

genome is structured in a similar manner to the human genome, with Raw Data being equivalent to DNA, Segments being equivalent to genes, Code Blocks being equivalent to chromosomes and the Core being equivalent to the complete genome.

5 The application has four independent claims (1, 9, 17 and 20) filed on 28 December 2016, which read as follows:

1. An Artificial Intelligence Genome (AIG), wherein a modular, hierarchical structure of self-contained data within a system and/or machine contains and is used to give the AI in which it inhabits traits and/or abilities, without having direct control over the actions or operations of the AI but while being able to influence, in part or in full, one or more of the traits, abilities and/or functions of the AI.

9. An Artificial Intelligence Genome Organiser (AIGO), wherein a list of data pertaining to the design and genetic information of an Artificial Intelligence Genome (AIG) contains at least one or more of the following, including but not limited to: structural information; identifying information; traits and/or abilities.

17. An Artificial Intelligence Genome Controller (AIGC), wherein a program comprising one or more of the following: abilities and permissions to create and/or handle an Artificial Intelligence Genome (AIG); and abilities and permissions to create and/or handle an Artificial Intelligence Genome Organiser (AIGO); controls the automation of functions and tasks of or involving an AIG.

20. A computer implemented method, wherein an AI is able to evolve without human intervention through the use of an Artificial Intelligence Genome (AIG), an Artificial Intelligence Genome Organizer (AIGO) and an Artificial Intelligence Genome Controller (AIGC), the method comprising: storing traits and/or abilities within an AIG; storing genetic information about the genome within an AIGO; and using an AIGC to control and manipulate an AIG based on the genetic information of an AIGO.

The law

6 Section 1(2) of the Act lists certain categories of subject-matter which are not considered to be inventions. These categories of subject-matter are often referred to as excluded subject-matter:

1(2). 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.

7 The Court of Appeal in *Symbian*¹ stated that the question of whether a computer-implemented invention is patentable has to be resolved by answering the question whether it reveals a technical contribution to the state of the art. It proceeded to answer the question with the aid of the four-step test for excluded subject-matter set out in its earlier judgment in *Aerotel*², the steps of the test are as follows:

- (i) properly construe the claim;
- (ii) identify the actual contribution;
- (iii) ask whether it falls solely within the excluded subject-matter;
- (iv) check whether the actual or alleged contribution is actually technical in nature.

8 Paragraph 43 in *Aerotel* provides some guidance regarding the second step:

“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.

9 According to paragraph 46 of *Aerotel*, applying the fourth step may not be necessary because the third step should have covered the question. This is because a contribution which consists solely of excluded matter will not count as being a "technical contribution" and thus will not, as the fourth step puts it, be "technical in nature".

10 Lewison LJ has provided five helpful signposts in *AT&T/CVON*³ and *HTC v Apple*⁴, which summarise where the Courts have identified a technical contribution in computer-implemented inventions. These so-called “AT&T signposts” are:

- i) whether the claimed technical effect has a technical effect on a process which is carried on outside the computer;
- ii) whether the claimed technical effect operates at the level of the architecture of the computer; that is to say, whether the effect is produced irrespective of the data being processed or the applications being run;
- iii) whether the claimed technical effect results in the computer being made to operate in a new way;
- iv) whether the program make the computer a better computer in the sense of running more efficiently and effectively as a computer; and
- v) whether the perceived problem is overcome by the claimed invention as opposed to merely being circumvented.

Arguments and analysis

11 The first two steps in assessing whether a computer-implemented invention such as the one described in the application is patentable involve construing the claims and identifying the contribution made by the invention. The first step of construing the claims presented the examiner with some difficulty due to the lack of technical detail in the description. She eventually concluded that it was simply a particular way of

¹ *Symbian Ltd v Comptroller-General of Patents* [2008] EWCA Civ 1066

² *Aerotel Ltd v Telco Holdings Ltd and Macrossan's Application* [2006] EWCA Civ 1371

³ *AT&T Knowledge Ventures LP, Re* [2009] EWHC 343 (Pat)

⁴ *HTC v Apple* [2013] EWCA Civ 451

structuring and organising data. Mr Reaux-Savonte assesses the contribution differently: he says that it is the creation of a functioning artificial genome, which allows for the production, reproduction, and evolution of artificial organisms, both digital and physical. It seems to me that there is very little difference in substance between these two positions, with Mr Reaux-Savonte's explanation of the contribution being set in the context of its eventual use and benefits, namely the production and evolution of future AI code. Having considered the application as a whole, I assess the contribution to be a particular way of structuring and organising data that may allow for the production and evolution of future AI code.

- 12 The next step is to determine whether the contribution is technical. The examiner has assessed the contribution with respect to each of the AT&T signposts and concluded that it is not technical. Mr Reaux-Savonte disagrees. I shall deal with each signpost in turn.
- 13 The first signpost suggests that a technical contribution can be found when the computer-implemented invention has an effect outside the computer. The examiner argues that the ordering and structuring of data does not have an external effect outside of the computer, while Mr Reaux-Savonte suggests that the invention enables the healing and reproduction of AI genomes in an analogous way to biological genes in nature, thereby allowing the creation of physical systems outside a computer. The application does not describe in any detail how the way of structuring and organising data leads directly to the creation of physical systems outside a computer, it merely suggests that replicating the structure of computer code in the same way that the building blocks of biological life are understood to be organised should lead to the same results in computer systems as observed in nature. It seems to me that the effect described by Mr Reaux-Savonte is purely theoretical and it is not the direct external effect envisaged by the first signpost.
- 14 The second signpost points to a technical effect when the contribution is made at the level of architecture of the computer or where the effect is produced irrespective of the data being processed or the applications being run. There was some discussion of this at the hearing, with Mr Reaux-Savonte rightly saying that this signpost relates to inventions in the operating system of a computer and also within the firmware of system components. Mr Reaux-Savonte says that the invention defines what type of system an artificial organism is, what it looks like, and what it is able to do; in other words, it can define the digital and physical architecture of an artificial organism. The examiner says that the invention is intrinsically related to the data being processed, i.e. the AI code. I agree with the examiner: the organisation and structuring of AI code does not operate at the architecture level, so no technical effect can be found here.
- 15 The third signpost suggests that a technical effect can be found when the invention results in the computer being made to operate in a new way. Mr Reaux-Savonte says that no computer has ever been defined, built, or operated based on an artificial genome before, nor has one ever reproduced or evolved. However, a computer system operating on new code does not imply that the system works in any way differently to how it would with the old code. I have been unable to find anything in the application that suggests that a computer system is being made to operate in a new way.

- 16 Mr Reaux-Savonte accepts that the fourth signpost is not relevant to his invention. His argument in relation to the fifth signpost (where technical problems are solved by technical solutions as opposed to being circumvented by non-technical workarounds), is that the problem of the impossibility of evolutionary artificial organisms is overcome simply by making it possible. I agree with the examiner that it is not clear how this is achieved, and there is no evidence that this problem, or indeed any other technical problem for that matter, has actually been overcome using the system described in the application.

Conclusion

- 17 I find that the claimed invention is excluded under section 1(2) because it relates to a computer program as such. I have read the specification carefully and I can see nothing that could be reasonably expected to form the basis of a valid claim. I therefore refuse the application under section 18(3).

Appeal

- 18 Any appeal must be lodged within 28 days after the date of this decision.

HUW JONES

Deputy Director, acting for the Comptroller