Appeal No: CA-2024-000036

(CH-2022-000144)

IN THE COURT OF APPEAL

ON APPEAL FROM THE BUSINESS AND PROPERTY COURTS

OF ENGLAND AND WALES

INTELLECTUAL PROPERTY LIST

PATENTS COURT (SIR ANTHONY MANN)

ON APPEAL FROM THE DECISION OF THE COMPTROLLER GENERAL OF PATENTS DATED 22 JUNE 2022 (BLO/542/22)

IN THE MATTER OF THE PATENTS ACT 1977

and

IN THE MATTER OF UK PATENT APPLICATION GB1904713.3

IN THE NAME OF EMOTIONAL PERCEPTION AI LTD

THE APPLICANT/RESPONDENT'S SKELETON ARGUMENT

ON APPEAL TO THE COURT OF APPEAL

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A. INTRODUCTION

1. The global music streaming industry is projected to grow from $25 billion in 2021 to $103 billion by 2029[1]. Spotify, a world leading music streaming service, alone had an R&D spend in 2021 of €912 million[2]. The global video streaming industry is larger still[3].

2. The Application GB1904713.3 ('the Application') relates to AI, or, more specifically, to adaptive neural networks (ANNs), their training and application in technology that gives rise to particular practical benefits to these industries, amongst others. The Judgment is of substantial commercial importance to the Applicant ('EPAI') and the industry more broadly, and has attracted enormous interest.

3. By the Judge's decision he considered the nature of the inventions claimed in the claims of the Application, and having done so concluded that an ANN is not a 'program for a computer' at all[4]. He held that the invention is cast at a level of generality above the specific manner of its implementation, whether in hardware or as a software emulation[5]. The exclusion was therefore not engaged[6]. For good measure the Judge also held that, were he to be wrong about that, then in any event the invention as claimed demonstrated a 'technical effect' in accordance with the established case law and was not for a 'program for a computer … as such'[7].

4. By its appeal, the UKIPO seeks to argue that the Judge was wrong so to conclude. The UKIPO's approach is, however, wrong in law and incorrect on the facts. The UKIPO's approach is to strip out from the claimed invention the inventive *concept* which underlies it, and then to say that it is only that *idea* which is to be compared to the statutory exclusions[8]. But that is to take the 'contribution approach' which was ruled to be *wrong* by this Court in *Genentech*, *Merril Lynch* and *Aerotel*. The UKIPO's approach also asks whether the invention is 'computer implemented', an ill-defined

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[1] https://www.grandviewresearch.com/industry-analysis/music-streaming-market.

[2] https://www.statista.com/statistics/813751/spotify-research-development-costs/.

[3] https://www.grandviewresearch.com/industry-analysis/video-streaming-market#:~:text=The%20global%20video%20streaming%20market,21.3%25%20from%202022%20to%202030.

[4] Judgment [58], [61].

[5] Judgment [56].

[6] Judgment [61].

[7] Judgment [76] and [78].

[8] See in particular at [32] – [34].

phrase which is not used in the Act, and positively criticises the Judge for looking for a 'computer program'[9]; despite that being exactly what the statute requires[10].

5. The UKIPO also seeks to withdraw ('interpret' it says[11]) its concession in front of the Judge that in a hardware ANN at least there is no computer program at all. EPAI does not object to this withdrawal on formal grounds, since it does not wish it to be said that the decision from this Court is based on that later-disputed concession, but EPAI says that the UKIPO's original concession was in fact rightly made, and its reversed position on this appeal is artificial and wrong.

6. The UKIPO further incorrectly understands how the ANN of the claims operates. The UKIPO states repeatedly that the ANN is making subjective or emotional judgments[12], but that is wrong. In use the ANNs of the invention make purely mechanical assessments of the physical properties of tracks. That the results are better *inter alia* because of the improved track recommendation is a *benefit* of the invention, not how the ANN functions.

7. EPAI submits that the correct approach in law to a case such as this is:

   a. First to ask the *Aerotel* questions. These serve correctly to orientate oneself for the statutory question, but do not themselves answer that statutory question;

   b. Second to consider whether the invention is within the exclusion, which itself has two aspects:

      i) Does the invention involve a "*program for a computer*" at all?

      ii) If it does, then to consider whether the invention is a "*program for a computer … as such*".

8. This latter step (b.(ii) above) requires a consideration of the invention as defined in the claim, and asking whether that invention is just ("*as such*") a computer program. It is well established in the cases that an invention which is properly characterised as a method or system for doing something (itself not excluded under the Act), such as designing a drill bit, canning soup, sending an internet alert message or analysing an image file, is not excluded just because it may be *implemented* using a computer program. The cases also show that even where a claim contains some integers which might be said to be a computer program, if it also contains elements which are external to that computer program it

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[9] UKIPO's skeleton §27.

[10] "… as such".

[11] UKIPO's skeleton [63].

[12] E.g. UKIPO skeleton §§8, 40, 41 and 56.

will also normally satisfy the statute. This is because in each case the invention claimed is not to a computer program "*as such*": in the first case the invention is at a level of generality above the manner of its implementation, and in the second the invention contains elements in addition to those which might be described as a computer program. This is often referred to in the cases as the search for a 'technical effect', but that language can be rationalised as just a – possibly slightly distracting – paraphrase of the statutory test.

9. Once the proper questions in law have been identified, it quickly becomes clear that the Judge was right for the reasons he gave. It also becomes equally clear that the UKIPO's case, based as it is on the long-rejected 'contribution approach', is wrong.

10. In this skeleton, we start with a fairly brief introduction to the technology and the Application, then we examine the English law in some detail, followed by a brief summary of the approach in the EPO and other major EPC jurisdictions. Finally we draw this all together and explain why the Judge was right, and the UKIPO's appeal is flawed and wrong.

B. TECHNICAL BACKGROUND AND THE EXPERT EVIDENCE

11. The technology in this case is at times complicated. The Judge outlined the nature of ANNs in [14] – [18]. They are further described in Annex 1 to our High Court Skeleton (which the Court is invited to read) [SUPP/1/pp.42-46], and further detail is found in Prof. Pardoe's report at §§19 – 43 [SUPP/8/pp.212-217].

12. An ANN consists of a collection of nodes ('neurons'), arranged in layers and coupled to the neurons in the layer above and below by connections ('links'). Each neuron[13] receives inputs from neurons in the layer above, and passes on its output to neurons in the layer below. Often each neuron in one layer will have connections from every neuron in the layer above, and to every one in the layer below, but this is not always the case.

13. The links have 'weights' and the neurons 'biases'. Some neurons will feed inputs onto others strongly (by their link having a high weighting factor), whilst others may do so more weakly, or even negatively. Each neuron typically also has a bias associated with it (i.e. a positive or negative offset).

14. In a trained ANN this complicated internal structure takes inputs which cascade through the layers of neurons to provide useful outputs: to identify similar images in response to a user request, or to identify drug candidate molecules, for example. The 'training' of an ANN is an initial iterative

[13] Other than in the top and bottom layers, for obvious reasons.

process by which its internal structure is amended and refined using test data to produce the working product, which the Judge describes at [16] – [17].

15. A point which is important to appreciate is that ANNs, comprising this structure of nodes, links, weights and biases, can exist in a hardware form, or be emulated using software. As the Judge puts it in [14] and [18], the former is a physical box with electronics in it, whilst in the latter a conventional computer runs a piece of software which enables the computer to emulate the ANN as if it were a hardware ANN[14]. Hardware solutions for training and constructing ANNs are commercially available, and there is no practical differences between ANNs implemented in software or in hardware[15]. Software and hardware implementations are thus the same in terms of the architecture, weights and biases, and the outputs produced[16]. It is just a question of which is a more convenient or efficient way to implement the ANN in a particular scenario[17]. This is important as it is informative of what an ANN actually *is*, and also of the level at which the inventions of the claims are cast (which refer to ANNs themselves, but above or agnostic of the manner of their implementation).

16. Further, even where emulated on a computer, an ANN is both in form and nature very different from a computer program. A computer program takes the form of serial logical 'if-then' type statements defined by the human programmer and which define exactly what it is that the programmed computer does. A software supported ANN, however, does not rely upon a series of instructions of that type, but instead is an emulated machine supported on a software platform.

17. The core utility of ANNs (including the ANNs of the Application) lies in their ability to address problems which would be intractable to computer programming. To write a computer program requires the programmer to understand the problem at hand and the manner of its solution, from which to formulate a series of logical commands for the computer to follow. Where the problem is itself intractable, then a computer programmer (and computer program) cannot help – how, rhetorically, can a programmer write a program when the solution to the problem is not even understood? By contrast an ANN is a machine-based system which is able through iterative training on a (usually very extensive) data set to create for itself an internal structure which solves the otherwise intractable problem. The solution to the problem is embedded into the structure of the ANN, i.e., in its links, nodes, weights and biases; that structure being the result of iterative changes made during the training process. In many cases, certainly including those of the Application, there may be enormous

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[14] Judgment [18].

[15] Judgment [18].

[16] Judgment [53].

[17] Pardoe [43].

insight in how the training objectives and the training data are used to cause the ANN in question to evolve during training; but even then the computer scientist does not know in advance what structure the ANN will adopt nor what patterns and relationships the ANN will ultimately pick up in the data, and indeed it is normally impossible even once the ANN is trained to understand how it is approaching the problem in question to produce the answers given.

18. It is for those reasons that the Judge was right to say that a claim to an ANN is not a claim to a program for a computer, and did not engage the exclusion at all (indeed, was a technical thing in itself[18]). At the level of the claim, an ANN is a machine the structure of which provides its function. That that thing can be *implemented* as a physical ANN or emulated on a software platform does not change the nature of the claimed invention, and does not matter. The ANN of this Application, and likely ANNs in general, are outside of the exclusion.

19. In addition the claims of this Application contained wider technical features, and the Judge was right to conclude that they would also have been allowable on this alternative basis.

C. THE APPLICATION

20. The Application is technically dense and complicated. It can be found at [SUPP/6]. The Judge summarised it at [4] – [13]. We provided a more detailed explanation at Annex 2 to our High Court skeleton [SUPP/1/pp.47-57], which the Court is invited to read, and is it further addressed by Prof Pardoe at [44] – [61] [SUPP/6/pp.217-221].

21. In briefest outline, the position is as follows. As the Judge records at [4], the prior approach to making music recommendations tended to be limited to recommendations within fixed types of music, based on categorisation by human tagging or investigating human playlists. The result was that recommendations tend to be limited by genre (hard rock playlists beget hard rock songs, even if there might be a musically very similar song in a different genre – Wagner perhaps). By the innovative pairwise training described by the Judge at [8] – [12], the trained ANN of the invention obtains a structure which can be used to analyse the *physical* properties of tracks (rhythm, tonality, timbre etc) to identify other tracks which will in fact have similar musical or emotional feel[19]. Thus an ANN of the invention is able to make recommendations based on only physical attributes but which can cross genres – with the invention if you put in hard rock you may indeed have a musically similar Wagner track returned. As the Hearing Officer held, and the Judge recorded, the invention results in better,

[18] Judgment [78].

[19] This is referred to as the 'semantic' feel in the Application, due to it being derived from a written description.

more accurate recommendations[20], provided also by a system which is faster and simpler than the prior art[21].

22. Note, however, that what the ANN is doing in use is purely objective – it performs a physical analysis of the physical properties of the track, and outputs a recommendation based also on the physical analysis of the physical properties of the recommended track. Whilst the result is a (subjectively) better recommendation, that (subjective) improvement is only a *benefit* of the invention – it is not how the ANN of the invention actually *works*. The ANN of the invention does not make value judgments, nor does it have subjective views on musical taste. Nor is it unusual in patent law that the benefit of an invention is a happier user – to the contrary that is true of many, many patented inventions: improved massage machines, better car suspension, clearer audio equipment, improved video or audio codecs in telecommunications, etc., all have a (subjectively) happier user at their heart.

23. Note also that the claims are to a *system* (claim 1) or a method using that *system* (claim 4), in each case containing *inter alia* an ANN, a database, a communications network and a user device to which the recommendation message[22] is sent. The claims are not merely to the idea of the pairwise approach to the training objectives, even if that is a significant (and technically very clever) aspect of the inventive step underlying the claimed inventions.

24. Finally, whilst to date it has been EPAI's position that it was unlikely that claims 1 and 4 needed to be considered separately, it has always reserved its rights in this regards. Given the UKIPO's approach on this appeal it is possible, albeit we still think unlikely, that a distinction may arise[23].

D. THE LAW

25. The law in this area is not, it is probably fair to say, always of complete simplicity. Nonetheless, as we have explained above, the caselaw can be synthesised into a fair and logical structure, which properly has regard to the wording and principles of the Act. The key to understanding all of these cases, as it ever is in patent law, is properly to focus on the identification of the *claimed invention* itself.

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[20] Decision [48], [53] – [54] and [69].

[21] Decision [49] and Judgment [13].

[22] At the hearing in front of the Judge there was a discussion as to whether the recommendation message contained the recommended music file, or whether a link would be enough. It was common ground, however, that this did not affect the decision and can be left open.

[23] See in particular §87 below.

26. What is excluded under s1(1)(d) and 1(2)(c) of the Act[24] are inventions which are '*programs for computers ... as such*'. Under the English approach (the 'technical effect approach'[25] (with 'rider')) the question asked is whether the invention as defined in the claim makes a 'technical contribution'[26] or has a 'technical effect'. Within the EPO a different approach is taken, and the focus is upon the presence of any piece of physical hardware (sometimes called the 'any hardware approach'). These in a sense may come full circle when, under the consideration of obviousness under Art. 56 EPC, the EPO will exclude features which do not contribute to the technical character from its consideration of Arts 54 and 56. But nonetheless the approaches are quite different.

27. Furthermore, as Lewison LJ commented in *HTC v Apple*[27], our Courts (and the Technical Boards of Appeal) focus not on the words of the statute, but instead upon a search for a technical contribution or effect. As Lewison LJ says: instead of arguing about what the legislation means, we argue about what the gloss means. But it is important to understand what the gloss is really about, which is the proper identification of the claimed invention and whether, properly characterised, it is (or contains aspects which are) other than a '*program for a computer ... as such*'. There might be something to be said for moving on from that specific language to something more focussed on the wording of the Act and the invention, since the 'technical contribution' language does not always add clarity, but that question does not affect the substance of the law.

28. Rather than seeking clarity in this case, however, the UKIPO seeks to add yet further glosses to the statutory test, by recasting the exclusion as appertaining to 'computer implemented inventions', without precision as to what that means and why that different language should be used when the Act refers to a '*program for a computer … as such*'. The reason the UKIPO does this is to try to gloss over its problem that an ANN is not a computer program at all. We therefore resist that invitation, and focus on the statutory language herein.

29. EPAI's position is that the Judge correctly summarised the law, and reached the right conclusion. Although cognisant of the divergence between the English caselaw and that in the EPO, and bearing in mind also *Actavis c Merck*[28], for the purposes of this hearing our primary case (subject

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[24] Patents Act 1977 (as amended).

[25] With the 'rider' that a novel or non-obvious improvement in an excluded category does not count as a technical improvement.

[26] Given that *Aerotel* rejects the 'contribution' approach, the choice of language here is unfortunate.

[27] [2013] EWCA Civ 451, at [143] – [147].

[28] [2008] EWCA Civ 444, [2008] RPC 26.

to one tweak, which we think proper but which likely does not matter for the Court's decision[29]) is that the English law is correct and should be applied in this case. The UKIPO agrees[30]. Towards the end of this skeleton, we nonetheless also briefly summarise the approach of the EPO, in case it is of interest to the Court, and formally we reserve our position on the law were this case to go further.

The Statute and EPC

30. The Court will be familiar with subs. (1) and (2) of s.1 of the Act, which are among the statutory provisions that are specifically mentioned in s.130(7) of the Act[31] and so should be construed consistently with the corresponding provisions of the EPC. In its current form (EPC 2000) those provisions are found in Art.52.

The Nature of the Exclusions

31. Whilst the exclusions constitute what Jacob LJ described in *Aerotel*[32] as a 'disparate group', both here and in the EPO some degree of consensus is emerging about them, perhaps bolstered by the addition to Art. 52 EPC 2000 of the words 'in all fields of technology' as we discuss below. The modern understanding is set out by Birss J (as he was then) in *Halliburton*[33] at [26] – [27], where he stated in particular that "*at the heart of the law is the consistent principle that an inventor must make a contribution to the art (that is to say the invention must be new and not obvious) and that contribution must be technical in nature (susceptible of industrial application and not within one of the areas excluded by Art.52(2)). ... In my judgment the observation remains true today taking full account of Aerotel and Symbian as well as the other cases decided at the Patents Court level since.*"

32. The EPO takes much the same view. In *G1/19* the EBA commented on the limited nature of the exclusions under Art 52(2)(c). It noted in [24] and [25] that the words 'in all fields of technology' were inserted into Art. 52 EPC 2000, to bring it into line with Art. 27 TRIPS, and expressed the intent of TRIPS not generally to exclude programs for computers from patentability. Accordingly, the TBA concluded that this was a bar to a broad interpretation of the exclusions listed in Art. 52(2) EPC.

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[29] Concerning the effect of the amendments in 2008 to bring to Art. 52 EPC into line with the protection afforded to the "all fields of technology" requirement of Art. 27 TRIPS, see paragraph 33 below.

[30] UKIPO skeleton §79.

[31] Which states "*130(7) ... it is hereby declared that the following provisions of this Act, that is to say, sections 1(1) to (4) ... are so framed as to have, as nearly as practicable, the same effects in the United Kingdom as the corresponding provisions of the European Patent Convention ... have in the territories to which those Conventions apply.*"

[32] *Aerotel Ltd v Telco Holdings & Ors* [2006] EWCA Civ 1371, [2007] RPC 7.

[33] *Halliburton Energy Services Inc's Patent Application* [2011] EWHC 2508 (Pat), [2012] RPC 12.

33. In *Aerotel* at [9] Jacob LJ had taken the view that there was no indication as to whether the exclusions should be read narrowly or widely. *Aerotel* was, however, a case decided under the EPC 1973, without the wording 'in all areas of technology' which was added by the amendments to create EPC 2000 and referred to by the Board in *G1/19*. Whilst we think that this observation unlikely matters to the decision in this case[34], in terms of a wider understanding of the law in this area we submit it would now be correct to read the Act with the amendments to EPC 2000 and the statements in *G1/19* in mind, and that the exclusions should be viewed as narrow[35].

E. THE MEANING OF A 'PROGRAM FOR A COMPUTER'?

34. This is, as far as we are aware, the first case in which there has been a close focus on the meaning of a 'program for a computer' under the Act. Before the Judge, as it did before the Hearing Officer, EPAI relied upon a set of dictionary definitions set out by the Judge at [36]: for example "*a set of instructions for a computer to perform some task*" and "*a set of instructions that makes a computer do a particular thing*". As the Judge noted at [36], the UKIPO accepted these definitions – this not being something the UKIPO seeks to resile from on this appeal. This was also supported by Prof. Pardoe's description of a computer program in his report at [22], cited by the Judge at [37]. We further note Jacob LJ's description of a program for a computer in *Aerotel* at [31] as "*a set of instructions*" and a "*series of instructions*", and also *Gale*[36] at p.324$_{40-50}$ "*a series of instructions capable of being followed by a cpu to produce a desired result*". This is also consistent with the policy which Jacob LJ identified as underlying the program for a computer exclusion, namely overlap with protection under the law of copyright; which posits that the computer program comprise a human-created set of written instructions, i.e. at the level of idea/expression protected by copyright.

F. THE ENGLISH LAW

Aerotel, Merrill Lynch and Genentech

35. *Aerotel* is well known and well cited for its eponymous test. It is informative, however, to start with the analysis which underlay the final decision, which the Court included in an Appendix from [78] onwards of that decision.

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[34] Although insofar as necessary EPAI would rely upon it.

[35] For completeness we refer the Court to the first instance decision in *Symbian* [2008] EWHC 518 (Pat) at [46] - [48] where Patten J rejected a much more extreme argument that the changes to Art. 52 EPC in the light of TRIPs allowed the High Court to reject *Aerotel* wholesale and adopt the approach of the EPO 'trio' of cases – *Pension Benefit*, *Hitachi* and *Microsoft*. See also *Halliburton* at [79]. That is not our case here – only that the exclusions should now all be viewed as narrow.

[36] *Gale's Application* [1991] RPC 305.

36. The Court's analysis starts at [78] with the then-leading decision in *Merril Lynch*[37]. Here the Court recorded that in his first instance decision in that case[38] Falconer J had rejected the application on the basis of the so called 'contribution' approach; namely to ask whether the *inventive step* resides only in the contribution of excluded matter[39]. Given the approach of the UKIPO in its skeleton, it is important to set out Falconer J's reasoning here (emphasis added):

> *"In my judgment, where an invention for which a patent is sought involves any of the matters specified in paragraphs (a), (b), (c) and (d) ("an excluded matter"), on its proper construction the qualification in section 1(2) does require of the Patent Office an initial enquiry and assessment as to whether the inventive step resides in the contribution of that excluded matter alone – if only that contribution of the excluded matter is the inventive step, the invention is not patentable by virtue of section 1(2). I endorse, therefore, the view of the principal examiner that in the determination of whether or not an application relates to an excluded thing it is necessary to take into account whether the non-excluded features are already known or obvious."*

37. Thus the approach of Falconer J was to strip out from the claim all that was known (or obvious), and ask if that which remained – that which provided the inventive step – fell within the exclusions.

38. In [80] of *Aerotel* the Court considered the decision of the Court of Appeal in *Genentech*[40], which was heard after the first instance decision in *Merril Lynch* but before its appeal. As the Court set out in [80] – [81], the Court of Appeal in *Genentech* noted a difference between the approach of Falconer J and an important decision from the TBA[41] in *Vicom*[42] (discussed below) which made it clear that the mere fact that a computer is involved is in itself no objection – what is decisive is the technical contribution made by the invention as defined in the claim when considered as a whole.

39. The Court of Appeal in *Genentech* preferred the approach in *Vicom*, rejecting the 'contribution' approach of Falconer J in *Merril Lynch*. The Court in *Aerotel* (at [82]) cited and approved sections of Dillon LJ's and Whitford J's judgments in *Genentech* in which they pointed out that the contribution approach gave illogical and unworkable results. See also [34] of *Aerotel* where the Court summarised the point: "*suppose the "discovery" of the genetic (nucleotide) sequence which encodes for a particular valuable protein and a claim to a novel cloning vector incorporating that sequence. If you "strip out" the discovery all you have is a known sort of cloning vector. So all that has been added is the discovery – since that is unpatentable the claim is unpatentable*

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[37] *Merril Lynch's Appn (1989)* [1989] RPC 561.

[38] *Merril Lynch's Appn (1989)* [1988] RPC 1.

[39] As summarised by the Court in *Aerotel* at [26].

[40] *Genentech's Patent* [1989] RPC 147.

[41] Technical Board of Appeal of the EPO.

[42] *Vicom* (1986) T208/84, [1987] OJ 14.

too. That cannot be right – it would exclude many valuable inventions. Hence the contribution approach is wrong.". That has much in common also with the analysis of Nicholls LJ in *Gale* at 323_{29} – 324_{41}.

40. Although in [35] of *Aerotel* the Court questioned the correctness of this analysis they (a) stated that they were bound by it, and (b) their proposed solution to this in *Aerotel* would have been to reveal the fallacy in the 'contribution approach' in a different way, not to suggest that *Genentech* was wrong to reject the contribution approach at all.

41. This is important, as the contribution approach rejected in *Genentech* should be compared with the approach taken by the UKIPO on this appeal, where they repeatedly state that certain features of the claims can be ignored because they were known in the art, or not part of the inventive step, and say that the inventive remainder is all that can be focussed upon for the purpose of the exclusions[43]. That is to apply the contribution approach, but that approach is wrong in law and has been rejected.

42. Returning to *Aerotel*, at [83] the Court summarised the decision on appeal in *Merrill Lynch*, which applied the reasoning in *Genentech* and *Vicom*. The Court then proceeded to consider a number of other cases, including from [121] the decision of Peter Prescott QC in *CFPH's Application*[44]. The Court picked up on the subject of the identification of a 'technical contribution' in [125], which we set out below along with [104] of *CFPH* of the citation which followed it (emphasis added):

> *125. Mr Prescott held that the policy against the patenting of computer programs as such must extend to precluding patenting a computer when running under the instructions of a new program. Otherwise the exclusion is pointless. The test was whether the claimed subject-matter was new and non-obvious merely because there was a computer program. If on the other hand the computer program was merely a tool for doing something in a better way it was not caught by the exclusion unless that "something" was itself excluded, e.g. as being a business method.*
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> ...
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> *[104] But the mere fact that a claimed artefact includes a computer program, or that a claimed process uses a computer program, does not establish, in and of itself, that the patent would foreclose the use of a computer program. There are many artefacts that operate under computer control (e.g. the automatic pilot of an aircraft) and there are many industrial processes that operate under computer control (e.g. making canned soup). A better way of doing those things ought, in principle, to be patentable. The question to ask should be: is it (the artefact or process) new and non-obvious merely because there is a computer program? Or would it still be new and non- obvious in principle even if the same decisions and commands could somehow be taken and issued by a little man at a control panel, operating under the same rules? For if the answer to the latter question is 'Yes' it becomes apparent that the computer program is merely a tool, and the invention is not about computer programming at all. It is about better rules for governing an automatic pilot or better rules for conducting the manufacture of canned soup.*

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[43] UKIPO's skeleton at e.g. §§11, 32 – 34 and 54.

[44] *CFPH's Appns* [2005] EWHC 1589 (Pat), [2006] RPC 359.

43. That analysis is pithy and compelling (and plainly Jacob LJ would have said so had he thought otherwise). At its core is the proper identification of the claimed invention. If the invention is merely the computerisation of something that is known, then that is within the exclusion, but if – analysed correctly and at the right level of generality – the invention is for a product or process which is merely implemented on a computer, then the invention is that product or process (and not '*a computer program ... as such*') and is patentable. We will see below that the EPO said the same in *Vicom* at [15] – [16].

44. Returning to the start of *Aerotel*, in [38] the Court recorded that it was bound by *inter alia Merril Lynch* and *Genentech* and it set out the well known test at [40]: "*The approach is in 4 steps: (1) properly construe the claim, (2) identify the actual contribution; (3) ask whether it falls solely within the excluded subject matter; (4) check whether the actual or alleged contribution is actually technical in nature*".

45. The first step was further described by the Court in *Aerotel* at [42] "*42. No-one could quarrel with the first step – construction. You first have to decide what the monopoly is before going on the question of whether it is excluded. Any test must involve this first step.*"

46. As to the second "*43. The second step – identify the contribution – is said to be more problematical. How do you assess the contribution? Mr Birss submits the test is workable – it is an exercise in judgment probably involving the problem said to be solved, how the invention works, what its advantages are. What has the inventor really added to human knowledge perhaps best sums up the exercise. The formulation involves looking at substance not form – which is surely what the legislator intended.*" Thus one must look at the substance not the form, but the question is of the substance of the claimed invention, not some kind of extracted summary of its inventive step, as the UKIPO approach it in its skeleton[45]. That is what the discussion of *Merril Lynch* and *Genentech* was about.

47. The third step was addressed at [45], and as Lord Neuberger's commented in *Symbian*[46] at [8] & [12], it is really just to ask the statutory question[47]:

> *45. The third step – is the contribution solely of excluded matter? – is merely an expression of the "as such" qualification of Art.52(3). During the course of argument Mr Birss accepted a re-formulation of the third step: Ask whether the contribution thus identified consists of excluded subject matter as such? We think either formulation will do – they mean the same thing.*

48. Finally in *Aerotel* at [46] the Court commented that the fourth step should not be necessary because the third step should have covered that. It was included for consistency with *Merrill Lynch*, and although we are now 16 years further down the line we are not aware of any case where step 4

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[45] n.43 *supra.*

[46] *Symbian v Comptroller-General of Patents* [2008] EWCA Civ 1066, [2009] RPC 1.

[47] It is in that sense rather like the *Pozolli* approach to obviousness which, as Lord Hodge noted in *Actavis v. ICOS*at [60], serves to orientate the Court for the statutory question rather than answer the statutory question itself.

has mattered. There might be something to be said for simplifying matters and putting that one to bed.

49. Summarising, it is important to appreciate what *Aerotel* is really about. First, it contains a rejection of the 'contribution' approach and an affirmation of the 'technical effect' approach. Secondly, it provides a structure for approaching the statutory question. The first two *Aerotel* questions serve correctly to orientate the Court for the statutory question, which is addressed in question 3 (and in a sense question 4); but *Aerotel* does not really help answer the statutory test.

Vicom

50. *Vicom* is an important case from the EPO, approved and applied in many English decisions including *Genentech*, *Merrill Lynch*, *Aerotel*, and numerous following cases. It involved an application which concerned a method of digitally filtering image files using a novel mathematical algorithm. As such it was paradigmatically both computer-based and mathematical. It was granted nonetheless.

51. The Board considered and rejected the mathematical method exclusion in [4] – [9], which we touch upon in that context below. From [10] the Board moved on to the exclusion for computer programs. In [11] the Board noted that the invention in that case could be implemented on new hardware specific to the invention, but also upon an entirely conventional computer programmed for that purpose. Paragraph [12] then reads as follows:

> *12. The Board is of the opinion that a claim directed to a technical process which process is carried out under the control of a program (be this implemented in hardware or in software), cannot be regarded as relating to a computer program as such within the meaning of Article 52(3) EPC, as it is the application of the program for determining the sequence of steps in the process for which in effect protection is sought. Consequently, such a claim is allowable under Article 52(2)(c) and (3) EPC.*

52. Unpicking that slightly, the point the Board is making is that a claim to a *process* controlled by a computer is not to be considered a claim to computer program as such, but rather the computer is just the *mechanism* by which the invention (the 'sequence of steps in the process') is implemented or put into effect. This aligns with the soup canning process in *CFPH supra*. See also *AT&T*[48] at [18].

53. *Vicom* [13] and [14] consider and reject an allegation of lack of novelty made on the basis that the claims cover a conventional computer operating according to new instructions. That then takes us to [15] and [16] dealing with the computer program exclusion (cited in *Genentech*, *Merril Lynch*, *Aerotel* and, as we will see, many other English cases), emphasis added:

> *15. In view of certain considerations by the Examining Division which appear to apply to the apparatus claims as well (cf. paragraph 10 above) it remains to be examined if the present apparatus Claim 8 would*

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[48] *AT&T Knowledge Ventures LP's Patent Application* [2009] EWHC 343 (Pat), [2009] FSR 19.

> *be objectionable under Article 52(2)(c) as qualified by (3) EPC. For reasons analogous to those given in paragraph 12 above, the Board holds that this is not the case and the same applies to the other apparatus Claims 9-11. Generally claims which can be considered as being directed to a computer set up to operate in accordance with a specified program (whether by means of hardware or software) for controlling or carrying out a technical process cannot be regarded as relating to a computer program as such and thus are not objectionable under Article 52(2)(c) and (3) EPC.*
>
> *16. In arriving at this conclusion the Board has additionally considered that making a distinction between embodiments of the same invention carried out in hardware or in software is inappropriate as it can fairly be said that the choice between these two possibilities is not of an essential nature but is based on technical and economical considerations which bear no relationship to the inventive concept as such.*
>
> *Generally speaking, an invention which would be patentable in accordance with conventional patentability criteria should not be excluded from protection by the mere fact that for its implementation modern technical means in the form of a computer program are used.*
>
> *Decisive is what technical contribution the invention as defined in the claim when considered as a whole makes to the known art.*
>
> *Finally, it would seem illogical to grant protection for a technical process controlled by a suitably programmed computer but not for the computer itself when set up to execute the control.*

54. So, it is no objection to patentability that the claimed invention is performed on a conventional computer operating in accordance with a computer program. What is 'decisive' is what technical contribution the invention makes to the known art. If the invention is at a higher level of generality than the computer/computer program used to implement it, then it will generally be outside the exclusion since the claim is to the invention implemented by the program, not to the program itself (or 'as such'). This recalls the soup canning machine example of *CFPH*[49]. That is why the TBA states that, generally speaking, an invention which would be patentable in accordance with conventional patentability criteria should not be excluded from protection by the mere fact that for its implementation modern technical means in the form of a computer program are used. Likewise where the same invention can be implemented in hardware or in software, then it does not matter which is chosen as it can fairly be said that that is just an implementation choice and bears no relationship to the invention properly identified at all.

Symbian

55. *Symbian* concerned a DLL, or dynamic link library, which was a piece of software used to make programs run more efficiently on a computer. It was therefore what is sometimes called a 'better computer' case. The Court reviewed the cases from [37], citing extensively from *Vicom*, and in [49] and [51] followed the Board's analysis in *Vicom*, two other TBA decisions relating to *IBM*[50], and what

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[49] This is consistent also with Jacob LJ's description of the technical contribution in *Vicom* itself being a new method and apparatus for manipulating images (see *Aerotel* at [81]). See also per Lewison J in *AT&T Knowleght Ventures LP's Patent Application* [2009] EWHC 343 (Pat); [2009] FSR 19 at [20].

[50] *IBM CORP/Data processor network* T6/83 [1990] O.J. E.P.O. 5, [1990] E.P.O.R. 91 and T115/85 *IBM CORP/Computer-related invention* [1990] E.P.O.R. 107.

this Court said in *Merrill Lynch* and *Gale*. At [54] the Court concluded that the application was patentable, not only because it would produce a better computer, but also because it would benefit devices external to the computer, such as cameras, and furthermore recorded that "*the fact that the improvement may be to software programmed into the computer rather than hardware forming part of the computer cannot make a difference – see Vicom; indeed the point was also made by Fox L.J. in Merrill Lynch*". See also the end of [58] of the decision.

AT&T and the Signposts

56. In AT&T, Lewison J applied *inter alia Vicom*, the *IBM* cases, *Merril Lynch* and *Gale*, summarising the law saying "*what the Board [in Vicom] are saying ... is ... that you assess the patentability of the claimed invention ignoring the fact that it operates through a computer program. If, ignoring the computer program, it would be patentable, then the fact that a computer drives the invention does not deprive it of patentability*". Lewison J also sought to formulate some 'signposts' to assist in the identification of a 'technical effect' at [40][51]. The Judge set them out in the Judgment at [21]. As Birss J (as he then was) pointed out in *Lenovo*[52] at [23] the signposts are really focussed on what might be called a 'better computer' case, and are not of universal application anyway[53]. Outside of 'better computers' cases, that leaves signpost (i), which just begs the statutory question. The signposts thus have little role to play in this case.

Halliburton

57. This case concerned a claim to a method of *design* of a drill bit, although the actual step of manufacturing the designed drill bit was not claimed[54]. Birss J (as he then was) provided a summary of the modern law in [32] – [33] and [38], which the Judge cited in the present case at [67]. Note in particular Birss J's statements at [32] " … *The question is decided by considering what task it is that the program (or the programmed computer) actually performs. A computer programmed to perform a task which makes a contribution to the art which is technical in nature, is a patentable invention and may be claimed as such.* …" and [33] "… *What if the task performed by the program represents something specific and external to the computer and does not fall within one of the excluded areas? Although it is clear that that is not the end of the enquiry, in my judgment that circumstance is likely to indicate that the invention is patentable* …". This is all at one with *Vicom* and the cases citing it.

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[51] Which the judge subsequently revised in *HTC v Apple* at [148] – [150].

[52] [2020] EWHC 1076 (Pat).

[53] As indeed Lewison LJ himself noted in *HTC v Apple* at [149]; see also per Kitchin LJ at [51].

[54] See at [17] – [18].

Gemstar and Protecting Kids

58. These two cases are of interest as concrete examples of the demonstration of another way in which a technical contribution may be demonstrated, namely where there are integers of the claim which are external to any computer/computer program. In such a case, the claimed invention as a whole is not to a computer program 'as such'.

59. In *Gemstar* the first two patents in suit were held to fall within the exclusions as being programs for a computer, but the third was not. That patent, referred to as the 'transfer patent' in the judgment, concerned a claim in which an electronic programming guide enabled a user to select a function which resulted in a TV program being saved to an external hard drive. The Judge held at [234] that that movement of data from the computer to the hard drive was a physical effect which took the claim outside of the exception (note that there was nothing clever in the transfer process itself).

60. *Protecting Kids* was a decision which concerned a system for monitoring electronic communications, so that users (e.g., children) were not exposed to inappropriate content or language. See at [4]. The system involved sending to parents an alarm message when content judged as potentially inappropriate was accessed. The 'clever' bit was in the manner of the monitoring of the electronic communications, which as a result was said to be faster and more reliable than the prior art (see [5]). As a result the alarm messages were sent out more rapidly and reliably as well (see [6]), but they were otherwise entirely conventional alarms (see [25], [31]). There was therefore an "improved alarm" (see [31], [32]), even though the improvement only came about as a result of the more efficient monitoring process performed by the program on the computer.

61. At [34] Floyd J held that the relevant claim was allowable, since the generation of that improved alarm message sent to a remote device gave it technical character. Note here that the Judge based his decision on two aspects of the alert in *Protecting Kids*:

62. First, he drew attention to the fact that the sending of an alert message over a communications network was a physical process, rather than an abstract one – an effect external to the computer, just like the file transfer in the third patent in *Gemstar*;

63. Second, he relied on the fact that the monitoring was an improved monitoring (even though that monitoring was a process occurring entirely within the program on the computer). The inventive step lay within the program performed on the computer, but the claim was allowable because the invention as a whole could be characterised as a better way of monitoring internet access.

G. CONCLUSION ON THE LAW

64. From these cases we submit that the right approach can by synthesised as follows:

65. First – to start by asking the *Aerotel* questions, which principally serve correctly to orientate the Court as to the statutory test, but which they do not really help in answering[55].

66. Second – then to consider the statutory test. As Parker LJ noted in *Gale* at 328_{50} – 329_{3}, that itself has two strands: does the claimed invention engage any of the exceptions, and if so does it do so to the extent that it is a claim to excluded subject matter 'as such'.

a. One therefore has to ask whether the invention involves a 'program for a computer' at all?

b. If it does, is the claimed invention a 'program for a computer ... as such'.

67. That final step is often phrased as a search for a 'technical contribution', and the caselaw contains three clear strands (albeit they overlap in some cases):

a. First, are those cases where the invention is properly characterised as a method or system for doing something, and is above (or agnostic of) their specific mode of implementation. That they could be implemented on a standard computer using a computer program does not matter; *a fortiori* where there are other alternative implementations available. This is exactly the point made in for example *Vicom* at [15] – [16], *AT&T* at [18] & [20], the improved monitoring of internet access in *Protecting Kids*, and of which the soup canning process of *CFPH* cited in *Aerotel* is a vivid illustration.

b. Second, are those cases where the invention includes elements external to any computer/computer program, such that the invention as a whole does not relate to a '*computer program ... as such*'. Examples here include *Halliburton* at [38], the data transfer in *Gemstar* and the remote alert message in *Protecting Kids*. Note that in each of these cases, the 'clever bit' lay in the program operating on the computer, but the claims were allowable nonetheless because they resulted in an effect external to the computer.

c. Third, are the so-called 'better computer' cases, such as the two *IBM* decisions. These are, however, likely just a subclass of the first class – a case in which the invention is properly characterised as a better computer, albeit that the improvement may be implemented through a computer program.

68. We do not suggest that there is a closed class of technical effect, and each case has to be considered on its facts, but the above form established threads running through the caselaw. Further

[55] There is something to be said for concluding that the time has come to hold the fourth step is not in fact needed, as it is wrapped up in the third, although this is not a necessary point for this case.

whilst phrased as a search for a 'technical effect', in the first (and third) classes the invention is not to a 'program for a computer' at all, but is an invention at a higher level of generality – even if it can be implemented using a computer program. In the second class, even if some elements of the claim might properly be classified as a program for a computer, others elements exist outside of that, as so therefore the claim as a whole is not to a program for a computer 'as such'.

69. Finally we note for completeness that where a computer program leads to such a technical effect, then the program itself can be claimed – see *Astron Clinica*[56] at [51].

H. THE EPO

70. The EPO's approach to the exclusions is different, and very simple. The EPO adopts the 'any hardware' approach, and as such software-focussed claims which recite any hardware (a computer, a storage medium, a server etc) are allowable under Art 52 (*T258/03 Auction Method/Hitachi*). That approach, however, should also be understood in conjunction with the EPO's approach to obviousness pursuant to the so-called *Comvik* approach by which certain features relating to non-technical fields are deemed to be known to the skilled person (or worked into the problem, in the problem-solution approach) for the purposes of the obviousness analysis. This is set out in the UKIPO's skeleton at §76, and is discussed in some more detail in *G1/19* at [31] – [33]. A non-technical feature is only ignored if it does not contribute to the solution of a technical problem, and an invention directed to a problem in a non-technical field can regardless be claimed if it provides a technical solution to that problem – see *T1769/10 IGT* in particular at [4.2]. We note that the UKIPO does not suggest that the EPO approach should be adopted here (UKIPO skeleton §79), and nor do we on this appeal.

I. OTHER EPC JURISDICTIONS

Germany

71. The Courts of Germany follow an approach which is similar to that of the English Courts, and do not apply the EPO's 'any hardware' approach. The leading case is understood to be *Dynamische Dokumentengenerierung* (*Dynamic Document Generation*)[57], which sets out in section 4(c) that what is necessary to avoid the computer program exclusion is that a technical problem is solved. Although there was hardware in the claims (which referred to 'at least one microcontroller' and a 'host computer' for example), the Court did not just hold that that was sufficient (as the 'any hardware' approach

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[56] *Astron Clinica Ltd v Comptroller General* [2008] EHWC 85 (Pat).

[57] Xa ZB 20/08 (BPatG).

would dictate), but instead went on to consider whether or not the claimed solution as a whole was 'technical'.

France

72. The French courts, too, do not apply the EPO's 'any hardware' approach. In what we understand to be the leading case on computer implemented inventions, *Sesame*[58], the Cour d'Appel de Paris considered the nature of the invention in the round, and did not apply the simple any 'hardware approach'. Indeed, the Court rejected the application even though it contained hardware elements[59].

The Netherlands

73. The general approach of the Dutch Courts is to follow the law as applied by the EPO – but noting that the Dutch courts are not obliged to do so and do not always do so. The Netherlands has no national patent examination procedure, but a registration system, and one therefore does not find decisions of the Dutch Patent Office on the exclusions. In the only decision we have found, *Orope Germany v Nokia*[60], the Hague District Court applied the law essentially in accordance with the EPO's approach (see at [4.14]).

J. THE JUDGE'S DECISION

74. After a few introductory paragraphs, the Judgment starts with a discussion of the Application, noting in [11] & [12] that in use the analysis performed by the ANN is purely of the physical properties of the tracks to make improved recommendations[61]. In [13], the Judge records the additional benefits of the speed and simplicity of the ANN of the invention.

75. From [14] – [18], Mann J discusses ANNs, rightly noting that ANNs consist of structures of nodes and layers (with links and biases), and that in a computer emulation the computer runs a piece of software which enables the computer to emulate the hardware ANN as if it were a hardware ANN

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[58] *Cour d'Appel de Paris, 26/06/2016*, case *15/01962*.

[59] There have been two relatively recent decisions of the Cour de Cassation in the field of excluded subject matter, but they add little. In the first, *Thales* (*Cour de Cassation*, *Jan 11 2023*, *case no 075/2019*.) the appeal was allowed on the basis that the decision of the Cour d'Appel de Paris was insufficiently reasoned, and remitted. In the second, *Bull*[59], the Cour de Cassation refused to hear an appeal from the Cour d'Appel de Paris allowing the application to proceed. The case concerned the exclusion relating to the performance of mental acts, and the Cour d'Appel's decision involved an investigation of the technical nature of the invention as a whole (not the simple application of the 'any hardware' approach).

[60] *Orope Germany GMBH vs Nokia Solutions and Networks* OYECLI:NL:RBDHA:2022:9193.

[61] See also the Hearing Officer at [48] and [54].

– software and hardware ANNs are the same, and have the same effect, save for the manner of their implementation.

76. After a review of the Hearing Officer's decision, the substance of the Judgment starts at [32], where the Judge addressed the related questions of where are the computer and the computer program which the UKIPO relies upon to found its objection. In [33], the Judge records the UKIPO's concession that a hardware ANN does not involve a computer program at all.

77. From [36] the Judge addresses whether a hardware ANN was itself a computer. EPAI contended that a computer was a 'device for executing computer programs'; which the Judge rejected but which is something the UKIPO has now conceded (see its skeleton §62)[62].

78. At [43] the Judge turned to consider the question of whether there was a computer program at all in a hardware ANN (which is an important point, since it is indicative of the nature of an ANN itself). That there was no such program was conceded by the UKIPO before the Judge, but this now forms the subject of its 'Ground 3' of its appeal, which it is convenient to address now.

79. After the oral hearing in the High Court the Judge sent a Note to Counsel [SUPP/3] which stated that he struggled to understand the UKIPO's case on where the program for a computer lay in this case (reflecting also EPAI's oral submissions to the same effect), and he requested clarification of certain questions. By its response [SUPP/3] the UKIPO stated in clear terms at §5 that "*Insofar as the invention is implemented in hardware form, there is no relevant computer program to which the exclusion applies. In the premises, had the invention been limited to a 'hardware-only' implementation, it is unlikely that the computer program exclusion would have been engaged.*" There was no uncertainty about that.

80. On this appeal, the UKIPO seeks to withdraw that concession, and now says that the hardwired structure of a hardware ANN itself is a 'computer program' – i.e., that the ANN *itself* is the program. The reason the UKIPO seeks to do this is because it has realised that if a hardware ANN is not or does not contain a computer program, then that shows that ANNs *themselves* are not computer programs – and given the clear law that an invention should not be excluded merely because it is *implemented* using modern technical means in the form of a computer program (*Vicom*, *AT&T* and many others) then it must follow that the Judge's decision is right.

81. The UKIPO is therefore forced to argue that the 'box with electronics in it'[63] is itself a 'program for a computer', or that "it is the set of weights and biases which therefore form the 'program' of this unconventional computer." The UKIPO says that this is so because the electronics form the nodes,

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[62] And which is the subject of EPAI's Respondent's Notice.

[63] Judgment [14].

links, weights and biases which enable the physical ANN to perform its function[64]. But so what? The electronics in any electronic device give it its function, but that does not make electronic devices into computer programs, and there is no principled reason why an ANN should be treated differently. Those electronics are not a 'set of instructions', but rather are hardware which achieve a function. There is no 'computer program' in a hardware ANN. Indeed on the UKIPO's case, there is no 'program *for* a computer' but rather the program *is* the computer. The whole logic of the UKIPO's position is confused and wrong.

82. The UKIPO also seeks to make comparisons with computer programs stored in ROM, but that is a different kind of thing. That is just storing a series of instructions for a computer in a permanent rather than temporary (RAM) sort of memory. It does not change the nature of the instructions. See also *Astron Clinica* at [41] – [42].

83. The UKIPO also says that it is enough to constitute a computer program that the links, nodes, weights and biases "*start with human input and configuration and use an intermediate computer system to generate the final product*"[65]. But that does not make the trained ANN a computer program, and the statute does not exclude the *product* of even a computer assisted process as *Halliburton* shows (there the drill bit was not even claimed).

84. It is submitted, therefore, that the UKIPO's original concession was correctly made, and was right. A hardware ANN is not, nor contains, a program for a computer. It is a box of electronics.

85. As a consequence, since the UKIPO agrees on this appeal that "*computers are devices for executing a computer program*" (UKIPO skeleton, §62), then EPAI must also be correct on the point in its Respondent's notice, namely that a hardware ANN is not a computer at all.

86. Turning to a software emulated ANN (which the Judge addressed in particular from [48]), the UKIPO refers to two potential computer programs: that used in training and that which provides the emulation platform in use.

87. EPAI accepts that a computer program is used in aspects of the training stage. Programming at that stage is something which enables the training objectives and approach to backpropagation to be fed through to the then untrained ANN, so that the training process can be set in motion[66]. It is just the method by which the training is performed, and we cannot see that it matters to this debate at all. As the Judge noted in [59] it does not serve to transform the whole system into a program for

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[64] UKIPO skeleton §63(2).

[65] UKIPO skeleton §66.

[66] See T2/239 – 243.

a computer, and one needs to be more analytical than that. The argument is completely irrelevant to the system claim 1, since that claims a trained ANN, but not the training process itself[67]. As regards claim 4, the point still does not matter. The exclusion bites where the whole claim comprises excluded subject matter. Even were (arguendo, which we do not agree) the training step to be objectionable, the Court would still need to resolve whether the other steps comprise excluded subject matter, including therefore the previous focus of the debate: the trained ANN itself. Furthermore the Judge also accepted that the trained ANNs themselves were to be regarded as technical effects (or technical things) – something the UKIPO accepted[68] and has not appealed. That is also correct; just as the design of the drill bit was a technical effect in *Halliburton* – see at [71]. This is why we have submitted above that although it is possible that a distinction could arise between the claims, we do not think it likely that it does (or insofar as there is a distinction, the claims are both allowable anyway).

88. As regards the underlying software platform in a computer emulated ANN, for the reasons we have set out, that is an irrelevance. If an ANN itself is not a computer program, then its implementation by emulation on software is just an implementation decision, which is not relevant having regards to the law which we have set out. What matters is that which is claimed at the level of generality at which it is claimed. Here the claims are to (amongst other integers) the ANNs, agnostic of the manner of their implementation.

89. The Judge was therefore correct to conclude that the claimed invention did not claim a program for a computer at all, and that the exclusion was not invoked at all. See [50], [58] and [60] – [61].

90. The Judge nonetheless went on to consider from [63] whether, were there to have been a relevant program for a computer, the claimed invention was nonetheless outside of the exclusion for not being a claim to a program for a computer 'as such'. See §§66.b and 67 above.

91. The technical contribution of the claims of the Application was set out by Hearing Officer at [53][69]:

> *53. ... [T]he invention of the Application is an ANN-based system for providing improved file recommendations. The invention may be hardware or software implemented. The fundamental insight is in the training of the ANN which analyses the physical properties of the file by pairwise comparisons of training files. In these pairwise comparisons the distance in property space between the output (property) vectors of the ANN is converged to reflect the differences in semantic space between the semantic vectors of each pair of files. The result is that in the trained ANN, files clustered close together in property space will in fact have similar semantic characteristics, and those far apart in property space will have dissimilar semantic characteristics. Once trained the trained ANN can then*

[67] Compare also *Halliburton* where the designed thing, the drill bit, was not claimed at all.

[68] See Judgment at [78].

[69] See also Judgment [24], cross referred to in [65]. Minor typo in the final sentence corrected.

be used to identify, swiftly and accurately, files from a database which correspond semantically to a target file, and to provide – again swiftly and accurately – file recommendations to a user device (over a communication network).

92. The Judge, having summarised the law at [64] – [72] including *Aerotel*, *Halliburton*, *Vicom*, *Gemstar* and *Protecting Kids*, held at [76] that the claimed inventions, were they to have involved a program for a computer at all, would have been allowable on this alternative basis too. In particular, the Judge noted that the claims of the Application contain specific integers directed to the sending of the recommendation message and file to a remote user device over a communications network, and observed that that was the result of a technical analysis by the ANN based on technical criteria (i.e., the physical attributes of the tracks involved). He accepted that that is an external transfer of data (as per *Gemstar*), and is on all fours with claim 33 in *Protecting Kids*. There, the provision of an improved alert message, sent over a communications network to a terminal, provided a relevant technical effect, even though the 'clever bit' lay within the process for monitoring internet access occurring with the computer itself. Further, as in *Protecting Kids,* the message sent is better in that it contains a better recommendation[70], and the system is faster and simpler. The Judge accordingly held that the claims of the Application were not to a program for a computer as such.

93. Further, the Judge held at [78] that a trained ANN itself was a technical advance, something which the UKIPO appeared to accept before him and which they do not challenge in this appeal. The Judge accordingly held that that also was a technical effect sufficient to render the claims outside of the exclusion, and it is not clear what (if any) answer the UKIPO has to this point.

94. Finally, even were the ANNs themselves to be considered to be computer programs, the claims could also be allowed on the basis that, properly characterised, the claimed inventions are systems/methods for providing an improved file recommendation and recommendation message[71]. That is an invention at a level above the manner of implementation of the system/method (i.e. a hardware or software ANN), and in accordance with the established law (summarised at 67.a above) the invention is not for a computer program as such. The claims should have been allowed on this basis too.[72]

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[70] And also is new in the sense that a prior art approach would send a *different* message.

[71] Or expanding this, improved systems/methods for providing an file recommendation and recommendation message based on an analysis of the physical properties of the respective tracks.

[72] This is the subject of the Applicant's respondent's notice, since the Judge recited the argument in law but did not need to address it on the facts.

K. THE UKIPO'S APPEAL

Ground 1

95. By its first ground of appeal, the UKIPO says that the Judge wrongly identified the inventive contribution, which – the UKIPO says – was merely in the idea of "*the training program*"[73]. It is not particularly clear what the UKIPO really means by that, but in any event throughout the UKIPO's skeleton it muddles up the concepts of the invention claimed in an application, and the inventive concept or idea underlying the claim: see §4 above. We set out some instances in the footnote below[74], but this is particularly acutely set out in the UKIPO's skeleton at §§32 – 34. It sets out in §32 that claim 4 covers *inter alia*, a training program, an ANN, a database, the relevant data, a target device and a network, but then in §33 states that much of that was conventional at the priority date, and therefore in §34 concludes that "*all that is left is the training program. That is, in substance, the contribution of claim 4*". It describes this as 'deconstructing' the claim[75], but, as we have said, that kind of reductionist argument is exactly the 'contribution approach' which was rejected in *Merrill Lynch*, *Genentech* and *Aerotel*. See §39 above. The UKIPO's approach is also contrary to what is said in *Vicom*, that what must be considered are the claims as a whole[76]. The UKIPO's approach also is contrary to the Hearing Officer's summary of the technical contribution of the claims of the Application, as we set out in §91 above, and which the UKIPO does not appeal[77].

96. The UKIPO similarly argues that the analysis must be one of 'substance not form', citing *Aerotel* at [43] and [44][78]. We do not disagree with this, but the UKIPO errs by taking this proposition far too far. It uses it as support for its 'deconstructive' contribution analysis which strips away everything save the inventive idea underlying the claim. That that is wrong is shown by *Aerotel* itself and the rejection in it of the contribution approach promulgated in *Merrill Lynch* at first instance. Indeed, were the UKIPO to be correct, many of the previous cases would have been decided wrongly: *Vicom*, *Gemstar*, *Protecting Kids*, *Halliburton*, *Genentech* etc.

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[73] UKIPO skeleton §34.

[74] §11 – EPAI does say that the features listed are part of the claimed invention, but merely accepts that they are not individually new or inventive. §31 – the substance of the claimed invention does not reside in the training of the ANN, although that is a core part of the inventive step (a 'fundamental insight').

[75] UKIPO skeleton §32.

[76] §53 above.

[77] Indeed accepted in front of Mann J, and appears to do so in front of this Court – see the UKIPO's skeleton at §12.

[78] e.g. UKIPO skeleton [19], [20].

97. The UKIPO's skeleton also misunderstands the statement in *Vicom* (and following cases) that what is decisive is the substance of the claimed invention, not whether it is implemented in hardware or by software. In §§25 – 26 the UKIPO takes this to support a position that even *hardware* ANNs would be within the exemption. But that is entirely the opposite of what *Vicom* says – that case is making the point that if your invention is properly characterised as a method or system for doing 'X', then it will be *outside of the exclusion irrespective of how it is implemented*. See §§52 – 54 above.

Ground 4

98. This ground only arises if the UKIPO were to be correct on ground 1. By this part of its argument, the UKIPO argues that the Judge was wrong to say that the sending of the recommendation message over a communications network to the user device was not such as to constitute a technical contribution taking the claim as a whole outside of the exclusion. The UKIPO therefore also seeks to distinguish the decisions in *Protecting Kids* and *Gemstar*.

99. The UKIPO's case is wrong for at least four reasons:

100. First, the UKIPO repeats its incorrect approach of seeking to ignore features of the claim which are a functional part of the invention. Specifically the UKIPO refers to the fact that the network is conventional and the message standard in form (although its content is new) – see for example UKIPO's skeleton at §§39, 41, 55. But that was also true in *Protecting Kids*, and UKIPO's argument misunderstands or ignores the reason why there is a consideration of such technical features – as we set out in §68 above, it is the presence of those elements of the claim which means that the claimed invention as a whole is not to a 'program for a computer ... as such'.

101. Second, the UKIPO repeatedly asserts that the selection of the recommended file is 'subjective' (see for example the UKIPO's skeleton §§8, 56), but that is to misunderstand the technology completely. Once trained, the ANN of the Application makes decisions based solely on the objective, physical characteristics of the tracks – features like tonality, rhythm, timbre, based for example on a Mel spectrogram and discussed in the Application at col 23_{27} – 31_{6}, col 36_{16-27} and Fig 4. Although it is not known exactly how any particular trained ANN analyses the features of the tracks to make decisions, since the workings of an ANN are generally not human understandable, it is known that this is based on the physical analysis of the tracks – after all that is the only input data into the ANN in use. This is what the Judge sets out in [11] & [12], and is why he states in [76] that although the criteria used by the ANN cannot be described in purely technical terms (since they are unknown to any human); the ANN has gone about its analysis in a technical way, identifying the recommended file by the application of technical criteria. As we have said before, the UKIPO is confusing the nature of the analysis (based on purely physical features) with the *benefits* of the invention. The invention is

beneficial because the recommendations are better, more aligned with the musicality of the tracks, as well as for other reasons such as being a simpler and faster system (Judgment [13]), but that is not how the ANN of the invention *operates*.

102. The UKIPO refers at §42 of its skeleton to *T0306/10 Yahoo!*, but misunderstands that case. That decision concerns obviousness, and is somewhat compressed (likely due to the fact that the applicant did not attend oral proceedings – see at V – VII in the Summary). That was a case much like the two patents which were rejected in *Gemstar*, in which there was no feature external to the computer – the recommendation was just data on a screen. Further, the analysis was of business decisions, not physical data as in the present case. In the passage the UKIPO refers to it appears that the applicant in *T0306/10* sought to justify the existence of a technical effect by reference to saving time because the *human user* of the service may make fewer clicks on screen. It is the *user* which plays more or fewer songs, or issues more or fewer search queries – see also *T1741/08* at 2.1.6, cited in the paragraph of T0306/10 the UKIPO refers to. The case says nothing about a truly external effect such as the external transfers of data as occur in the present case, as well as in *Protecting Kids* and *Gemstar*, and indeed the *T1741/08* decision cited in *T0306/10* is clear that an external transfer of data *is* a technical effect – see 2.2.1. As such, the pair of decisions support EPAI's position, not the UKIPO's.

103. The UKIPO also refers to *T1567/05*, but this is a case concerning the exclusion for the presentation of information. The case itself concerned, in effect, colour coding a known stress analysis for building designs. The point being considered in the cited paragraphs is that that exclusion applies to *all* presentations of information (see 3.5) and that there is no technical effect in choosing a particular presentation to suit a particular class of person. It has nothing to do with this case at all.

104. Third, the UKIPO seeks to say that the Judge was wrong to hold that the external recommendation message and file was an external technical effect, and to distinguish *Gemstar* and *Protecting Kids*[79].

105. The point with *Gemstar* was that the first two patents merely presented the information differently on a screen. Mann J considered that that could not be considered a technical effect, since most computer programs have this as a feature so would restrict the scope of the exclusion unnecessarily[80], although those features were also excluded as being the presentation of information (see [52] and [148]). That has nothing to do with subjectivity, as the UKIPO puts it, and indeed in

[79] Note that the UKIPO is wrong to say that 'the only part of the invention relies upon by the Applicant as being relevant to any question of technical contribution was "the sending of a message over a communications network"', if they mean anything other than that is the focus of the Applicant's case for this part of the argument.

[80] It is not clear that he is correct as to this, although it probably matters little: see the summary of *Vicom* in *Aerotel* at [81].

the third patent the information which was transferred was selected by the user of the EPG – and therefore a truly subjective selection (contrast the Application). As regards *Protecting Kids*, the UKIPO simply misreads the case in its skeleton at §51. The point which Floyd J was making in the section they cite was that whilst an alert in general may just be information presented to a user, the remote alert sent to the user terminal in that case "*is ... qualitatively different*" because the sending of the alert is "*undoubtedly a physical one rather than an abstract one*", and as such was akin to the third *Gemstar* patent, just discussed. Those cases both make the same point – namely that an external transfer of data will usually establish a relevant technical effect external to the computer. That is unsurprising – a physical transfer of data from one device to another is not 'a computer program ... as such' (or at all), but is a real-world event. Both *Gemstar* and *Protecting Kids* support EPAI's case.

106. Fourth, the UKIPO does not deal with the fact that it appeared to accept before the Judge (and has not appealed) that a trained ANN is a technical thing in itself – see the Judgment at [78]. That decision is unsurprising and right; and follows from the nature of ANNs themselves as machines which perform a useful function[81]. That plainly establishes the allowability of the claims of the Application, and as we say in §93, it is not clear what the UKIPO's answer to this is.

107. Finally the UKIPO also refers to 'an alternative approach' in their §§52 – 57, by which "a technical solution which is not itself intrinsically objective or technical satisfies the technical contribution threshold if the contribution as a whole addresses a technical problem". Whilst we completely accept the premise, this is the point we make in §§67.a and 94 above – the CFPH soup canning machine type of case. The UKIPO's arguments here are wrong for the reasons set out there.

Ground 2 – the UKIPO's concession

108. We have addressed the substance of this above, and here only deal with two tail end points. First the UKIPO also refers to the decision in *T0702/20 Mitsubishi*[82]. This decision concerned a method of training ANNs which was divorced from any real-world purpose. It was completely abstract and untethered and, for example, would have covered processes such as forecasting stock market evolution (i.e. a business method). It was *not* considered excluded as a computer program as such, but was arbitrary, non-technical and therefore held to be obvious[83]. It does not support a proposition that ANNs are generally unpatentable, however, and quite to the contrary the Board was careful to state at [20]: "*[t]he Board stresses that there can be no reasonable doubt that neural networks can provide*

[81] So long as the function is not in itself excluded for being a business method or the like.

[82] UKIPO skeleton §78.

[83] See at [19.1].

technical tools useful for automating human tasks or solving technical problems" and therefore be patentable. This case principally turns on its unusual facts, but the Board's statement of principle at [20] supports EPAI not the UKIPO.

109. Second the UKIPO says[84] that there may be other computer programs engaged in other parts of the system (e.g., the database). But that is irrelevant. It is no objection that *parts* of a claimed system are implemented on a computer, the claim as a whole has to be within the exclusion.

Ground 3 – Mathematical methods

110. This objection arises under s1(2)(a) of the Act, and relates to inventions which are "*a mathematical method ... as such*". The UKIPO's point here is very short, but again misunderstands the law. At the level of generality of the claims, the claims are to systems or methods of using systems including ANNs. Those are practical applications of any underlying mathematical theory. The law is clear on this – whilst one cannot claim mathematical concepts in themselves, one can claim applications of those mathematical concepts, and indeed many (perhaps most) inventions in electronics, telecommunications and engineering make use of underlying mathematical theories and can be explained in mathematical terms. See for example *Gale* at 327_{34-42} (Nicholls LJ), *Hallibuton* at [72] and *AT&T* at [17]. The position in the EPO is the same: a 'pure' claim to a mathematical idea or concept is not allowable, but its application in a technical process is. See the *Caselaw* at 2.2.2, citing *Vicom* (which addresses the issue at [4] – [9]).

L. CONCLUSION

111. The UKIPO states in §80 that the Judgment creates a divide between the approach of the English Courts and the decisions of the EPO, creating a carve out for ANN implemented inventions that cannot be justified under the EPO or domestic approach to excluded subject matter. That is simply not the case. The approach of the Judge was to apply the established law in this jurisdiction (which is not the same as that in the EPO) to a proper understanding of the facts and the claims as properly construed, and reached a result which is the same as would be reached in the EPO applying the different approach which is taken there. It is the approach of the UKIPO, which ignores the nature of ANNs, and seeks to carve out of the claim as a whole some extracted statement of the inventive step underlying it, and to compare that to the exclusion, which is wrong and which would further diverge the law here from that in the EPO. The Judge was right, and this appeal should be dismissed.

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[84] UKIPO skeleton §67.