their treatments of the list differ.

33 See para 9 above.

34 T 1173/97, EP:BA:1998:T117397.19980701, para 2.3.

35 See Ng-Loy Wee Loon, *Law of Intellectual Property of Singapore* (Sweet & Maxwell, 2nd Ed, 2014) at para 30.1.18.

36 See paras 178–188 below.

37 Ng-Loy Wee Loon, *Law of Intellectual Property of Singapore* (Sweet & Maxwell, 2nd Ed, 2014) at para 30.1.19.

only at the subsequent assessment of inventive step. This is the approach that has been adopted by the EPO.[38] Professor Ng-Loy referred to an interpretation that takes a "middle of the road approach", where the assessment of whether there is or is not an invention is subsumed within the novelty and inventive-step inquiries.[39]

20 It is submitted that any narrow interpretation, including the third interpretation, would crucially require precise answers to the following questions: what subject matters are excludable from patentability in Singapore and what is the test of exclusion? Local case law has not had much opportunity to shed light on these questions.

21 *Main-Line Corporate Holdings Ltd v United Overseas Bank Ltd*[40] ("*Mainline*") involved a Singapore patented computerised process for the automatic detection of a payment card's home currency. Since the patent's validity was upheld, this case may support an argument that Singapore has taken a liberal position on computer program patentability. However, no arguments on subject-matter exclusion were raised in the case and on appeal.[41]

22 In *Merck & Co Inc v Pharmaforte Singapore Pte Ltd*[42] ("*Merck*"), the Singapore Court of Appeal drew a distinction between a discovery and an invention, *ie*, "[a discovery] does not amount to an invention"; again, no issue on subject-matter eligibility was raised. By the distinction that was drawn, Professor Ng-Loy opined that this case provided support for the "middle of the road approach" in relation to the above third interpretation.[43]

23 The discovery in *Merck* was for a specific chemical impurity (dimer) that was previously not known to be present in a chemical compound with medical efficacy (Lovastatin). The invention for the compound with a reduced amount of this impurity was held to be obvious, in light of the fact that numerous purifying techniques were, prior to the patent, available for the compound. It is of significance that

38 See Part VI below.

39 Ng-Loy Wee Loon, *Law of Intellectual Property of Singapore* (Sweet & Maxwell, 2nd Ed, 2014) at para 30.1.20.

40 [2007] 1 SLR(R) 1021.

41 *First Currency Choice Pte Ltd v Main-Line Corporate Holdings Ltd* [2008] 1 SLR(R) 335. Also see Ng-Loy Wee Loon, *Law of Intellectual Property of Singapore* (Sweet & Maxwell, 2nd Ed, 2014) at para 30.1.24, where it was highlighted that the computerised process was claimed in the form of a practical application.

42 [2000] 2 SLR(R) 708.

43 Ng-Loy Wee Loon, *Law of Intellectual Property of Singapore* (Sweet & Maxwell, 2nd Ed, 2014) at paras 30.1.21–30.1.22.

in its patentability assessment the court did *not* exclude the discovery (as an excludable subject matter), though exclusion would be expected if the court had intended to give effect to subject-matter exclusion within the inventive-step assessment. Simply put, the claimed product, though incorporating the new discovery, was just not good enough for patentability; not because of subject-matter exclusion but because it was obvious in light of known purification techniques.

24 It is submitted that the absence of a statutory list of subject-matter exclusions and clear judicial exclusion paints a rather indefinite legal picture of the computer program issue in Singapore. The above questions await a clearer answer.

25 Patent prosecution rules, on the other hand, expressly provide for subject-matter exclusion, but also without enumeration. Rule 2A(3)(*ba*) and r 46(1A)(*ba*) of the Patents Rules,[44] which were introduced pursuant to the powers conferred by s 115 of the Patents Act[45] for regulating the business of the Intellectual Property Office of Singapore ("IPOS"), provide that an objection may be raised during supplementary examination on the grounds that "the invention defined in any claim of the specification of the application does not constitute an invention". The authorising Act[46] is silent on subject-matter exclusion.

26 The examination practices of IPOS accord with the position in the above rules for exclusion of subject matters. In the *Examination Guidelines for Patent Applications at IPOS* (March 2020 version) ("Examination Guidelines"), computer-implemented inventions, for example, may be excluded, during examination, if the actual contribution of the invention does not comprise technical features.[47]

27 It is further stated in the Examination Guidelines that the actual contribution is identified by reference to the approach that was laid down by the UK Court of Appeal in *Aerotel Ltd v Telco Holdings Ltd; Macrossan's Application*[48] ("*Aerotel*").[49] Other subject matters that are excludable include discoveries, mathematical methods, aesthetic creations, business

44 Cap 221, R 1, 2007 Rev Ed.
45 Cap 221, 2005 Rev Ed.
46 Patents Act (Cap 221, 2005 Rev Ed).
47 Intellectual Property Office of Singapore, *Examination Guidelines for Patent Applications at IPOS* (March 2020) at para 8.6.
48 [2007] Bus LR 634; [2006] EWCA Civ 1371.
49 Intellectual Property Office of Singapore, *Examination Guidelines for Patent Applications at IPOS* (March 2020) at paras 8.3–8.4.

schemes, and presentation of information.[50] These areas of exclusion are consistent with the s 13(2) List. It seems that the approach, on a whole, is largely based on the UK approach with similarities to the UK list of excluded matter, while allowing for an independent development that takes into account international patent norms and public policy considerations.[51]

28 Next, the patent system's policy objectives will be discussed, particularly those that common law judges have relied upon in the cases, in the hope of a better elucidation of the subject-matter exclusion issue.

III. Policy objectives

29 Common law judges have long cautioned against unfettered subject-matter patentability due to its adverse effects on the patent system.

30 Particularly, the UK Court of Appeal in *Aerotel* pointed out that while the patent system could incentivise research activities, it would also extract a price on society, which included: patenting costs; barriers to competition; non-infringement compliance costs; cost of uncertainties; and litigation costs.[52] Based on the empirical data that was made available in *Aerotel*, the court doubted whether liberalising subject-matter exclusions, particularly for business methods and computer programs, would help to promote a greater pace of innovation.[53]

31 Turning to the US, the US Supreme Court has suggested weighing "the things which are worth to the public the embarrassment of an exclusive patent" against the risk that further progress may be hindered by the patent system itself (which has been referred to as "pre-emption risks").[54]

32 Pre-emption risks may arise because all inventions, at some level, embody, use or apply, laws of nature, natural phenomena, and/or abstract ideas, and patents that claim these building blocks of human

50 See Intellectual Property Office of Singapore, *Examination Guidelines for Patent Applications at IPOS* (March 2020) at ss 8.A.i–8.A.v.

51 Intellectual Property Office of Singapore, *Examination Guidelines for Patent Applications at IPOS* (March 2020) at paras 8.4, 8.8 and 8.13.

52 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [20].

53 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [19]–[20].

54 *Bilski v Kappos* 561 US 593; 130 S Ct 3218 at 3258 (2010), quoting from "Letter from Thomas Jefferson to Isaac McPherson" (13 August 1813) in *The Writings of Thomas Jefferson Vol VI* (H A Washington ed) (H W Derby, 1861) at p 181.

ingenuity can pre-empt and preclude the public's access to the basic tools of scientific and technological work.[55]

33 In *Mayo Collaborative Services v Prometheus Laboratories Inc*[56] ("*Mayo*"), a case not involving software patent, the US Supreme Court ruled that the patents in issue set forth laws of nature without more.[57] The underlying concern was that these patents could "tie up too much future use of laws of nature" (another expression for pre-emption risks).[58]

34 The US Supreme Court had to consider if there was an outright bar on business method patentability in *Bilski v Kappos*[59] ("*Bilski*"), particularly in relation to an invention that described how buyers and sellers of commodities in the energy market could protect, or hedge, against the risk of price changes.

35 The Bench of nine Justices in *Bilski* unanimously ruled that the invention was not patent-eligible on the basis that the application claimed an abstract idea.[60] However, different opinions were filed by the Justices to support the decision.

36 While the majority held (in the opinion delivered by Justice Kennedy) that there was no outright bar on business method inventions,[61] the minority concluded that there was.[62] Though in the minority, it is respectfully submitted that the policy arguments that were raised by the minority in *Bilski* in this regard are insightful – *ie*, that business method innovations were already incentivised sufficiently through a competitive marketplace without requiring further incentives from the patent system; and that ills would result from the "potential vagueness" in business method patents and their "breadth" of scope and "omnipresence" in society.[63]

---

55 *Bilski v Kappos* 561 US 593; 130 S Ct 3218 at 3258 (2010), and *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2354–2355 (2014).

56 132 S Ct 1289 (2012).

57 *Mayo Collaborative Services v Prometheus Laboratories Inc* 132 S Ct 1289 at 1297 (2012).

58 *Mayo Collaborative Services v Prometheus Laboratories Inc* 132 S Ct 1289 at 1302 (2012).

59 561 US 593, 130 S Ct 3218 (2010).

60 *Bilski v Kappos* 561 US 593; 130 S Ct 3218 at 3230 (2010).

61 It was further opined by the majority that, on the other hand, the legal basis for having no outright bar over business inventions also "does not suggest broad patentability of such claimed inventions" (*Bilski v Kappos* 561 US 593; 130 S Ct 3218 at 3229 (2010)).

62 *Bilski v Kappos* 561 US 593; 130 S Ct 3218 at 3228–3229 and 3231–3257 (2010).

63 *Bilski v Kappos* 561 US 593; 130 S Ct 3218 at 3254–3257 (2010).

37 Pre-emption risks have also been raised in the UK.

38 In *CFPH LLC*[64] ("*CFPH*"), Peter Prescott QC (sitting as a Deputy Judge) opined that the law would raise an objection when a discovery as such, *ie*, apart from artefacts or processes that have been developed based on the discovery, was being monopolised, for the reason that creation of further artefacts or processes, which were not yet conceived, may be stifled.[65]

39 It is submitted that in these cases there exists the notion that innovations must result from both patentability in some cases and imitation and refinement in others, and innovations in the latter cases could be hindered by excessive patentability.[66] Further, liberal eligibility may not be necessary to spur innovations, and if not necessary it is also not worth the social costs of a patent.

40 Though not in the specific context of subject-matter exclusion, the Court of Appeal of Singapore has also accepted that there are "intrinsic tensions" in the modern patent system, and a right balance must be struck between "stimulating the creative energies of inventors, while promoting the free flow of ideas and encouraging entrepreneurship".[67]

41 Some commentators, in arguing against a conservative stance on subject-matter eligibility, have raised the spectre of a jurisdiction becoming a patent "backwater" as a consequence of not keeping up with the development of new technologies.[68] Arguments that keen competition among patent jurisdictions required the bar of exclusions (in relation to computer programs and business methods) to be set low were considered and rejected by the UK Court of Appeal in *Aerotel*.[69]

64 [2005] EWHC 1589 (Pat).

65 *CFPH LLC* [2005] EWHC 1589 (Pat) at [34].

66 Also see judgment of Justice Stevens of the US Supreme Court (with whom three other Justices joined) in *Bilski v Kappos* 561 US 593; 130 S Ct 3218 at 3252 (2010).

67 *First Currency Choice Pte Ltd v Main-Line Corporate Holdings Ltd* [2008] 1 SLR(R) 335.

68 Sigrid Sterckx & Julian Cockbain, *Exclusions from Patentability* (Cambridge University Press, 2012) at p 80, referring to the decision in *IBM*, T 1173/97, EP:BA:1998:T117397.19980701.

69 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [17]–[19].

IV. Patent eligibility of computer programs in the US

42 The US Patents Act[70] provides several categories of inventions for patent eligibility (see emphasis below):

> 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. [emphasis added]

43 Like in Singapore, in the US there is no statutory list of patent-ineligible subject matters. Still, three judicial exceptions have been developed, namely, *abstract ideas*, *laws of nature* and *physical phenomena*. In the cases, the "abstract ideas" category has received much attention especially in relation to computer-implemented inventions.

44 According to the *Longman Dictionary*, the word "abstract" refers to that which is based on general ideas or principles rather than specific examples or real events.

45 Abstract ideas include man-idea ideas, such as social activities and economic practices. These practices include financial hedging (the subject matter in *Bilski*), intermediated settlement (in *Alice Corp Pty Ltd v CLS Bank International*[71] ("*Alice*")); mathematical formula (in *Parker v Flook*[72]); and mental processes (in *Gottschalk v Benson*[73]).

A. The Alice *framework*

46 *Alice* is a well-known US Supreme Court case on patent eligibility of computer-implemented inventions.

47 To assess the patents in issue, the *Alice* court adopted the two-step framework laid out in *Mayo*, an earlier US Supreme Court case on patent eligibility of a method of medical diagnosis. The steps under this framework are as follows:[74]

> (a) First, determine whether the claims at issue are directed to any laws of nature, natural phenomena, and abstract ideas. If no, the claims are patent eligible.[75]

---

70 35 USC (US) § 101.
71 134 S Ct 2347 (2014).
72 437 US 584 (1978); 98 S Ct 2552.
73 409 US 63 (1972); 93 S Ct 253.
74 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2355 (2014).
75 *Core Wireless Licensing SARL v LG Electronics Inc* 880 F 3d 1356 at 1363 (Fed Cir, 2018); *Data Engine Technologies LLC v Google LLC* 906 F 3d 999 at 1007 (Fed Cir, 2018).

(b) If yes, next consider if there is anything in the claims to transform the nature of the claim into a patent-eligible application.

There is transformation under the second step, if an "inventive concept" that is sufficient to ensure that the patent, in practice, amounts to significantly more than a patent upon the ineligible concept itself, is discernible.[76]

48 For convenience, these steps will be referred to as *Alice* step 1 and *Alice* step 2, accordingly.

49 The patents in issue described a computer-implemented process for the purpose of mitigating financial transaction settlement risk (the risk that only one party to a financial transaction carries out the obligations) through the use of a computer system.[77] The claimed method in *Alice* provided for a third-party intermediary to "create" shadow credit and debit records, "update" the shadow records in real time and "instruct" relevant financial institutions to carry out the permitted transactions in accordance with the updated shadow records.[78]

50 In *Alice* step 1, the court determined whether the claims at issue were directed to an ineligible concept. The court characterised the claims in issue as a method of exchanging financial obligations between two parties using a third-party intermediary to mitigate settlement risks, and held that the claims, "[o]n their face", were drawn to the concept of intermediated settlement.[79]

51 Moving to *Alice* step 2, the court considered whether the claims had encompassed an inventive concept so that in practice they amounted to more than a monopoly over the abstract idea itself. In this step, after considering each of the claims in issue as a whole and in its separate claim elements, the court ruled that the claims in issue did no more than "simply instruct the practitioner to implement the abstract idea of intermediated settlement on a generic computer".[80]

B. Alice *step 1 – "Directed to" excluded matter*

52 There is little guidance in *Alice* itself for the "directed-to" inquiry. However, the *Alice* court did cite and comment on three earlier cases,

76 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2355 (2014).
77 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2352 (2014).
78 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2352 (2014).
79 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2356 (2014).
80 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2359 (2014).

namely, *Gottschalk v Benson*[81] ("*Benson*"), *Parker v Flook*[82] ("*Flook*") and *Bilski*, to illustrate inventions that were directed to abstract ideas.[83]

53 In *Benson*, the rejected claims involved an algorithm for converting binary-coded decimal numerals into pure binary form. The claims were not limited to any particular technology or use. The *Alice* court opined that the claimed patent was in effect a patent on the algorithm itself.[84]

54 In *Flook*, the invention in issue was a computerised method for adjusting alarm limits over certain physical conditions by the use of a mathematical algorithm. Though the claimed method was limited to a catalytic conversion process and therefore a specific technological application, it was still caught under the abstract idea exclusion.[85] In *Diamond v Diehr*[86] ("*Diehr*"), a case also involving computerised technological processes that incorporated a well-known mathematical algorithm, the US Supreme Court distinguished the invention in *Flook* from a patentable invention on the basis that insufficient explanations (apart from the mathematical algorithm) were given to update the alarm limit.[87]

55 In *Bilski*, the patents at issue described a method for hedging against the financial risk of price fluctuations, including a series of steps for hedging risks in commodities and energy markets. The claimed method was characterised as a concept of hedging and was also caught under the abstract idea exclusion.[88]

56 To create non-abstract claims, it may be helpful to include a feature of high specificity, even if a generalised version of it is just as functional. *Data Engine Technologies LLC v Google LLC*[89] ("*Google*") is illustrative. *Google* is also particularly insightful in that some of the claims in issue were caught under *Alice* step 1, while others were not.

57 In *Google*, the US Court of Appeals for the Federal Circuit ("CAFC") had to consider whether inventions relating to our modern-day

81 409 US 63; 93 S Ct 253 (1972).
82 437 US 584 (1978); 98 S Ct 2552.
83 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2355–2356 (2014).
84 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2355 (2014).
85 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2355 (2014).
86 450 US 175 (1981); 101 S Ct 1048.
87 *Diamond v Diehr* 450 US 175 at 186–187; 101 S Ct 1048 (1981).
88 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2355–2356 (2014).
89 906 F 3d 999 (Fed Cir, 2018).

ubiquitous electronic spreadsheets and their user-navigation methods were patent-eligible.[90]

58 These electronic spreadsheets may be two-dimensional or three-dimensional in form. The three-dimensional spreadsheets are made up of multiple two-dimensional spreadsheets that are linked together in a certain way.[91]

59 At the end of the day, what made the difference for US Patent No 5590259 ("the '259 patent") was a spreadsheet page identifier in the form of a "notebook tab", and its ease of use. This "notebook tab" was illustrated as tabs A to N in figure 2D of the '259 patent (set out below).

FIG. 2D

60 The CAFC explained that the tabs were part of a "specific interface" that solved a technological problem in previous three-dimensional electronic spreadsheets, specifically that these spreadsheets were difficult to use and navigate by users.[92]

61 The court was persuaded that the notebook tabs improved three-dimensional spreadsheet navigation, after contemporaneous publications commenting on the improvement were filed by the patentee.[93]

62 However, claims that had merely recited a generalised version of the "notebook tab", *ie*, "a user-settable page identifier" that would cover any other means for identifying and tagging electronic spreadsheet pages, were held ineligible.[94]

63 Not a bad result at the end of the day for what was essentially a small repeated image of a tab!

90 *Data Engine Technologies LLC v Google LLC* 906 F 3d 999 at 1004 (Fed Cir, 2018).
91 *Data Engine Technologies LLC v Google LLC* 906 F 3d 999 at 1002–1004 (Fed Cir, 2018).
92 *Data Engine Technologies LLC v Google LLC* 906 F 3d 999 at 1005 and 1008 (Fed Cir, 2018).
93 *Data Engine Technologies LLC v Google LLC* 906 F 3d 999 at 1004 and 1008–1009 (Fed Cir, 2018).
94 *Data Engine Technologies LLC v Google LLC* 906 F 3d 999 at 1012 (Fed Cir, 2018).

C. A reformulation of Alice *step 1 – The claimed advance*

64 In some cases decided by the CAFC, *Alice* step 1 has been reformulated as follows:[95]

> … evaluate 'the focus of the claimed advance over the prior art' to determine if the character of the claim as a whole, considered in light of the specification, is directed to excluded subject-matter.

65 However, not every CAFC case has followed the "claimed advance" formulation, which is not the exact test laid down in *Alice* after all. In the dissenting opinion by Judge Reyna of the CAFC in *Illumina, Inc v Ariosa Diagnostics, Inc*[96] ("*Illumina*"), a case relating to discovery of a natural phenomenon, he wrote:[97]

> Since 2016, in a string of cases reciting process claims, we began conducting the 'directed to' inquiry by asking whether the 'claimed advance' of the patent 'improves upon a technological process or [is] merely an ineligible concept.' …
>
> … If a written description highlights the discovery of a natural phenomenon – *eg*, by describing the natural phenomenon as the only 'surprising' or 'unexpected' aspect of the invention or that the invention is 'based on the discovery' of a natural law – the natural phenomenon likely constitutes the claimed advance.

66 Judge Reyna went on to opine that "[t]he Majority's [*Alice*] step one analysis ignore[d] the claimed advance inquiry altogether", and the majority had decided *Alice* step 1 on the basis that the steps included in the claims in issue were "concrete" in nature.[98] In Judge Reyna's views above, a "claimed advance" invokes the notion of improvements. Further, improvements were also cited (by the CAFC) in *Google* to support the decision for clearing the '259 patent in *Alice* step 1.[99]

67 However, improvements were not directly referred to in the original *Alice* step 1 formulation.

68 While the *Alice* court had cited a lack of improvements to reject the claims in issue, particularly, that the claims did not "purport to improve the functioning of the computer itself" or "effect an improvement in any

---

95 *Trading Technologies International, Inc v IBG LLC* 921 F 3d 1084 at 1092 (Fed Cir, 2019), citing earlier precedents for support.

96 952 F 3d 1367 (Fed Cir, 2020).

97 *Illumina, Inc v Ariosa Diagnostics, Inc* 952 F 3d 1367 at 1378 (Fed Cir, 2020) (dissenting opinion).

98 *Illumina, Inc v Ariosa Diagnostics, Inc* 952 F 3d 1367 at 1379 (Fed Cir, 2020) (dissenting opinion).

99 *Data Engine Technologies LLC v Google LLC* 906 F 3d 999 at 1004 and 1008–1009 (Fed Cir, 2018).

other technology or technical field",[100] these opinions were provided in the court's analysis under *Alice* step 2, not *Alice* step 1.

69 Still, allegations relating to improvement were often raised in attempts to clear *Alice* step 1. However, while an alleged improvement may prove to be of some worth in CAFC cases, the CAFC precedents suggest that unlikely improvements, or improvements that are not technological in nature, are of little worth.

70 In *Trading Technologies International, Inc v IBG LLC*[101] ("*IBG*"), the patent eligibility of US Patent Nos 7,533,056, 7,212,999 and 7,904,374 ("the '374 patent") was challenged. These patents related generally to a graphical user interface ("GUI") for electronic trading.

71 What was claimed in the '374 patent was "a display and trading method … by displaying market depth on a vertical or horizontal plane, which fluctuates logically up or down, left or right across the plane as the market prices fluctuate".[102]

72 The court ruled that the claimed process was directed to the abstract idea of "receiving a user input to send a trade order", since the claim "only minimally requires collecting and analyzing information and includes no requirement that any of that information is displayed".[103]

73 The patentee did not challenge the above characterisation of the claimed invention, but repeated its argument (made before the US Patent Trial and Appeal Board) that the GUI in question could solve a problem that the trader might submit a trade order at a price that he did not intend.[104] This argument was rejected as the court was not persuaded that the claimed method could have provided the purported improvement.[105]

74 The patentee had also argued that the above method involved use of a specific, structured GUI that solved various known problems relating to speed, accuracy and usability of GUI for trading activities.[106]

---

100 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2359–2360 (2014).
101 921 F 3d 1084 (Fed Cir, 2019).
102 *Trading Technologies International, Inc v IBG LLC* 921 F 3d 1084 at 1086 (Fed Cir, 2019).
103 *Trading Technologies International, Inc v IBG LLC* 921 F 3d 1084 at 1094 (Fed Cir, 2019), citing with approval the opinions of the US Patent Trial and Appeal Boards.
104 *Trading Technologies International, Inc v IBG LLC* 921 F 3d 1084 at 1094 and 1091 (Fed Cir, 2019).
105 *Trading Technologies International, Inc v IBG LLC* 921 F 3d 1084 at 1094 (Fed Cir, 2019).
106 *Trading Technologies International, Inc v IBG LLC* 921 F 3d 1084 at 1091 (Fed Cir, 2019).

Not being persuaded, the court ruled that these improvements were "not technological"; the invention in question focused on "improving the trader, not the functioning of the computer".[107]

75 It is not an easy task to distinguish between technological improvements and non-technological improvements, which were also referred to as improvements in wholly abstract ideas or "abstract improvements" by the courts in some CAFC cases.[108]

76 In *Customedia Technologies, LLC v Dish Network Corp*[109] ("*Customedia*"), it was held that it is not a technological improvement to "merely improve a fundamental practice or abstract process by invoking a computer merely as a tool".[110] To illustrate the notion of an abstract improvement, precedents were cited. The court in *Customedia* wrote:[111]

> [I]n *Trading Techs. I*, … [a]lthough the claimed display purportedly 'assist[ed] traders in processing information more quickly,' we held that this purported improvement in user experience did not 'improve the functioning of the computer, make it operate more efficiently, or solve any technological problem.' *Id.*; *see also … Trading Techs. II* … holding that claims 'focused on providing information to traders in a way that helps them process information more quickly' did not constitute a patent-eligible improvement to computer functionality[.]

77 In *Customedia*, the patents in issue were held to be directed to the abstract concept of targeted advertising; generic computer speed and efficiency improvements were regarded as non-technological improvements.[112]

78 It is also submitted that distinguishing an "abstract" improvement and a computer functionality improvement is not easy as they often overlap. The former may result in the latter since all inventions, at some level, make use of excluded matter. To illustrate, the invention in *Google* improved user navigation of three-dimensional spreadsheets, but it was not directed to an abstract idea.

---

107 *Trading Technologies International, Inc v IBG LLC* 921 F 3d 1084 at 1091 (Fed Cir, 2019).

The US Supreme Court has since denied leave to appeal: see *Trading Technologies International, Inc v IBG LLC* 140 S Ct 954 (2020).

108 *Customedia Technologies, LLC v Dish Network Corp* 951 F 3d 1359 at 1364–1365 (Fed Cir, 2020).

109 951 F 3d 1359 (Fed Cir, 2020).

110 *Customedia Technologies, LLC v Dish Network Corp* 951 F 3d 1359 at 1364 (Fed Cir, 2020).

111 *Customedia Technologies, LLC v Dish Network Corp* 951 F 3d 1359 at 1365 (Fed Cir, 2020).

112 *Customedia Technologies, LLC v Dish Network Corp* 951 F 3d 1359 at 1365 (Fed Cir, 2020).

79 It is respectfully submitted that there is a notion of backward reasoning in decisions where a separating line in relation to these two types of improvements was drawn in *Alice* step 1. Perhaps, improvements are at best a secondary factor for consideration under *Alice* step 1.[113]

D. Alice *step 2 – "What else" is there in the claim?*

80 If a claim was caught under *Alice* step 1 for excluded subject matter, it may still be salvaged under *Alice* step 2. To salvage the claim, there must be something else, other than excluded matters, in the claimed invention that amounts to an inventive concept that may transform the invention, that is otherwise patent-ineligible, into one that is patent-eligible.[114]

81 In *SAP America, Inc v InvestPic, LLC*[115] ("*SAP*"), the CAFC opined that this step "looks *more precisely* at what the claim elements add" [emphasis added].[116]

82 Not to be conflated with the notion of inventive concept in the well-known "Windsurfing test"[117] that is part of Singapore's and UK's patent laws on inventive step, the inventive concept in *Alice* step 2 refers to "an element or combination of elements [in the claim] that is sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the ineligible concept itself".[118]

83 The elements of each claim, both individually and "as an ordered combination", could supply an invention concept (the search target in *Alice* step 2).[119] A new *combination of steps* in a claimed process may render the invention in question patent-eligible, even though "all the constituents of the combination were well known and in common use before the combination was made".[120]

---

113 Also see John Robert Sepúlveda, "The Post-Alice Jurisprudence Pendulum and Its Effects on Patent Eligible Subject Matter" (2019) 35(2) *Touro Law Review* 897 at p 915, where the author expressed optimism that developments of case law by the Court of Appeals for the Federal Circuit were providing "some direction and clarity in drafting claims" for inventors.

114 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2357 (2014).

115 898 F 3d 1161 (Fed Cir, 2018).

116 *SAP America, Inc v InvestPic, LLC* 898 F 3d 1161 at 1167 (Fed Cir, 2018).

117 *Windsurfing International Inc v Tabur Marine (Great Britain) Ltd* [1985] RPC 59.

118 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2355 (2014).

119 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2355 (2014); *Mayo Collaborative Services v Prometheus Laboratories Inc* 132 S Ct 1289 at 1297–1298 (2012).

120 *Mayo Collaborative Services v Prometheus Laboratories Inc* 132 S Ct 1289 at 1298 (2012).

E. What cannot supply an inventive concept

84 An abstract idea or any other ineligible subject matter, itself, cannot supply the inventive concept, no matter how groundbreaking it may be.[121]

85 Further excluded from what can supply an inventive concept are *well-understood, routine, conventional activities* previously known to the industry,[122] and *insignificant post-solution* activities.[123] One implication is, therefore, that non-novel claim limitations may still be of assistance to salvage the claimed invention under *Alice* step 2.[124]

86 Whether an activity is well understood, routine and conventional is a factual determination.[125] *Berkheimer v HP Inc*[126] ("*Berkheimer*") is a summary judgment where issues of whether an activity was well understood, routine and conventional arose. In *Berkheimer*, part of the case was remanded after the court ruled that there was a need to further conduct a factual inquiry.

87 The patent under challenge in *Berkheimer* was US Patent No 7,447,713 ("the '713 patent"), relating to digital processing and archiving of data files in a digital asset management system. The invention in question "parses files into multiple objects and tags the objects to create relationships between them".[127]

88 The patentee, while admitting that "parsers" and the functions they perform have existed for years prior to his patent, had alleged patent-eligibility over dependent claims 4 to 7 of the '713 patent.[128]

89 Under *Alice* step 1, the court ruled that claim 4 of the '713 patent was directed to the abstract idea of parsing, comparing and storing data, while claims 5 to 7 of the same patent were directed to the abstract idea

121 *Trading Technologies International, Inc v IBG LLC* 921 F 3d 1084 at 1093 (Fed Cir, 2019), quoting *SAP America, Inc v InvestPic, LLC* 898 F 3d 1161 at 1171 (Fed Cir, 2018).

122 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2359 (2014).

123 *Mayo Collaborative Services v Prometheus Laboratories Inc* 132 S Ct 1289 at 1298 (2012).

124 The result is, perhaps, unsurprising since the issue in question is one of patent eligibility and not one of novelty or inventive step.

125 *Berkheimer v HP Inc* 881 F 3d 1360 at 1368–1369 (Fed Cir, 2018).

126 881 F 3d 1360 (Fed Cir, 2018).

127 *Berkheimer v HP Inc* 881 F 3d 1360 at 1362 (Fed Cir, 2018).

128 *Berkheimer v HP Inc* 881 F 3d 1360 at 1365–1367 (Fed Cir, 2018).

of parsing, comparing, storing and editing data (in relation to claims 5 to 7).[129]

90 Turning to *Alice* step 2, the court noted that each of claims 5 to 7 recited limitations in the claimed methods of archiving data, that was alleged in the patent specification to improve computer functionality, and since it was not clear if the limitations constituted well-understood, routine and conventional activities, it arose as a genuine issue of material fact which could not be decided on summary judgment.[130]

91 *Flook*, a pre-*Alice* US Supreme Court decision, is illustrative of the notion of "insignificant post-solution activity".[131] The process in issue in *Flook* was a computerised method for using a mathematical formula to adjust alarm limits for certain operating conditions (*eg*, temperature and pressure) that could signal inefficiency or danger in a catalytic conversion process.

92 In the *Alice* court's comments about *Flook*, the invention in issue in *Flook* merely limited the use of an abstract idea in a claim to a particular technological environment and that was insufficient.[132] Though use of the mathematical formula in a catalytic conversion process was novel, the method could not clear *Alice* step 2. In the *Alice* court's explanation, "the formula itself was an abstract idea" and the "computer implementation was purely conventional".[133]

93 The *Mayo* court similarly explained the results in *Flook* as follows: "putting the formula to the side, there was no inventive concept in the claimed application of the formula".[134]

94 *Flook* constitutes a split decision. The minority, three out of nine Justices on the Bench, dissented and opined that the invention in question held low risks of pre-emption and that the majority, in rejecting the invention in issue, would have imported into subject-matter patentability the criteria of novelty and inventiveness.[135] Citing the *Diehr* court's comment, "[w]e rejected in *Flook* the argument that because all possible uses of the mathematical formula were not pre-empted, the claim

129 *Berkheimer v HP Inc* 881 F 3d 1360 at 1366 (Fed Cir, 2018).
130 *Berkheimer v HP Inc* 881 F 3d 1360 at 1370–1371 (Fed Cir, 2018).
131 *Mayo Collaborative Services v Prometheus Laboratories Inc* 132 S Ct 1289 at 1298 (2012).
132 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2358 (2014).
133 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2358 (2014).
134 *Mayo Collaborative Services v Prometheus Laboratories Inc* 132 S Ct 1289 at 1299 (2012).
135 *Parker v Flook* 437 US 584 at 599–600; 98 S Ct 2552 (1978).

should be eligible for patent protection",[136] for support, the US Patent and Trademark Office ("USPTO") has taken the position that "the absence of complete pre-emption does not demonstrate that a claim is eligible".[137]

F. What can supply an inventive concept

95 The *Flook* decision seems to represent a peak in the US patent-eligibility threshold for computer programs. It was, perhaps, hinted by the majority in *Flook* that the result would be different if the Justices were persuaded of the alleged improvements.[138]

96 Other cases have demonstrated less equivocally that improvements made to a computerised technological process may supply the requisite inventive concept under *Alice* step 2. *Diehr* is illustrative.

97 *Diehr* is a US Supreme Court case on patent eligibility of a computer-implemented invention that came after *Flook* but before the *Alice* framework was formalised. *Diehr* is an interesting case to compare with *Flook* as both cases relate to computerised technological processes that incorporated well-known mathematical algorithms, yet they held different outcomes.

98 Among related cases of the US Supreme Court and the CAFC, *Diehr* is one rare positive case of patent eligibility, though four out of nine Justices dissented. *Diehr* is rarer still for inventions that were analysed in the US judgments and held to successfully clear *Alice* step 2. Many judgments do not discuss *Alice* step 2 if the invention in issue cleared *Alice* step 1.

99 The claimed invention in *Diehr* was concerned with a process for curing synthetic rubber which included in several of its steps the use of a mathematical formula, namely the Arrhenius equation, and a programmed digital computer.

---

136 *Diamond v Diehr* 450 US 175; 101 S Ct 1048 (1981) at fn 14.

137 United States Patent and Trademark Office, *Manual of Patent Examining Procedure (MPEP)* (9th Ed, Revision 10.2019, Last Revised June 2020) ("MPEP") at § 2106.04 <https://www.uspto.gov/web/offices/pac/mpep/index.html> (accessed 2 October 2020).

138 The majority wrote: "[r]espondent's application simply provide[d] a new and presumably better method for calculating alarm limit values". See *Parker v Flook* 437 US 584 at 594–595; 98 S Ct 2552 (1978). The minority, on the other hand, had cited the validity of the improvement patent in *Eibel Process Co v Minnesota & Ontario Paper Co* 261 US 45 (1923), in dissent. See *Parker v Flook* 437 US 584 at 600.

100 *Diehr* was also cited by the court in *Alice*. In its discussions on *Alice* step 2, the *Alice* court opined that the invention in *Diehr* was patent-eligible "not because it involved a computer" but because it "improved an existing technological process".[139]

101 The court in *Diehr* suggested that the decision was based in part on the resulting improvement. The majority wrote:[140]

> Arrhenius' equation is not patentable in isolation, but when a process for curing rubber is devised which incorporates in it a more efficient solution of the equation, that process is at the very least not barred at the threshold by § 101.

102 Though inventive concept may invoke the notion that it must be made up of new things, it is not permitted to disregard known claim limitations in an assessment of inventive concept.

103 In its analysis, the majority in *Diehr* considered the claims in question in their respective wholes, cautioning against dissecting them into old and new elements and then to ignore the presence of the old elements in the analysis.[141] This comment would have been prompted by the patent examiner's earlier decision to deny eligibility on the grounds that "individual steps" in the claimed method either constituted non-eligible subject matter or were "conventional and necessary" to the rubber curing process.[142]

G. *Post*-Alice*: After the supposed apocalypse*

104 Some commentators have expressed dismay at the failure of the US courts to consistently approach the software patentability issue and bring much needed certainty to the law on subject-matter eligibility.[143] One may come to sympathise with such views, especially in light of

139 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2358 (2014). Also see *Diamond v Diehr* 450 US 175 at 177; 101 S Ct 1048 (1981) where the court opined that the invention solved a "technological problem in conventional industry practice", albeit by the use of a well-known mathematical equation, *ie*, the Arrhenius equation.

140 *Diamond v Diehr* 450 US 175 at 188; 101 S Ct 1048 (1981).

141 *Diamond v Diehr* 450 US 175 at 188; 101 S Ct 1048 (1981).

142 *Diamond v Diehr* 450 US 175 at 180–181; 101 S Ct 1048 (1981).

143 See Matthew Fisher, "Software-related Inventions" in *Research Handbook on Intellectual Property and Digital Technologies* (Tanya Aplin ed) (Edward Elgar Publishing, 2020) ch 13, at p 292; Brad Sherman, "Intangible Machines: Patent Protection for Software in the United States" (2019) 57(1) *History of Science* 18 at 37, on computer programs, and Trevor Cook, "The Prejudice Against Patenting Business Methods" in *Research Handbook on Intellectual Property and Digital Technologies* (Tanya Aplin ed) (Edward Elgar Publishing, 2020) ch 14, at p 315, on business methods.

software patentability's heyday during the 1998 CAFC decision in *State Street Bank & Trust Co v Signature Financial Group Inc*[144] to its gloomy day in *Flook*[145] before enjoying a seeming respite in *Diehr*;[146] only for the gloom and doom to return in *Alice*, or so it seems.

105 It was also reported that in the aftermath of *Alice* the monthly USPTO allowances of software patent claims dropped to one-eighth of their pre-*Alice* rates.[147] However, despite the (relatively) new framework in *Alice* and even considering the importance of software to the volume of patent application,[148] the total annual utility patent applications in the US were actually on an uptrend: from 578,802 (2014) to 605,571 (2016) and 621,453 (2019).[149]

106 There were also empirical studies showing that about 60% and more of US patent attorneys, including patent litigators, were capable of correctly identifying court outcomes in the *Alice* framework despite being given very little time and materials for review.[150] The above statistics cast doubts on whether *Alice* had brought as much uncertainty to the law, as some were prepared to claim in criticism.[151]

107 In *Alice* and *Mayo*, the essential purpose of the *Alice* framework is to address risks of pre-emption, so that the building blocks of future inventions are not undeservedly monopolised. That risk of pre-emption is the driver for the exclusionary principle in the US, was also recognised

144 149 F 3d 1368 (Fed Cir, 1998).

145 Also see Matthew Fisher, "Software-related Inventions" in *Research Handbook on Intellectual Property and Digital Technologies* (Tanya Aplin ed) (Edward Elgar Publishing, 2020) ch 13, at p 295.

146 Also see Matthew Fisher, "Software-related Inventions" in *Research Handbook on Intellectual Property and Digital Technologies* (Tanya Aplin ed) (Edward Elgar Publishing, 2020) ch 13, at p 297.

147 See John Robert Sepúlveda, "The Post-Alice Jurisprudence Pendulum and Its Effects on Patent Eligible Subject Matter" (2019) 35(2) *Touro Law Review* 897 at p 915.

148 According to Raimund Lutz, then Vice-President of the EPO, in *India and Europe Explore the Impact of Industry 4.0 on the Patent System* (EPO, 9 December 2016) at p 5: "[b]y 2020 it is quite possible that over 50% of all patent applications at the EPO and globally will claim software-implemented inventions".

149 United States Patent and Trademark Office, "US Patent Statistics Chart Calendar Years 1963–2019" *US Patent and Trademark Office* (Updated April 2020) <https://www.uspto.gov/web/offices/ac/ido/oeip/taf/us_stat.htm> (accessed 2 October 2020).

150 Jason D Reinecke, "Is the Supreme Court's Patentable Subject Matter Test Overly Ambiguous? An Empirical Test" (2019) 3 *Utah Law Review* 581 at 583.

151 See Jason D Reinecke, "Is the Supreme Court's Patentable Subject Matter Test Overly Ambiguous? An Empirical Test" (2019) 3 *Utah Law Review* 581 at 582.

by the USPTO in its *Manual of Patent Examining Procedure*[152] ("MPEP"), which states:[153]

> The Supreme Court has explained that the judicial exceptions reflect the Court's view that abstract ideas, laws of nature, and natural phenomena are 'the basic tools of scientific and technological work', and are thus excluded from patentability because 'monopolization of those tools through the grant of a patent might tend to impede innovation more than it would tend to promote it.' … *The Supreme Court's concern that drives this 'exclusionary principle' is pre-emption.* [emphasis added]

108 The *Alice* court did not purport to lay down *definitional* boundaries for software patentability.[154] Though one may yearn for a comprehensive set of guidelines beyond what has been laid down by the *Alice* court to necessarily decide the issues before it, it may be prudent not to do so "lest a new protective rule that seems to suit the needs of one field produce unforeseen results in another".[155]

109 Post-*Alice*, the USPTO has incorporated the *Alice* framework and relevant legal principles, which were developed by the Supreme Court and the CAFC, into its examination practice, while being selective with CAFC-developed doctrines.[156] In particular, the "claimed advance" reformulation of *Alice* step 1 by the CAFC (in some cases) was left out, but the requirement for a factual determination to establish what a "well-understood, routine, conventional" activity (relevant for *Alice* step 2) has been adopted.[157] The CAFC has, in some cases, relied on a finding of improvement to render eligibility under *Alice* step 1 (instead of under *Alice* step 2 which is what the Alice court seemed to have intended[158]); this was incorporated into the USPTO's practice for *Alice* step 1.[159] The USPTO has also distilled from the cases several categories of abstract ideas for the purpose of aiding examiners to identify any abstract idea that a claim may be directed to.

---

152 Available at The United States Patent and Trademark Office website https://www.uspto.gov/web/offices/pac/mpep/index.html (accessed 10 October 2020).

153 MPEP at § 2106.04.

154 See *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2357 (2014), where the court wrote: "we need not labor to delimit the precise contours of the 'abstract ideas' category". It may also be noted that the *Alice Corp Pty Ltd v CLS Bank International* and *Mayo Collaborative Services v Prometheus Laboratories Inc* 132 S Ct 1289 (2012) judgments are relatively short in length, being not more than 12 and 14 pages long, respectively.

155 *Mayo Collaborative Services v Prometheus Laboratories Inc* 132 S Ct 1289 at 1305 (2012).

156 See MPEP at §§ 2106.04 and 2106.05.

157 MPEP at § 2106.

158 See paras 64–79 above.

159 MPEP at § 2106.04.

110 These efforts have clarified what is expected of the actual practice on the eligibility subject, so much so that the USPTO could report a significant drop in the number of subject-matter eligibility rejections and a 44% drop in the level of uncertainty.[160]

V. Computer program exclusion in the UK

111 A very different approach to subject-matter exclusion, in both form and substance, has been adopted in the UK.

112 The deleted Singapore list of excluded subject matters is largely similar to the UK list in s 1(2) of the UK Patents Act 1977,[161] which states:[162]

> It is hereby declared that the following (among other things) are not inventions for the purposes of this Act, that is to say, anything which consists of –
>
> (a) a discovery, scientific theory or mathematical method;
>
> (b) a literary, dramatic, musical or artistic work or any other aesthetic creation whatsoever;
>
> (c) a scheme, rule or method for performing a mental act, playing a game or doing business, or a program for a computer;
>
> (d) the presentation of information;
>
> but the foregoing provision shall prevent anything from being treated as an invention for the purposes of this Act only to the extent that a patent or application for a patent relates to that thing as such.

113 There is no statutory guidance on how to interpret the description "as such". In its absence, the UK Patent Office weighed in on the discussions in 2001, concluding, after a public consultation, that "patents are for technological innovations", "[s]oftware should not be patentable where there is no technological innovation", and there was

160 See Laura Peter, Deputy Director, United States Patent and Trademark Office, "Remarks by Deputy Director Peter at the Eagle Forum Education and Legal Defense Fund Patent Event" (5 October 2020) <https://www.uspto.gov/about-us/news-updates/remarks-delivered-eagle-forum-education-and-legal-defense-fund-patent-event> (accessed 13 October 2020).

161 c 37.

162 Previously, s 101(1) of the Patents Act 1949 (c 87) (UK) had defined an invention to mean "any manner of new manufacture … and any new method or process of testing applicable to the improvement or control of manufacture, and includes an alleged invention". Similar provisions subsist in the Australian Patents Act 1990 which defines an invention, in Schedule 1, as "any manner of new manufacture the subject of letters patent and grant of privilege within s 6 of the Statute of Monopolies, and includes an alleged invention".

insufficient evidence that patentability for business methods "would be likely to increase innovation".[163]

A. The technical contribution approach

114 In 2006, the UK Court of Appeal decided two appeals in *Aerotel*, a landmark case in which a thorough treatment on the topic of computer program patentability was given.

115 Starting with statutory interpretation, the *Aerotel* court opined that the *list* of excluded matter was difficult to interpret for several reasons, including:[164]

> (a) that it is not possible to form "an overall approach" to the categories in the list of exclusions, which form "a disparate group";
>
> (b) that there was a lack of clear boundary "between some of the exclusions themselves" and "between them the overall requirement that an invention be 'susceptible of industrial application'"; and
>
> (c) that some categories of exclusion, including a scientific theory, are "so abstract" as to be meaningless or unnecessary.

The court concluded that no overarching principle in the excluded categories was intended, and it was left to the patent judges to work out the details (how to apply the description "as such").[165]

116 Various approaches to address issues of exclusion were raised in *Aerotel*. Eventually, the court ruled in favour of the technical effect approach, which regards an invention to be covered by the patent statutes if it has made a "technical contribution" to the known art, subject to the rule that "novel or inventive purely excluded matter" does not count as a technical contribution.[166]

---

163 The Patent Office, "Should Patents be Granted for Computer Software or Ways of Doing Business?" *The National Archives* (March 2001) at paras 19 and 24. As the publication was not accessible at the official website, an online copy was reviewed for this article: <https://webarchive.nationalarchives.gov.uk/20060425232842/http://www.patent.gov.uk:80/about/consultations/conclusions.htm> (accessed 1 June 2020).

164 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [9].

165 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [11].

166 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [26] and [38].

117 The court further opined that "[d]ecisive is what *technical contribution* the invention makes to the known art" [emphasis added], and there must be "some technical advance on the prior art in the form of a new result".[167] The analysis on excluded subject matter should be carried out as a matter of substance not form.[168]

118 To provide a structure for determining any relevant technical contribution, the *Aerotel* court proposed the following approach:[169]

(a) step (1), properly construe the claim;

(b) step (2), identify the actual contribution to the known art;

(c) step (3), ask whether it falls solely within the excluded subject matter as such; and

(d) step (4), check whether the actual or alleged contribution is actually technical in nature; novel or inventive purely excluded matter does not count as a technical contribution.

119 How the contribution is identified may be an exercise of judgment involving the problem "said to be solved", how the invention works, and what its advantages are.[170]

120 The contribution inquiry necessarily involves discerning what is old. However, it does not mean that a prior art search exercise, what many would regard as a daunting task, is necessary. Further, what is old is often self-evident,[171] and it is the area of contribution, not its scope, that is in issue.[172] While allegations of technical contribution may be acceptable, the court suggested that it is acceptable only at the application stage,

---

167 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [83].

168 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [43]; *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [46].

As a result, the exclusion "as such" for computer programs was interpreted to cover computer programs existing in any tangible forms, including hard drive and CD, though a computer program is literally just an abstract series of instructions. See *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [31].

169 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [39]–[49] and *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [36]. This approach, which the UK Patent Office has also been following, was originally submitted by it for the *Aerotel* court's consideration. See Intellectual Property Practice, "Manual of Patent Practice" *GOV.UK* (19 February 2016) <https://www.gov.uk/guidance/manual-of-patent-practice-mopp/section-1-patentability> (accessed 26 May 2020).

170 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [43].

171 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [33].

172 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [118], citing with approval the opinions of Pumfrey J in *Re Shopalotto.com Ltd* [2005] EWHC 2416 (Pat) at [10]–[12].

where out of necessity the patent office may accept what the inventor has said is his contribution.[173] The court wrote: "[i]n the end the test must be what contribution has actually been made, not what the inventor says he has made".[174]

121 Further, the technical contribution test is separate from the patentability test relating to novelty and inventive step, and, therefore, different results for these tests may be obtained.[175]

122 Another nuance lies in the approach, in that while any part of the contribution that lies in excluded matter is disqualified in the final analysis under step (3) or (4) of the *Aerotel* approach, a novel claim feature or limitation itself that constitutes excluded matter should not be disqualified in the *prior* steps. This nuance can be further explained as follows: there is a technological application of a new discovery as such; the application is obvious, but apart from the discovery the application is neither new nor inventive in light of the discovery. Now, if the discovery were excluded from the contribution in step (2) of the *Aerotel* approach, what remains, being nothing new or inventive, can no longer constitute any meaningful contribution in the final analysis.[176] However, since the discovery is not excluded in the contribution assessment under step (2), the resulting contribution in its totality is more than a discovery as such in the final analysis.[177]

123 The technical contribution approach is also in contradistinction to the "any-hardware" approach, which has been adopted by the EPO. Under the any-hardware approach, a claim is not excluded if it involves the use of a piece of physical hardware, however mundane. The *Aerotel* court opined that this approach could lead to bad results. In the example provided by the court, a claim to a standard CD player that had been loaded with a new piece of music would, under this approach, be patent-eligible, and also patentable since, as a whole, the claim was novel, non-obvious and enabling.[178]

124 Variants of this approach that negate in the separate novelty and inventive-step tests the novelty of any *excluded matter* by deeming the matter as something that was known to a notional skilled person,

173 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [44].
174 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [44].
175 *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463 at [19] and [70].
176 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [82].
177 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [82].
178 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [27].

were also rejected by the court for the reason that the negation was "not intellectually honest".[179]

B. The appeals in Aerotel

125 There were two patent actions in *Aerotel*, one was referred to as the "*Aerotel* appeal" and the other the "*Macrossan* appeal". The invention in the latter appeal was excluded, while the invention in the former was not.[180]

126 The *Aerotel* appeal was concerned with a patent involving a telephone and call-billing system. In making a conventional phone call, the caller would dial the callee's number and the call would go through some public exchanges with an ultimate connection to the callee. A billing system that measured call duration would compute the cost.[181] In the claims, a "special exchange" was included in the calling path to facilitate call connection in cases where the call was initiated from a credit-bearing account.[182]

127 The court opined that what the invention had contributed was "a new system" or "a new physical combination of hardware", and that while the system "could be implemented using conventional computers" it is "clearly technical in nature".[183]

128 The invention in the *Macrossan* appeal was more controversial. This invention was concerned with a computerised document production process and was excluded as both a business method as such and a computer program as such.[184] More specifically, the computerised process was an automated method of acquiring the documents necessary to incorporate a company, wherein questions were posed by a remote server to a user sitting at a computer (in communication with the server) and, through the responses of the user, the server would generate the required documents.[185]

129 It was held that the contribution under step (2) of the *Aerotel* approach was an "interactive system" utilising standard hardware to perform the task which otherwise would have been carried out by

179 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [27].
180 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [2]–[3].
181 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [52].
182 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [52].
183 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [53].
184 The statutory exclusions operate cumulatively. See also *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [47].
185 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [58].

a solicitor or company formation agent.[186] However, this had contributed nothing more than a computer program as such.[187]

130 The *Aerotel* court overruled the first instance judgment that the invention in the *Macrossan* appeal was not covered by the business method exclusion. In doing so, the court disagreed that the business method exclusion merely operates on inventions that have been claimed at a high level of abstraction so that no "tool" was created.[188]

131 The technical contribution approach was affirmed in a more recent UK Court of Appeal case on subject-matter exclusion, *ie*, *HTC Europe Co Ltd v Apple Inc*[189] ("*HTC*"), where it was further suggested that the four-step approach in *Aerotel* was appropriate, but not strictly necessary.[190]

C. A contribution that is "technical" in nature

132 Though the test in *Aerotel* was referred to as the "technical effect approach",[191] not all technical effects, understood by the ordinary meaning of the word "technical", qualify as a technical contribution.

133 The relationship between technical effects and technical contribution can be particularly murky in cases of computer-implemented invention as computer operations are inherently technical in nature. As Floyd J (as he then was) wrote in *Re Protecting Kids the World Over (PKTWO) Ltd*[192] ("*PKTWO*"):[193]

> … as a matter of ordinary language, the programming of a computer is a technical exercise, and the consequence of so programming it can, again in ordinary language, be regarded as achieving a technical effect.

The exercise to apply the computer program exclusion then becomes one of "distinguish[ing] a relevant technical effect from one which is irrelevant".[194]

186 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [63].
187 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [73].
188 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [66]–[71].
189 [2013] EWCA Civ 451.
190 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [44].
191 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [26].
192 [2012] RPC 13; [2011] EWHC 2720 (Pat).
193 *Re Protecting Kids the World Over (PKTWO) Ltd* [2012] RPC 13; [2011] EWHC 2720 (Pat) at [14].
194 *Re Protecting Kids the World Over (PKTWO) Ltd* [2012] RPC 13; [2011] EWHC 2720 (Pat) at [14].

134 In *Shopalotto.com Ltd's Application*,[195] an effect to be expected from the "mere loading of a program into a computer" was not a relevant technical effect.[196] In other words, ordinary effects created by operating a computer program are regarded as non-technical effects.

135 While there is no straightforward test for determining whether an invention has made a "technical" contribution (*ie*, one that does not solely lie in excluded matter), some guidance was provided in *HTC*:[197]

(a) First, each case must be determined on its own facts.

(b) Second, the analysis must be carried out as a matter of substance not form.

(c) Third, the exclusions (in the different categories) operate cumulatively.

(d) Fourth, it is helpful to consider what the invention contributes to the art as a matter of practical reality over and above the fact that it relates to an excluded matter.

(e) Fifth, it is also helpful to consider whether the invention may be regarded as solving a problem which is essentially technical. Where an invention solves a technical problem, whether within or outside the computer, the invention may be taken to have produced a relevant technical effect.

136 In addition, discernible improvements to a device or a technical process may support a relevant technical effect. Kitchin LJ stated:[198]

> An invention which solves a technical problem within the computer will have a relevant technical effect in that it will make the computer, as a computer, *an improved device*, for example by increasing its speed. An invention which solves a technical problem outside the computer will also have a relevant technical effect, for example by controlling *an improved technical process*. [emphasis added]

137 In light of the futility to positively define a "relevant" technical effect, signposts (for such an effect) were proposed by Lewison J (as he then was) in *Re AT&T Knowledge Ventures LP*[199] ("*AT&T*").[200] These signposts, which were further refined in *HTC*, consist of the following:[201]

195 [2005] EWHC 2416 (Pat).
196 *Re Shopalotto.com Ltd* [2005] EWHC 2416 (Pat) at [9].
197 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [45]–[49].
198 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [49].
199 [2009] Bus LR D51.
200 *Re AT&T Knowledge Ventures LP* [2009] Bus LR D51 at [40].
201 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [50]–[51].

(a) the claimed technical effect has a technical effect on a process which is carried on outside the computer;

(b) the claimed technical effect operates at the level of the architecture of the computer; that is to say the effect is produced irrespective of the data being processed or the applications being run;

(c) the claimed technical effect results in the computer being made to operate in a new way;

(d) there is a better computer in the sense of running more efficiently and effectively as a computer; and

(e) the perceived problem is overcome by the claimed invention as opposed to merely being circumvented.

138 The first signpost may have been drawn from the proposition in *AT&T* that "[i]f, ignoring the computer program, it would be patentable, then the fact that a computer drives the invention does not deprive it of patentability".[202] If so, it may explain why in the cases the first signpost was apparently not met by the fact that a computer program would have a *practical effect* outside the computer.[203] The signposts must be applied by "looking at the contribution of the invention defined in the claim".[204]

139 The second signpost may have been drawn from the proposition in *AT&T* that:[205]

> [An] invention [that] works *irrespective of the nature of the data and irrespective of the particular application programs* which are used … relates to the architecture of the computer system and produces a better computer as a result. [emphasis added]

140 The first and second signposts may not be met, or, if met, carry little weight, in cases where the technical effect was generated within a conventional computer or "computer arrangement".[206] *Lantana Ltd v*

202 *Re AT&T Knowledge Ventures LP* [2009] Bus LR D51 at [20].

203 See *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463 at [47] and *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2013] EWHC 2673 (Pat) at [30]–[31].

204 See *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463 at [47].

205 *Re AT&T Knowledge Ventures LP* [2009] Bus LR D51 at [22].

206 There was a conventional computer arrangement in *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463, which comprised two generic computers that were connected by a telecommunications network, such as the Internet. The related signposts were discounted in this case. See the decision below in *Lantana v Comptroller-General of Patents* [2013] EWHC 2673

(cont'd on the next page)

Comptroller-General of Patents, Designs and Trade Marks[207] ("*Lantana*") is illustrative.

141 In *Lantana*, the UK Court of Appeal had to evaluate an invention relating to a "computer arrangement" for the retrieval of data from a remote computer to a local computer by use of a means that did not require continuous connection, and thereby addressing "the problem of vulnerable connectivity".[208] The means in issue was the conventional e-mail communication, which was a mode of communication that was not typically initiated by computers without user selection.[209]

142 The invention in *Lantana* was, however, characterised differently from the above description, and specifically, as a computer software "running on conventional computers connected by a conventional network".[210]

143 In so far that the e-mail communication was an external technical process, the invention arguably produced a technical effect (contribution) according to the first signpost. However, the court took a different view that "[a]ny contribution lay entirely with the program", and little weight was attached to this technical effect.[211]

144 The third signpost covers new ways to use the computer, *ie*, new computer functionalities. This signpost does not include an alternative computing process that does not change the ways that a computer may be put to use. *Lantana*, again, is illustrative.

145 It was argued in *Lantana* that the invention consisted of a new way of producing an old result in computer communication.[212] The *Lantana* court rejected the argument, upheld the finding at first instance

(Pat) at [30]–[31], where it was upheld on appeal (see [2014] EWCA Civ 1463 at [45]–[47]).

207 [2014] EWCA Civ 1463.

208 *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463 at [3] and [55].

209 *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463 at [3] and [55].

210 *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463 at [31].

211 *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463 at [46]–[48].

212 *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463 at [42].

that the computers in the invention "operated as before", and ruled that the third signpost was not met.[213]

146 The fourth signpost is closely related to the third one in that it covers improvements resulting from a new way of using the computer. In *Lantana*, Lady Justice Arden, in explaining the negative result in relation to the fourth signpost, opined that the benefits from the invention were not "benefits to the computer".[214]

147 The fifth and last signpost is related to the notion that a solution to a technical problem can, if the solution is not a mere circumvention, take its character from the technical nature of the problem.[215] A finding that the invention is a circumvention and not a solution is, however, not necessarily fatal to a patent-eligibility case. In the judgment of Lady Justice Arden in *Lantana*, a circumvention that is the result of "truly original linear thinking" may lead to patentability in an appropriate case.[216]

148 These signposts are a guide, not a destination or prescriptive conditions (whether conjunctive or disjunctive).[217] Further, they must be applied by reference to the contribution of the claimed invention.[218] In the final analysis, it is necessary to return to the ultimate question – it is not whether signposts are discernible but what the contribution made by the invention is and whether the contribution constitutes purely excluded matter.

149 To perform the analysis, it is submitted that the cases suggest examining the following aspects of the alleged invention: the problem which the alleged invention addresses; the way that the invention allegedly solves the problem; and the practical benefit or improvements that the invention may bring.[219]

213 *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463 at [49] and [17].

214 *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463 at [50].

215 *Lantana Ltd v The Comptroller-General of Patents, Designs and Trade Marks* [2013] EWHC 2673 (Pat) at [35].

216 *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463 at [51].

217 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [149].

218 *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463 at [47].

219 Also see *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371, "Appendix – Analysis of the Case Law" at [78]–[131]; and *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [56]–[58], where references were made for the purpose of this submission.

D. It is not enough to solve real practical problems

150 A computer program that overcomes a real practical problem, even if by employing conventional programming techniques, may be in a good position to escape the computer program exclusion. *HTC* is illustrative, but *Lantana* demonstrates that this cannot be a general principle.

151 In *HTC*, expert evidence from computer science professors was admitted for deciding whether the software invention in European Patent No 2098948 should be excluded for being a computer program as such. No other category of exclusion was put in issue.

152 In the background art of *HTC*, computer software was structured in layers, where at the lower layers the operating system ("OS") would interact with the hardware through device drivers below it,[220] and at the higher layers run-time libraries would interact with the OS below it and the application programs above it.[221]

153 The invention in issue was related to computer devices specifically with touch-sensitive screens that could electronically respond to multiple concurrent touches from a user.[222] In the invention, the multi-touch screen was divided into different parts, called views, that could be associated with different applications.[223] Each view would be associated with two different properties, namely the multi-touch property and the exclusive property. Each of these properties was configurable in a "flag", which was stored as a single binary bit, having only two possible values, either set (1) or not set (0).[224] The "multi-touch" flag would determine whether a particular view was allowed, or not allowed, to receive multiple simultaneous touches. Separately, the "exclusive" flag of a particular view would independently determine whether other views would be allowed to receive touches if the first view was flagged and was receiving a touch.[225]

154 Evidence was given for the allegations that the flags could preclude program applications from processing unnecessary or unintended touch data, which, in turn, could reduce the cost of development of software in cases where it was not necessary for the software to react to multiple

220 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [10].
221 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [11]–[12].
222 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [2].
223 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [15].
224 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [33].
225 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [21].

touches.[226] As a result, it was held that an effect of the invention was to make it simpler to write application programs for touchscreen devices.[227]

155 In the first instance judgment, ease of writing application software was not regarded as a relevant technical effect.[228] However, the UK Court of Appeal disagreed and characterised the contribution of the invention as an improved device for programmers to use. Kitchin LJ held:[229]

> The device is, in a real practical sense, an improved device. This is not because it now runs different application programs but because it is, as a device, easier for programmers to use. Once again, this emphasises the technical nature of the invention.

156 Before coming to the above position, Kitchin LJ had considered the nature of the problem and the purported solution. He stated:[230]

> The problem which the patent addresses, namely how to deal with multiple simultaneous touches on one of the new multi-touch devices, is essentially technical, …
>
> … the solution to this problem lies in a method … which concerns the basic internal operation of the device and applies irrespective of the particular application for which the device is being used and the application software which it is running for that purpose. … the problem and its solution are essentially technical in nature.

157 The different outcomes in *Lantana* and *HTC*, which fall on opposite sides of the fence of computer program exclusion, are difficult to explain, though they seem to emphasise the importance of an evident improvement. Conversely, a mere allegation that the invention solves a real-life problem may not be enough. Both inventions in issue in *HTC* and *Lantana* incorporated, in a new way, known technical means, *ie*, flags in *HTC* and e-mail communication in *Lantana*. Hence, an attempt to reconcile the outcomes in terms of novelty in claim features may fall flat.

158 However, these inventions may be distinguished by reference to whether the invention in issue is likely to solve a technical problem. Unlike in *HTC*, in *Lantana*, while it was alleged that the invention made an improvement by increasing the reliability of network communication, the Hearing Officer of the UK Patent Office had opined that there was no

226 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [19] and [27].
227 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [53].
228 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [55].
229 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [58].
230 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [56]–[57].

evidence of the improvement.[231] Without an evident improvement, the court went on to conclude that the technical problem identified in the invention was circumvented, not solved, and the contribution made by the invention was a computer program without more.[232]

159 The worth of solving real-life problems persuasively is also discernible in *PKTWO*, where it was held by the UK Patents Court that the invention in issue solved "a technical problem lying outside the computer".[233]

160 *PKTWO* was concerned with a new computer program that would be operated to monitor the content of electronic communications for the purpose of ensuring that users, particularly children, are not exposed to inappropriate content or language.[234] The invention utilised known programming concepts, including a hash-table, an aggregate alert level, and alarm notifications.[235]

161 It was accepted by the UK Patent Office that in comparison to the known art the invention in question included an alarm notification "giving a user/administrator an opportunity to choose an action before a default action takes place for a specific alert, rather than the system automatically specifying an action", which was characterised as a method of performing mental acts.[236]

162 Though it was submitted on behalf of the Comptroller that the alarm notification was a non-technical (excluded) effect, the court disagreed.[237] The court ruled that there was a technical improvement, specifically "the generation of a more rapid and reliable alarm notification" and "an improved monitoring of the content of electronic communications".[238]

---

231 *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463 at [11].

232 *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463 at [68]–[70].

233 *Re Protecting Kids the World Over (PKTWO) Ltd* [2012] RPC 13; [2011] EWHC 2720 (Pat) at [35].

234 *Re Protecting Kids the World Over (PKTWO) Ltd* [2012] RPC 13; [2011] EWHC 2720 (Pat) at [4].

235 *Re Protecting Kids the World Over (PKTWO) Ltd* [2012] RPC 13; [2011] EWHC 2720 (Pat) at [24].

236 *Re Protecting Kids the World Over (PKTWO) Ltd* [2012] RPC 13; [2011] EWHC 2720 (Pat) at [25].

237 *Re Protecting Kids the World Over (PKTWO) Ltd* [2012] RPC 13; [2011] EWHC 2720 (Pat) at [33].

238 *Re Protecting Kids the World Over (PKTWO) Ltd* [2012] RPC 13; [2011] EWHC 2720 (Pat) at [31]–[34].

163 As adverted to earlier, the efficacy of solving real practical problems cannot be generalised. *Re Gale's Application*[239] ("*Gale*"), an early UK Court of Appeal case on computer program exclusion, is illustrative.

164 If *HTC* suggested that computer programmers are legitimate sons of the patentability family, *Gale* may have portrayed mathematicians as heretics. In *Gale*, the invention in question involved a computer program implementing a new improved mathematical method to calculate square roots. The *Gale* court unanimously ruled that the invention was excluded for being a computer program as such. There were, however, different opinions on whether the invention was nothing more than a mathematical method or a discovery, as such.[240] Nicholls LJ, who gave the leading judgment, described the invention as follows:[241]

> Mr Norman Gale claims to have discovered an improved method of calculating the square root of a number with the aid of a computer. His method eliminates one of the stages, the division stage, required by most types of computer equipment. Mr Gale has put the necessary instructions for the computer into the electronic circuitry of a read-only memory (ROM) unit.

165 Recognising that the invention brought improvements to computer operations, Nicholls LJ stated:[242]

> The attraction of Mr Gale's case lies in the simple approach that, as claimed, he has found an improved means of carrying out an everyday function of computers. To that extent, and in that respect, his program makes a more efficient use of a computer's resources.

Be that as it may, the court eventually concluded that the invention was merely claiming a computer program as such. Nicholls LJ held:[243]

> What [Mr Gale's] instructions do, but it is all they do, is to prescribe for the cpu in a conventional computer a different set of calculations from those normally prescribed when the user wants a square root. I do not think that makes a claim to those instructions other than a claim to the instructions as such. The instructions do not define a new way of operating the computer in a technical sense[.]

239 [1991] RPC 305.

240 See *Re Gale's Application* [1991] RPC 305, as reported in Peter J Groves, *Sourcebook on Intellectual Property Law* (Cavendish Publishing Ltd, 1997) at pp 173, 183 and 187.

241 See Peter J Groves, *Sourcebook on Intellectual Property Law* (Cavendish Publishing Ltd, 1997) at p 173.

242 See Peter J Groves, *Sourcebook on Intellectual Property Law* (Cavendish Publishing Ltd, 1997) at p 183.

243 See Peter J Groves, *Sourcebook on Intellectual Property Law* (Cavendish Publishing Ltd, 1997) at p 183.

166 The court in *Aerotel* cited *Gale* for the proposition that "[a] technical effect which is no more than the running of the program is not a relevant technical effect".[244]

167 It is difficult to fully rationalise the computer exclusion decision in *Gale* under the technical contribution test, especially since it was accepted that the invention had improved an everyday computer function, which seems to be as "technical" as it can be (in the word's ordinary meaning). It is also difficult to see how the effects of the invention did not go beyond the running of the relevant computer program (stored in the ROM), when the invention would, in the real world, speed up the calculation of square roots.

168 With respect, similar sentiments were also expressed by Peter Prescott QC sitting as a Deputy Judge in *CFPH*. He stated:[245]

> The Court of Appeal did not explain why Fox LJ's observation ('There must … be some technical advance on the prior art … *eg* a substantial increase in speed as in Vicom …') did not apply to Mr *Gale*'s ROM circuit. One answer may be that nowhere does the Vicom decision refer to an increase in speed or call that a technical advance on the prior art. In 1986 it would have true [*sic*] of nearly all computer programs.

169 In *Gale*, the contribution of the invention is, essentially, the new mathematical algorithm, which is itself an excluded matter. This may preliminarily explain why, despite bringing technical improvements, the invention in *Gale* could not escape exclusion as a computer program as such. It cannot be the full explanation as it fails to explain why the invention in *Gale*, which included a technical application of the underlying mathematical algorithm, was *not* excluded under the mathematical method exclusion.[246]

E. Levels of abstraction rejected

170 A subject-matter exclusion is not limited to abstract matters.[247] Partly because of the difficulty in setting the right threshold among various levels of abstraction, the *Aerotel* court rejected its usefulness for testing whether an invention must be excluded.[248]

---

244 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [92].
245 *CFPH LLC* [2005] EWHC 1589 (Pat) at [81].
246 One member, out of the three-member Bench in *Re Gale's Application* [1991] RPC 305, did exclude the invention on the grounds that it was a mathematical method as such. See Peter J Groves, *Sourcebook on Intellectual Property Law* (Cavendish Publishing Ltd, 1997) at p 188.
247 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [68].
248 *Aerotel Ltd v Telco Holdings Ltd* [2007] Bus LR 634; [2006] EWCA Civ 1371 at [68].

171 However, it is submitted with respect that different levels of abstraction, not technical effects or improvements, may retrospectively explain the different outcomes in *Gale* and *HTC*.

172 In *Gale*, what was claimed was essentially the computerised method for calculating square roots, which is not an uncommon type of operation that computer programs carry out. There was, apart from computerisation, no other specifics to limit what was claimed.

173 In *HTC*, there was an idea for using "flags" to limit data transfer from one computer program to another (in the same device). Instead of claiming such flags in the abstract, what was claimed was a specific way to implement the flags that reduces inter-program data transfer.

F. Inherent vagueness in the technical contribution approach

174 It has been noted that the technical contribution approach, particularly its reference to the word "technical", may suffer an "inherent vagueness".[249]

175 The approach was also critiqued for being merely an extra-statutory "short-hand expression" for excluded matter, and while it is not wrong to refer to it, it is "merely a restatement of the problem in different and more imprecise language" and may become a "dangerous master".[250]

176 This vagueness may have resulted in difficulties in delineating what is and what is not a technical contribution. Peter Prescott QC (sitting as a Deputy Judge), in *CFPH*, expressed similar sentiments, including those in two other UK cases:[251]

> For example, in *Gale's Application* [1991] RPC 305, 328 Nicholls LJ said that Mr *Gale*'s algorithm did not solve a 'technical' problem lying within the computer. He continued:
>
> > I confess to having difficulty in identifying clearly the boundary line between what is and what is not a technical problem for this purpose.
> > …
>
> But for my part I think Nicholls LJ was too modest. I believe his difficulty arose, not through lack of expertise, but because of the inherent vagueness of the concept itself. In *Fujitsu Limited's Application* [1997] EWCA Civ 1174, [1997] RPC 608 Aldous LJ said:

249 *CFPH LLC* [2005] EWHC 1589 (Pat) at [13]–[14].
250 *CFPH LLC* [2005] EWHC 1589 (Pat) at [13]–[14].
251 *CFPH LLC* [2005] EWHC 1589 (Pat) at [13].

> I, like Nicholls LJ, have difficulty in identifying clearly the boundary line between what is and what is not a technical contribution.

177 There was also uneasiness in applying tests based on the description "technical contribution", "technical character" or "technical effect" instead of directly interpreting the wording of the statutes for the subject-matter exclusion. In his judgment in *HTC*, Lewison LJ said:[252]

> It is, to me at least, regrettable that because these apparently simple words have no clear meaning both our courts and the Technical Boards of Appeal at the EPO have stopped even trying to understand them. However we are so far down that road that 'returning were as tedious as go o'er'. Instead we are now engaged on a search for a 'technical contribution' or a 'technical effect'. Instead of arguing about what the legislation means, we argue about what the gloss means.

VI. The EPO approach

178 The EPO's harbour for computer programs is one with deep calm waters but a treacherous pier. The inherent vagueness from the definitional issue of the word "technical" in the UK and the EPO had never really gone away. The danger merely shifted.

179 The exclusion provisions in Art 52 of the European Patent Convention ("EPC") are substantively similar to the UK's, a difference being that the wording from TRIPS, "in all fields of technology", was expressly included in Art 52 of the EPC.

180 Despite the additional qualifier, the EPO has given a broad interpretation to the Article and adopted the earlier described "hardware approach".[253] According to the EPO's Board of Appeal in *Duns Licensing Associates*,[254] Art 52 of the EPC expressed a general entitlement to patent protection for any inventions in all technical fields, and the list of exclusions in its para (2) should be narrowly interpreted.[255]

181 The test may also be referred to as the "technical character" approach as technical character is an implicit requirement of an

252 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [143].
253 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [39].
254 Decision of 15 November 2006, *Duns Licensing Associates*, T 0154/04, EP:BA:2006:T015404.2006 1115.
255 Decision of 15 November 2006, *Duns Licensing Associates*, T 0154/04, EP:BA:2006:T015404. 20061115, para 6.

"invention" for the purposes of the EPC,[256] and it is not determined by any new contribution to the prior art.[257] In other words, novelty or a "new" contribution is not a requisite of an invention within the meaning of Art 52(1).[258]

182 It follows that the technical effect approach in *Aerotel* had to be, and was in fact, rejected by the EPO.[259] Further referral to the Enlarged Board of Appeal of the EPO ("Enlarged Board") of an appeal was inadmissible as the Enlarged Board ruled that the "technical character" approach laid down by the other EPO tribunals was not inconsistently applied and thus there was no legal basis for the Enlarged Board to intervene.[260]

183 In a further departure from the UK position, this time on levels of abstraction, the EPO Technical Board of Appeal in *Hitachi*[261] stated: "activities falling within the notion of a non-invention 'as such' would *typically* represent purely abstract concepts devoid of any technical implications" [emphasis added];[262] thereby suggesting that levels of abstraction can be a useful guide as part of the EPO's exclusionary principle.

184 Though one may think that with a broad statutory interpretation it will be relatively easy for an applicant to establish patentability, it is in fact not so. This is because the exclusions in Art 52(2) of the EPC are given material effect in the assessment for inventive step, in that only

256 Decision of 15 November 2006, *Duns Licensing Associates*, T 0154/04, EP:BA:2006:T015404. 20061115, para 5.

257 Decision of 15 November 2006, *Duns Licensing Associates*, T 0154/04, EP:BA:2006:T015404. 20061115, para 9.

258 In the Guidelines for Examination in the European Patent Office (November 2019), Part G, Chapter II, s 3.6 ("Programs for computers"), it was stated that "any method involving the use of technical means (*eg*, a computer) and any technical means itself (*eg*, a computer or a computer-readable storage medium) have technical character and thus represent inventions within the meaning of Art. 52(1)" <https://www.epo.org/law-practice/legal-texts/html/guidelines/e/g_ii_3_6.htm> (accessed 12 May 2020).

259 Decision of 15 November 2006, *Duns Licensing Associates*, T 0154/04, EP:BA:2006:T015404. 20061115, para 13.

260 Opinion of the Enlarged Board of Appeal of 12 May 2010, *Programs for Computers*, G 0003/08, EP:BA:2010:G0000308.20100512, paras 10.13 and 7.3.8. For a detailed account of the development of the divergence between the UK approach and the EPO approach and its related tension, please refer to Matthew Fisher, "Software-related Inventions" in *Research Handbook on Intellectual Property and Digital Technologies* (Tanya Aplin ed) (Edward Elgar Publishing, 2020) ch 13, at pp 285–291.

261 Decision of 21 April 2004, *Hitachi*, T 0258/03, EP:BA:2004:T025803.20040421.

262 Decision of 21 April 2004, *Hitachi*, T 0258/03, EP:BA:2004:T025803.20040421, para 4.5.

technical features may contribute towards novelty and inventive step.[263] Non-technical features, to the extent that they do not interact with any technical features to produce a technical effect, cannot contribute to any novelty or inventive step.[264]

185 It seems that the EPO's interpretation of the exclusion provisions has given rise to a low bar on eligibility but a high bar on inventive step.

186 For the purpose of ascertaining what is technical and what is not, in the context of the problem-solution approach that is adopted in the EPO's assessment of inventive step, a notional "non-technical" person was developed in several recent EPO appeal cases. This person may be a notional business person,[265] a notional computer programmer[266] and a notional mathematician.[267] An advantage of this notion could be that, as the notional skilled addressee has withstood (in patent law) the torrents of technological evolution, this notional "excluded" person may too so withstand.

187 Despite adopting tests of exclusion that are very different in form,[268] the UK Court of Appeal in *HTC* had expressed optimism that both would yield the same results since if an invention did not make any technical contribution it would eventually be excluded from patentability at the inventive-step bar.[269]

188 With respect, it is submitted that same outcomes are not guaranteed, particularly in view that several rules governing the assessment of novelty and inventive step may not have been applicable

263 Decision of 15 November 2006, *Duns Licensing Associates*, T 0154/04, EP:BA:2006:T015404. 20061115, para 14.

264 Decision of 15 November 2006, *Duns Licensing Associates*, T 0154/04, EP:BA:2006:T015404. 20061115, para 15.

265 In Decision of 31 January 2019, *SAP SE*, T 1082/13, EP:BA:2019:T108213.20190131, paras 4.7– 4.8 and Decision of 29 November 2016, *CardinalCommerce Corporation*, T 1463/11, EP:BA:2016:T146311.20161129, paras 13–17, it was suggested that the assessment of inventive step may take into account, where applicable, what a "notional business person" would contribute in the problem intended for the technically skilled person to solve.

266 Decision of 10 January 2019, *Google LLC*, T 0817/16, EP:BA:2019:T081716.20190110, paras 3.11–3.13.

267 Decision of 10 January 2019, *Google LLC*, T 0817/16, EP:BA:2019:T081716.20190110, paras 3.11–3.13.

268 Matthew Fisher, "Software-related Inventions" in *Research Handbook on Intellectual Property and Digital Technologies* (Tanya Aplin ed) (Edward Elgar Publishing, 2020) ch 13, at p 277, where it was remarked that details of the UK approach "differ significantly" from an approach in which any technical means would take a computer program outside exclusion.

269 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [41].

to subject-matter exclusion. These rules include the rule to assess novelty and inventive step with respect to what has been disclosed in one or more specific prior art references, and the requirement for an *enabling* prior disclosure to destroy novelty.[270]

VII. Sizing up the harbours

189 In Part I, the "problem children" of the computer program issue was treated to an introduction. While the problem children may have grown up along with the development of case law in some jurisdictions, some childhood complications never quite go away.

190 The approaches generally still suffer from a definitional problem – in the *Alice* approach it is related to the threshold for holding a claim to be directed to an abstract idea, and in the *Aerotel* approach, it is the definition of the word "technical". The former relates to a problem of degree while the latter is an ontological problem, which, it is submitted, creates more uncertainties especially in the case of a computer program because of its inherent technical nature and rapidly expanding use in social and business practices.[271]

191 While the *AT&T* signposts have been distilled from past cases in order to alleviate the definitional problem relating to the adjective "technical" in the *Aerotel* approach, they are not "determinative in every case".[272] It is also arguable that the signposts themselves are open to different interpretation, thereby creating uncertainties of their own.

192 The difficulties in pinning down what "technical" is are also apparent in the Examination Guidelines. It was earlier adverted to that in these guidelines, the "actual contribution" approach of *Aerotel* is adopted by IPOS. In relation to artificial intelligence and machine learning methods ("AI"), the guidelines suggest that whether an AI invention is characterised by its "technical" features depends on the problem that it solves and, seemingly, its degree of specificity.

---

270 *Synthon BV v SmithKline Beecham plc* [2005] UKHL 59 at [14].

271 See paras 1–13 above.

272 *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [51] and *Lantana Ltd v Comptroller-General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463 at [10]. In a recent case, *Lenovo (Singapore) Pte Ltd v Comptroller General of Patents* [2020] EWHC 1706 (Pat), Mr Justice Birss opined at [23] that "[t]he signposts are really focussed on what one might call the better computer cases … [the present case] is not one of those".

193 The guidelines in particular suggest that an AI invention may be barred if it solves a problem of "controlling a system" because it is a "generic problem", while an AI invention that was claimed to solve a problem of "controlling the navigation of an autonomous vehicle" is allowable.[273] In another case, a computerised business method invention would fail for solving no specific problem, while one that provides "a more secure environment for performing transactions" will pass muster for the reason that the actual contribution is likely to be in the use of the overall combination of hardware.[274] And so whether the problem is essentially technical now seems to depend not on the nature of the problem but on whether the invention solves a specific or a generic problem.[275]

194 Apart from the inherent vagueness in the adjective "technical", the *Aerotel* approach's focus on "actual contributions" also heightens the risk of the inquiry becoming unduly stringent, particularly in cases where the claimed invention was excessively stripped of features and down to its core where one finds, unsurprisingly, an abstract idea or some other excluded subject matters since all inventions at some level make use of an abstract idea.

195 This could be what had happened in *PKTWO*. In *PKTWO*, the hearing office had concluded that the invention in question added no technical contribution to the prior art but a "method of performing mental acts"; however, when the contribution was characterised by the improvements resulting from invention, the court allowed the appeal against the hearing office's decision.[276] In *Aristocrat Technologies Australia Pty Ltd v Commissioner of Patents*,[277] a 2020 Australian case, the delegate of the patent office had also stripped the claimed invention down to its core and determined that "the inventive concept [was] in substance directed towards a gaming procedure" (abstract ideas are not patentable) and there was no ingenuity in its implementation. The court disagreed with the delegate's characterisation of the invention. The court determined that the claimed invention was a device of a specific character and was thus a patent-eligible "manner of manufacture" according to the Australian patent statutes.[278]

---

273 Intellectual Property Office of Singapore, *Examination Guidelines for Patent Applications at IPOS* (March 2020) at paras 8.22–8.26.

274 Intellectual Property Office of Singapore, *Examination Guidelines for Patent Applications at IPOS* (March 2020) at para 8.7.

275 Intellectual Property Office of Singapore, *Examination Guidelines for Patent Applications at IPOS* (March 2020) at para 8.23; read with paras 8.6 and 8.7.

276 See paras 132–149 above.

277 [2020] FCA 778.

278 *Aristocrat Technologies Australia Pty Ltd v Commissioner of Patents* [2020] FCA 778 at [98] and [101]–[106].

196 A further objection to the *Aerotel* approach has been made on the basis that what is inventive (contribution) is being doubly counted – first, it is used for exclusionary purposes, and then again for inventive step purposes.[279]

197 The *Alice* approach is also susceptible to further criticism.

198 If there is a form versus substance scale that may be employed to characterise the trans-Atlantic trio of approaches, the *Alice* approach would fall further away from the substance end as the "directed to" inquiry in *Alice* step 1 takes precedence over the substantive "inventive concept" inquiry in *Alice* step 2. Together with the judicial exception of abstract idea, the *Alice* approach is arguably the most permissive of the trio.

199 However, a safe harbour for subject-matter eligibility may not necessarily be a bad thing if pre-emption risks are addressed and bearing in mind that an eligibility test is only a threshold test of patentability, and as a threshold test it does not have to be overly stringent or complicated to carry out, or even, to quote from *Alice*,[280] "swallow all of patent law".

200 In its favour, the *Alice* framework is a two-stage test with different focuses – step 1 focuses on claim scope and risks of pre-emption; step 2 focuses on the merits of the inventive concept in the claims. Such a framework is arguably better calibrated, and may, in theory at least, provide the applicant with greater flexibility for patent prosecution – first, the applicant may rely on a less ambitious claim of suitably narrow scope to clear the test at step 1, or alternatively, the applicant may proceed with an ambitious claim of wide scope and seek to overcome risks of pre-emption by showing (in step 2) the invention's merits in the form of improvements made to a technological process or other inventive concept. Providing options to patent applicants is usually sensible, particularly where the policy objectives of the patent system are still preserved while doing so.

201 Some critics may analogise the exclusionary principle of claim limitation in *Alice* step 1 to the "magic words" approach. However, the analogy is less than accurate as these "magic words" do not place any meaningful limitations on the scope of a claim.

279 Other commentators have raised similar observations; see Matthew Fisher, "Software-related Inventions" in *Research Handbook on Intellectual Property and Digital Technologies* (Tanya Aplin ed) (Edward Elgar Publishing, 2020) ch 13, at p 286, for example.

280 *Alice Corp Pty Ltd v CLS Bank International* 134 S Ct 2347 at 2354 (2014).

202 Critics also argued that the *Alice* steps are vague because they are based on broad-based principles.[281] However, such arguments may be countered with empirical studies demonstrating that it was more likely than not that a US patent practitioner would correctly predict an "*Alice*" outcome from an actual court case.[282]

VIII. Final thoughts

203 As the "problem children" are growing up, the approaches that are adopted in the US, UK and EPO have presented some interesting options to address the computer program issue. The position on subject-matter exclusion in Singapore is not as clear as one may hope for. There is no express statutory language on what subject matters are excludable as non-inventions and no judicial guidelines on how to assess them.

204 The UK approach, together with the EPO approach, emphasises what is non-technical for exclusion, and, seems to continually suffer from an inherent vagueness in the adjective "technical".[283] (Is it because efforts were made to understand not what the adjective means but what the gloss means?[284]) Other weaknesses of this approach were earlier discussed, especially in Part VII of this article. If, on the other hand, Singapore were to adopt the EPO approach, there are considerable uncertainties as legal developments in the patent law on novelty and inventive step may also be required.

205 The two-stage approach in *Alice* seems comparatively attractive, without suffering the same fundamental weakness while allowing for a calibrated assessment that takes into consideration the risks of pre-emption and merits of an inventive concept. The list of excluded matters in *Alice* is a judicial (not statutory) list, that is more grounded on policy objectives of the patent system. If a policy-based approach is

281 See Jason D Reinecke, "Is the Supreme Court's Patentable Subject Matter Test Overly Ambiguous? An Empirical Test" (2019) 3 *Utah Law Review* 581 at 583.

282 See Jason D Reinecke, "Is the Supreme Court's Patentable Subject Matter Test Overly Ambiguous? An Empirical Test" (2019) 3 *Utah Law Review* 581 at 583.

283 The vagueness in the EPO approach comes into play at the inventive step test.

284 A reminiscence of what Lewison LJ wrote in *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451 at [143]: "Instead we are now engaged on a search for a 'technical contribution' or a 'technical effect'. Instead of arguing about what the legislation means, we argue about what the gloss means."

preferred, it may be helpful to refer to the US approach and its post-*Alice* developments.
