

- (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.

The application in suit

- 5 This application was filed as a PCT application on 13 December 2013 with an earlier priority date of 27 November 2013. It was published in the international phase as WO2015/080753 and as GB2533896 upon entry into the national phase.
- 6 The disclosure relates to a method for geocellular modelling as shown in figures 1 to 5B and described in paragraphs [0019] to [0025] of the specification as filed, reproduced below:

[0019] Referring now to FIG. 1, a flow diagram of one embodiment of a method 100 for implementing the present disclosure is illustrated. The method 100 uses a subset of a geocellular mesh (e.g. including structured and unstructured grids) or an array of points (e.g. including regular and irregular spaced points) from a full volume prior to modeling the volume with geological, petrophysical, or mechanical property values, for example. The subset property values are maintained so that they will match exactly the property values in a subsequent full volume geocellular model at the identical location from which the subset was originally selected. The method 100 therefore, is a faster, more efficient method for geocellular modeling than conventional techniques as demonstrated herein.

[0020] In step 102, a geocellular mesh or an array of points is constructed using predetermined mesh settings or a point set and techniques well known in the art. Predetermined mesh settings include the origin of the mesh such as the x,y,z dimension of the cells in the mesh and the number of cells in each dimension. The point set for the array of points includes x,y,z locations for each point. In FIG, 2, for example, a geocellular mesh 200 is illustrated for a three- dimensional volume of interest 202 in a plan view comprising multiple cells 208. Alternatively, the geocellular mesh 200 may be comprised of any object of at least 3 sides as long as it is closed and encompasses an area or volume.

[0021] In step 104, data is automatically selected for the entire mesh or array or data may be manually selected using the client interface and/or the video interface described further in reference to FIG. 6. In FIG. 2, for example, the data may include well data from the wells 204 shown as circles in the geocellular mesh 200. The well data generally come from well logs, but may also come from core, seismic, or from any other sources that measure a property at a single or multiple locations in x, or y, or z, or t dimensions. The well data may be recorded at specific locations in the cells 208 of the geocellular mesh 200.

[0022] In step 106, at least one subset of the mesh or array is automatically selected or it may be manually selected using the client interface and/or the video interface described further in reference to FIG. 6. In FIG. 2, the subset 206 is selected with one well 204.

[0023] In step 108, each cell or point in each selected subset without a real property value is populated with interpolated or simulated property values using the selected data and techniques well known in the art for interpolation or simulation. If well data exists for a cell, then the well data, or an upscaled version of the well (where cells are coarser than the real well data sampling), is used as the real property value for that cell and possibly other cells if the well from which the well data is taken passes through multiple contiguous cells. In FIG. 3A, the geocellular mesh 200 illustrates the subset 206 populated with different interpolated or simulated property values distinguished from the cells outside subset 206 by the cross-hatching that represents the different property values. The cell with the well 204 in subset 206 honors the well data and thus, uses the real property value for the well data from the well 204 in the cell and is also distinguished from the cells outside subset 206 by its cross-hatching. The remaining cells in subset 206 are populated with interpolated or simulated property values using all of the well data from each well 204 in the geocellular mesh 200 and techniques well known in the art for interpolation or simulation. One technique for simulation may include geostatistical simulation using a Random Walk. In FIG. 3B, for example, the geocellular mesh 200 illustrates populating the subset 206 using a Random Walk. The geo statistical simulation occurs in the subset 206 following the numerical order in each cell established by the Random Walk. The circled number 9 represents a cell with a well 204. This cell thus, uses the real property value for the well data from the well 204.

[0024] In step 110, the interpolated or simulated property values in each cell or point of each selected subset are converted to a point set using techniques well known in the art. A point set is the set of x, y, and z values that describe the location of stored property values in each respective cell, the respective property value and the location of each respective cell. The interpreted or simulated property values that reside inside a cell are located at a specific point in space defined by an x, y, z location. The specific location could be any point in space (2D or 3D) as long as it is within the geometric boundaries of the cell. Commonly, the center of gravity of the cell is used as the location of the property value. The stored location of the property value would thus, be the center of the cell if the cell is regular in its dimensions. Regardless of the location of the stored property value, the property value is said to be representative of any location within the cell in which it resides. The cell location is generally described as a set on indices composed of the corner points defining its geometry. Commonly, the indices are referred to by i, j, k coordinates. Thus, the interpolated or simulated property values in each cell or point of each selected subset are converted to a point set comprising the x, y, and z location of each stored property value in each respective cell. In FIG. 4, the geocellular mesh 200 illustrates the converted point set in the subset 206, which are used like original well data and include the same cross-hatching as in FIG. 3A that represents the different property values.

[0025] In step 112, each cell or point in the mesh or array without a real property value is populated only outside each selected subset with interpolated or simulated property values using the selected data, the point set associated with each respective selected subset and techniques well known in the art for interpolation or simulation. If well data exists for a cell, then the well data is used as the real property value for that cell and possibly

other cells if the well from which the well data is taken passes through multiple contiguous cells. In FIG. 5A, the geocellular mesh 200 illustrates the subset 206 populated with the same interpolated or simulated property values as in FIG. 3A. In addition, each cell with a well 204 honors the well data and thus, uses the real property value for the well data from the well 204 in each respective cell and includes cross-hatching that represent the different property values. The remaining cells in the geocellular mesh 200 outside subset 206 are populated with interpolated or simulated property values using all of the well data from each well 204 in the geocellular mesh 200, the point set in FIG. 4 associated with subset 206 and techniques well known in the art for interpolation or simulation. One technique for simulation may include geostatistical simulation using a Random Walk. In FIG. 5B, for example, the geocellular mesh 200 illustrates populating the geocellular mesh 200 outside subset 206 using a Random Walk. The geostatistical simulation for the subset 206 follows the same numerical order in each cell established by the Random Walk in FIG. 3B and the geostatistical simulation for the rest of the cells in the geocellular mesh 200 outside subset 206 follows the numerical order in each cell established by the Random Walk. The circle numbers represent a cell with a well 204. These cells thus, use the real property value for the well data from the well 204 in each respective cell.

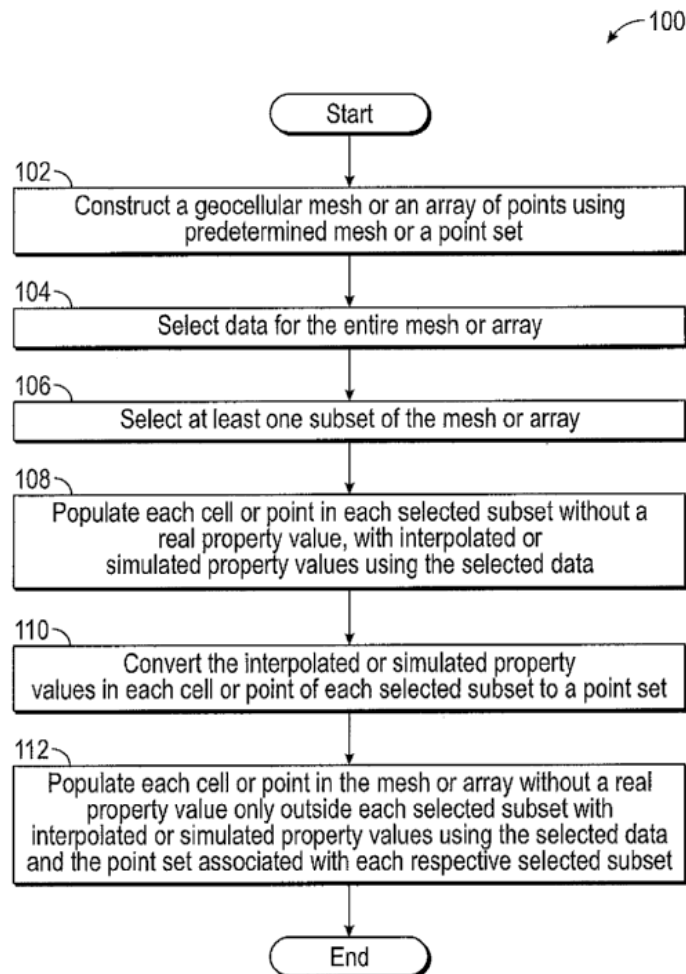


FIG. 1

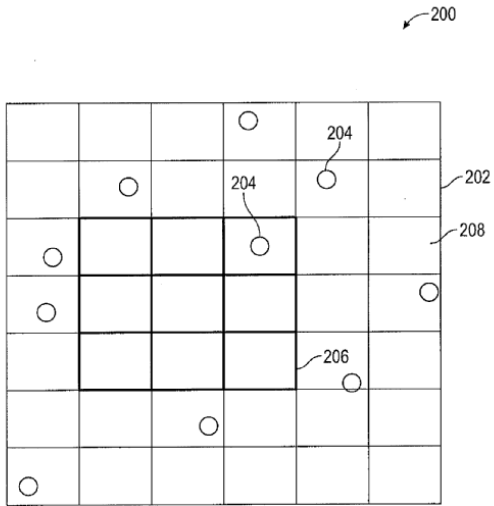


FIG. 2

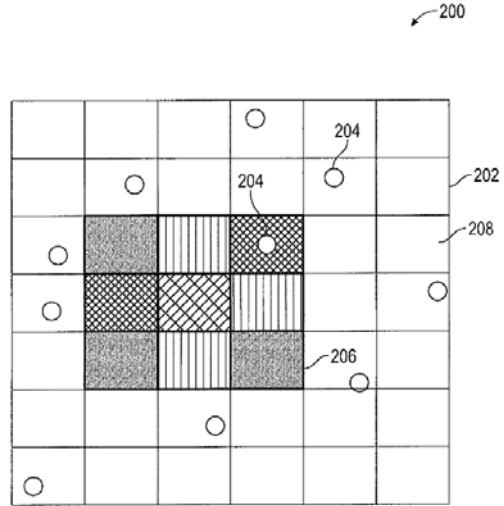


FIG. 3A

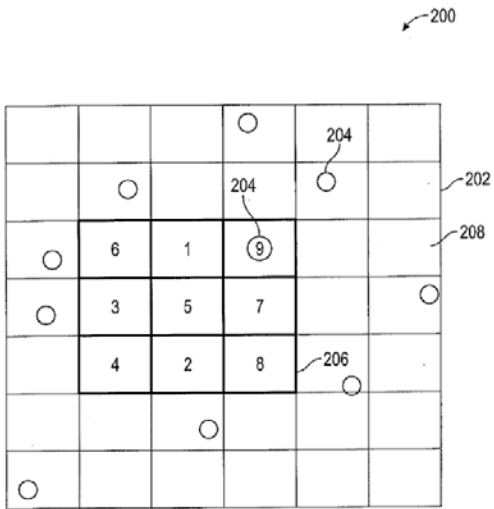


FIG. 3B

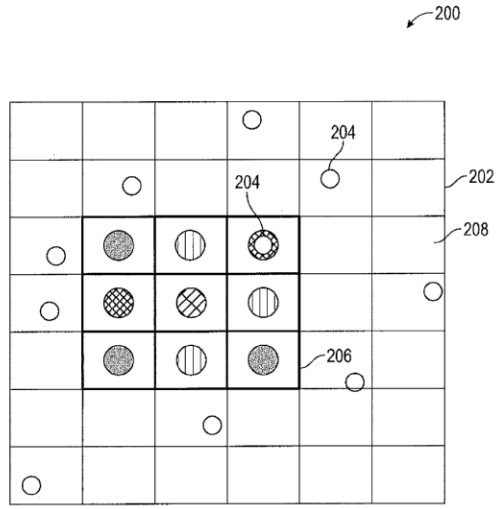


FIG. 4

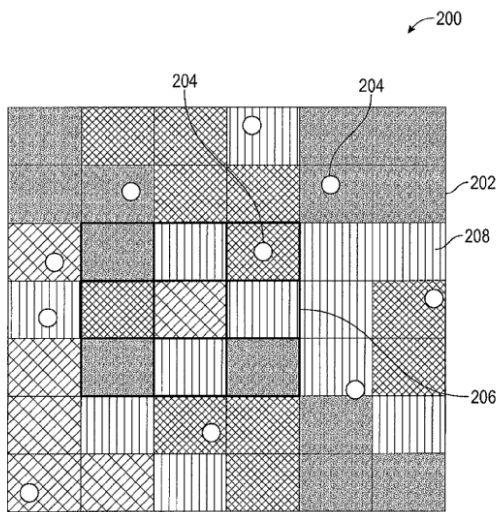


FIG. 5A

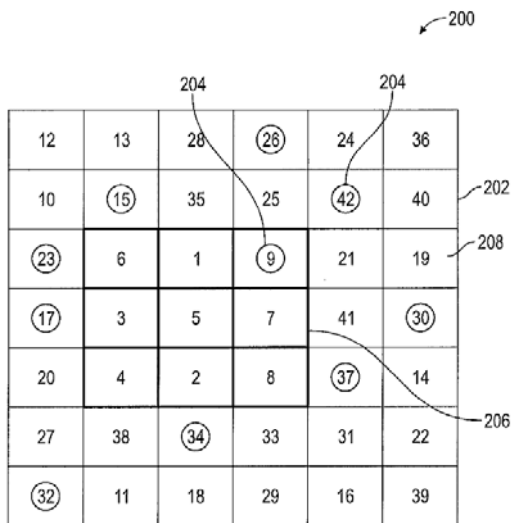


FIG. 5B

7 Claim 1 as currently amended reads as follows:

1. A method for geocellular modeling, which comprises:

populating one of each cell and each point without a real property value in each subset selected from one of a geocellular mesh or an array of points, respectively, with one of an interpolated property value and a simulated property value using all data from the geocellular mesh or the array of points, wherein the data includes at least one of:

well data collected from well logs
core data; and
seismic data;

converting one of the interpolated property value and the simulated property value in the cells or the points in each selected subset to a point set using a computer processor; and

populating each cell or each point without a real property value in the geocellular mesh or the array of points only outside each selected subset with one of an interpolated property value and a simulated property value using the data and the point set associated with each respective selected subset.

8 Independent claim 9 is directed to a program carrier device, but relates to the same inventive concept as claim 1 and so I will consider only claim 1. I note there are two omnibus claims which are generally no longer allowed

9 According to the *Aerotel* test I must first properly construe the claim, and claim 1 seems to me to be reasonably clear in the light of the description. In the conversion step, the method claimed is explicitly implemented using a computer and it seems clear from the description that the overall method would in practice be implemented using a computer system such as that shown in figure 6. The input to the method is a geocellular mesh or point array and some of the cells or points of the mesh or array have real property values. Thus the invention claimed does not encompass the first step shown in figure 1 in which the geocellular mesh or array of points is constructed.

10 As for the contribution, according to the examiner this is the application of computer programming techniques and mathematical methods to interpolate data values from known data before using said data in the formation of a model. In their skeleton arguments, Mr Russell and Dr Jones advance the view that the contribution lies in a better computer-implemented process for creating a geocellular model from real data, in the sense of the model being more accurate and taking less time. The referred to paragraph [0005] of the PCT publication for support. Certainly the present invention is computer-implemented and is likely to employ mathematical methods for interpolation or simulation. It is also described as "a faster, more efficient method for geocellular modelling than conventional techniques" (see paragraph [0019] as filed). It seems to me that a model already exists in the form of a mesh of cells or an array of points and that the method provides values for those cells or points in the model that have none. So rather than a process for creating a model I think it would be clearer to say that the contribution lies in a computer-implemented process for modifying a geocellular model using interpolation or simulation to populate with property values those cells or points that lack property values. Despite any use of

mathematical methods in the process, I do not feel that it is right to characterise the overall process as a mathematical method as such.

- 11 I would also not be comfortable in saying that the method amounts to a computer program as such. The inputs necessarily required by the process are not simply arbitrary data, but are real world data regarding a geological formation and a mesh or model that could be considered an object in the sense discussed in *Vicom*. The process then goes on to manipulate or modify that mesh or model to produce another object. Much like others of the applications being heard, Mr Russell and Dr Jones argued that the process of the invention and the data involved are of themselves technical and are aimed at a technical purpose, and I agree.

Conclusion

- 12 I find that the invention in GB1607340.5 is not excluded by section 1(2) either as a program for a computer as such or a mathematical method as such. I will however refer the application back to the examiner for further examination. This is because I believe that his search needs to be updated, that further consideration of novelty and inventive step was foreshadowed in the last examination report and that the omnibus claims will need to be deleted in line with current practice.

H JONES

Deputy Director, acting for the Comptroller

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The Law

- 4 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 conventionally known 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.

- 5 The Court of Appeal in *Symbian*² 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 set out in its earlier judgment in *Aerotel*³, the fourth step of this test being to check whether the contribution is technical in nature. In paragraph 46 of *Aerotel* it is stated that applying this 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".
- 6 Mr Russell and Dr Jones sought to persuade me how each of the seven applications before me provide the necessary technical contribution. In discussing the general approach to assessing patentability, Mr Russell and Dr Jones in essence had two points to make. The first concerned the appropriate standard of proof that an applicant should meet and the second point concerned the proper application of tests for patentability and especially the consideration of technical contribution. I shall deal with each point in turn.

Standard of proof

- 7 According to Mr Russell and Dr Jones, once an examiner has raised an objection to an application and the applicant has responded with argument and/or amendment then the examiner should give the applicant the benefit of the doubt and consider the objection overcome, unless there can be no doubt on the matter. While this is offered as a general proposition, in this decision I am particularly considering objections raised under section 1(2). In this regard Mr Russell and Dr Jones took me to a

² *Symbian Ltd. v Comptroller-General of Patents* [2008] EWCA Civ 1066

³ *Aerotel Ltd v Telco Holdings Ltd and Macrossan's Application* [2006] EWCA Civ 1371

passage in *Macrossan v Comptroller-General of Patents* ("Macrossan")⁴ (at paragraphs 7 and 8) in which *Fujitsu Ltd's Application*⁵ is quoted by the Appellant before Mann J; the passage from *Fujitsu* is as follows (paragraph 533):

"In coming to that conclusion [viz a conclusion against validity] I have borne in mind that, prima facie, a novel technical development should be patentable and that section 1(2) contains a list of exceptions to such patentability. Therefore, the onus lies on the person contesting patentability to prove that the invention falls foul of the statutory exclusions. Furthermore, at the patent office stage, benefit of the doubt should be given to the applicant. Refusal of the grant on the basis of a faulty appreciation of what is involved cannot thereafter be remedied."

8 Mann J goes on to say at paragraph 9 of *Macrossan*:

"Mr Birss, in his written submissions for the Comptroller, points out that Whitford J was not addressing a question of principle in what he said. I agree with that, but his statement nonetheless seems to reflect a principle or principles which are consistent with what Laddie J said in Fujitsu. That principle seems to involve the onus being on the person alleging that the alleged invention is within the exclusion. The reference to the benefit of the doubt is probably intended to signify that if there is substantial doubt then the burden has not been fulfilled. I do not consider that it means that if there is any doubt (legal or factual) then the application should succeed. It is not intended to import something like the criminal burden of proof into the proceedings. The tribunal still has to consider whether the exception applies, and it can come to the conclusion that it does without having to find that there is no doubt at all about it."

9 The current practice of the Office in this regard is set out in paragraph 1.10 of the Manual of Patent Practice, as follows:

"The Court of Appeal, in paragraph 5 of Aerotel Ltd v Telco Holdings Ltd & Ors Rev 1 [2007] RPC 7 (Aerotel/Macrossan), made it clear that assessing excluded matter involves a question of law which should be decided during prosecution of the patent application. The position is therefore assessed fully by patent examiners before grant, and objections are not to be dropped simply because the applicant asserts that the invention relates to non-excluded subject matter. The question of excluded matter is decided on the balance of probabilities, taking into account all of the evidence available. However, as it is a question of law, it is not something on which applicants are entitled to the benefit of the doubt, in the way they would be in relation to questions of pure fact (such as the date of a particular disclosure, or the scope of the common general knowledge)."

10 The original passage in question from the Court of Appeal is this:

"In that connection we should record also that we accept Mr Birss' submission that any pure question of law involved should be decided during prosecution. It is not enough to get a patent past the application stage to show that as a matter of law it merely arguably covers patentable subject-matter. The position is different from that under the old law. Then the rule was that patents should be refused only where on no reasonable view could the subject-matter be patentable, see Swift's & Co Application [1962] R.P.C. 37 at 46. Despite that being the rule, in the years that followed Swift, in practice a decision of the Office or on appeal to the Appeal Tribunal was taken to decide the matter once-and-for all. That itself shows there is no point doing other than deciding the question. Moreover that is what the European Patent Office (EPO) does and there is no warrant in the EPC for the "arguable" approach. Of course if a debatable question of pure fact is or may be involved at the application stage, things are different-one cannot then say that the

⁴ *Macrossan v Comptroller-General of Patents* [2006] EWHC 705 (Ch)

⁵ *Fujitsu Ltd's Application* [1996] RPC 511

decision at that point must be the last word on the subject. Then the applicant must be given the benefit of any reasonable doubt."

- 11 From the references to prosecution and application stage I take it that the quote from the Court of Appeal is relevant to the practice of the Office.
- 12 It seems therefore that there is a burden upon an examiner to demonstrate that an invention falls foul of the exclusions and that to overcome such an objection an applicant must do more than "show that ... it merely arguably covers patentable subject-matter". In other words, both the examiner and the applicant must do much more than simply assert that their view is correct.
- 13 Mr Russell and Dr Jones say in their skeleton arguments that they are not seeking to create false or spurious doubt about whether the inventions in each of the applications are excluded, since it is clear from the case law cited above that this would not be enough to cause an application to succeed. However, they say that the arguments advanced in respect of each of the applications are sufficient to create real and substantial doubt as to whether the inventions are excluded, and they suggest that the Office should only maintain an objection when it is clear that the applicant cannot be right.
- 14 Crucial to the test set out in *Aerotel* is the step of identifying the contribution, and it is the position of Mr Russell and Dr Jones that examiners have assessed the contribution in the present applications (and others before them) far too narrowly and have been unprepared to question their initial assessment or to consider whether it is possible that the applicant's assessment of the contribution may indeed be right. By way of illustration they asked me to consider the general case of a method that:
- i) uses a computer to read in geological data,
 - ii) carries out a sequence of mathematical operations with the computer to create a model of the geological formation, and
 - iii) carries out a sequence of mathematical operations with the computer on the model of the geological formation.
- 15 They argue that such a method is not a mathematical method in the sense of section 1(2) because the claim is to the application of mathematical steps to geological modelling. If there is any doubt about this then they say that the benefit of such doubt has to go with the applicant. It is similarly argued that the use of real data takes the method outside the computer program exclusion and that the steps of creating and manipulating a model create and then change a tangible technical entity which also take the method outside the computer program exclusion. Again, any doubt about this should be resolved in favour of the applicant.
- 16 I do not think that the arguments advanced in relation to this hypothetical example help clarify the standard of proof required of examiners in objecting to inventions relating to excluded subject-matter. However, I will return to these general arguments when considering the technical contribution in each of the applications before me.
- 17 Mr Russell and Dr Jones suggest that an applicant should be given the benefit of the doubt unless there is no reasonable doubt to be had. Insofar as this reasonable doubt is the same as the substantial doubt to which Mann J refers, I can agree with this principle. I consider that the question for me is whether or not there is such substantial doubt regarding each of these seven applications, such that where an

applicant makes a reasonable case that their invention is patentable then I am bound to find in their favour. I shall proceed on this basis.

Assessment of the contribution

18 The four steps in the *Aerotel* test which I referred to earlier are as follows:

- (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.

19 Mr Russell and Dr Jones say that the question of how to identify the contribution in the second step of this test is critical and referred me to the following paragraphs in *Aerotel* for guidance:

“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.

44. Mr Birss added the words "or alleged contribution" in his formulation of the second step. That will do at the application stage – where the Office must generally perforce accept what the inventor says is his contribution. It cannot actually be conclusive, however. If an inventor claims a computer when programmed with his new program, it will not assist him if he alleges wrongly that he has invented the computer itself, even if he specifies all the detailed elements of a computer in his claim. In the end the test must be what contribution has actually been made, not what the inventor says he has made.”

20 They referred me to paragraphs 37 and 53-54 of *Symbian* as evidence of how the Office’s approach to identifying the contribution made by inventions of the kind set out in the present applications is too narrow and is resulting in decisions by the Office to refuse applications that would otherwise be allowed by the Courts. Paragraphs 50-52 are also worth referencing as context to the subsequent paragraphs:

“37. The right starting point is the decision of the Board in Vicom/Computer-related invention T0208/84, [1987]2 EPOR 74. At [3], the Board said that:

"a method for obtaining and/or reproducing an image of a physical object or even an image of a simulated object (as in computer-aided design/computer-aided manufacturing ... systems) may be used e.g. in investigating properties of the object or designing an industrial article and is therefore susceptible of industrial application. Similarly a method for enhancing or restoring such an image, without adding to its informational content, has to be considered as susceptible of industrial application" and hence would not be excluded from patentability.

At [12]:

"a claim directed to a technical process which process is carried out under the control of a program (... in hardware or in software) cannot be regarded as relating to a computer program as such ..., as it is the application of the program for determining the sequence of steps in the process for which in effect protection is sought".

At [15]:

"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 a technical process cannot be regarded as relating to a computer program as such"

Finally at [16] the Board described "making a distinction between embodiments of the same invention carried out in hardware or in software" as "inappropriate", as what is "decisive" is the "technical contribution which the invention described in the claim when considered as a whole makes to the known art".

50. The fact that "the boundary line between what is and what is not a technical [contribution]" is imprecise (as Nicholls LJ said in Gale, and as was echoed by Aldous LJ in Fujitsu) may be attributable to three causes, which are not mutually exclusive. First, national tribunals and the Board may still be at an intermediate stage of working out and identifying the precise location of that line; secondly, the problem may be inherent and never wholly satisfactorily soluble; thirdly, there are competing views based on different philosophies (the "open source movement represents one extreme, that of companies such as the present applicant, the other). The uncertainty is well demonstrated by the elusiveness of the meaning of "technical", the change of attitude manifested in the more recent decisions of the Board, the contrasting outcomes in Vicom and Fujitsu, and indeed the possible reconsideration of the correct view of computer program patents in the United States (see Professor John Duffy: Death of Google's Patents? Patently-O Patent Law Blog, July 21st, 2008).

51. These considerations reinforce our view that, at least in this court at this stage, we should try to follow previous authority, we should seek to steer a relatively unadventurous and uncontroversial course, and we should be particularly concerned to minimise complexity and uncertainty. These aims are not necessarily mutually consistent, but, on this occasion, we believe they are achievable, namely by following the analysis adopted by the Board in Vicom and the two IBM Corp. cases, and of the Court of Appeal in Merrill Lynch and Gale.

52. These considerations also manifest the difficulty of formulating a precise test for deciding whether a computer program is excluded from patentability, and suggest that it could be inappropriate to accept either of the rival simple propositions (summarised at [17] above) advanced by the parties here. Bearing in mind the multifarious features of computer programs and the unpredictable developments which will no doubt occur in the IT field, we believe that it would also be dangerous to suggest that there is a clear rule available to determine whether or not a program is excluded by art 52(2)(c). Each case must be determined by reference to its particular facts and features, bearing in mind the guidance given in the decisions mentioned in the previous paragraph.

53. Based on these principles, we consider that Patten J was right and that the claimed invention does make a technical contribution, and is not therefore precluded from registration by art 52(2)(c). To start with a defensive point, the program in this case does not embody any of the items specifically excluded by the other categories in art 52; thus, it is not a method of doing business (as in Merrill Lynch), or a mathematical method (as in Gale), or a method for performing mental acts (as was probably the case in Fujitsu).

54. More positively, not only will a computer containing the instructions in question "be a better computer", as in Gale, but, unlike in that case, it can also be said that the instructions "solve a 'technical' problem lying with the computer itself". Indeed, the effect of the instant alleged invention is not merely within the computer programmed with the relevant instructions. The beneficial consequences of those instructions will feed into the cameras and other devices and products, which, as mentioned at [3] above, include such computer systems. Further, 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 LJ in Merrill Lynch.

- 21 Mr Russell and Dr Jones note that the European Patent Office Technical Board of Appeal's decision in *Vicom*⁶ was approved by the Court of Appeal in *Aerotel* and *Symbian*. They suggest that it is hard to conceive of a case that could be closer to the issues under consideration in the present application and say that *Vicom* points to the fact that the inventions in the seven applications before me are technical and do not lie in excluded subject-matter as such. They say that for the Office to find differently suggests that its approach to assessing contribution must be wrong.
- 22 So what then is the correct approach to assessing the contribution? In his second sentence in paragraph 44 of *Aerotel* (quoted above), Jacob LJ refers to the Office accepting the word of the inventor with regard to the contribution made, however it is not clear whether the qualification that follows, i.e. "It cannot actually be conclusive", is also intended to apply to the Office. Paragraph 1.20 of the Manual of Patent Practice appears at first glance to be helpful in this respect in that it takes me to paragraphs 23-24 in *IGT/Acres Gaming Inc*⁷, where Mr Peter Prescott QC (sitting as Deputy Judge) addresses this general issue:

"23. After hearing argument in this case I wondered what is meant by the second paragraph I have quoted, namely paragraph 44. Does it mean that the Patent Office is bound to accept the applicant's assertion (save in blatant cases)? Or can the Patent Office do a prior art search to find out what has the inventor really added to human knowledge? I therefore invited further submissions in writing.

24. Although there was some disagreement, both parties accepted that the Patent Office is entitled to do a prior art search and that if it turns out that the alleged contribution was already known, or was obvious, there can hardly be a contribution to human knowledge. In my judgment that is correct. And there will be no patentable contribution to human knowledge if what is new and not obvious relates solely to a business method as such."

- 23 What Mr Prescott appears to be saying here is that if the alleged contribution is either known or obvious such that the claimed invention adds nothing to human knowledge (per *Aerotel*), then the application can be refused under section 1(2). Although Mr Russell and Dr Jones did not address me directly on this case, they did address the general point that the correct basis for refusing an application in this situation would be for lack of novelty or inventive step and not under section 1(2), which is the approach, they say, that the European Patent Office takes.
- 24 Mr Russell and Dr Jones suggested that I need only look at how the Courts have approached the assessment of "actual contribution" to see how the Office approach is inconsistent. In the Patents Court judgment in *Halliburton Energy Services Inc. ("Halliburton")*⁸, in which HHJ Birss QC (as he then was, and sitting as a judge of the High Court) heard an appeal of an Office decision⁹ to refuse various applications relating to the use of a computer simulation to improve the design of roller cone drill bits for drilling oil wells, the actual contribution made by the invention was addressed as follows (paragraphs 66 and 67 of *Halliburton*):

"66. Mr Thorpe identified the contribution made by this invention in paragraph 29. He said:

29. I will leave for a moment the issue of whether outputting the results to a resource

⁶ [Vicom T 0208/84](#)

⁷ *IGT/Acres Gaming Inc*, Re [2008] EWHC 568 (Pat)

⁸ *Halliburton Energy Services Inc.*, [2011] EWHC 2508 (Pat)

⁹ [BL O/080/11](#)

adds to the contribution. For the moment I am happy to proceed on the basis of a slightly broader interpretation of what Mr Davis has proposed. The contribution of the claimed invention is in my view, as a matter of substance:

A method of designing drill bits that includes simulation of the performance of the drill bit based on calculating a three dimensional mesh for each cutting element and for the earth formation and using that to determine the forces acting on each mesh segment of the cutting element and then the forces and stresses acting on each cutting element.

67. I agree with that statement save that it seems to me to be important to state that the contribution is a computer implemented method of designing drill bits. Normally that emphasis would not be very important, for example if the case was concerned with the business method exclusion it would be irrelevant, but in this case, given the debate about the mental act exclusion, it is critical.”

- 25 At paragraph 67, HHJ Birss agrees with the Hearing Officer’s assessment of the actual contribution but considered it important to emphasise that the method of designing drill bits was limited to implementation on a computer, i.e. the contribution was a “computer-implemented method of designing drill bits”. Having identified the actual contribution, the Hearing Officer went on to consider whether the contribution fell within excluded subject-matter and felt bound to follow the conclusion reached previously by Pumfrey J in *Halliburton v Smith* (“*Smith*”)¹⁰ given the similarity of the inventions. The Hearing Officer refused the applications on the basis that the “untethered” inventions were mental acts. However, HHJ Birss said that the Hearing Officer had taken too broad a view of the mental act exclusion and had misinterpreted the way in which Pumfrey J had applied the exclusion in *Smith* - the claims in *Smith* encompassed acts that could be performed mentally whereas the claims in *Halliburton*, which included steps of simulation and outputting, tied the method to implementation on a computer and therefore could not be performed mentally. He says at paragraph 77 of *Halliburton* that “*His concern [i.e. Pumfrey J] was not with the technical contribution as a matter of substance – which he did not doubt – but with the form of the claims.*” The Hearing Officer had understood from *Smith* that a “tethering step”, i.e. the subsequent manufacture of the drill bit, was needed to avoid the mental act exclusion and for a technical contribution to be made, but HHJ Birss said that this was incorrect.
- 26 When it came to the step of assessing whether the contribution fell solely within excluded subject matter, i.e. the third step of the *Aerotel* test, HHJ Birss says at paragraph 71 that the contribution is a method of designing a drill bit and therefore more than a computer program as such. Here he relied upon a more general description of the contribution than the narrower version formulated by the Hearing Officer. When checking whether the contribution is actually technical in nature, i.e. the fourth step of the *Aerotel* test, HHJ Birss says at paragraph 74 that “*designing drill bits is obviously a highly technical process, capable of being applied industrially.....The detailed problems to be solved with wear and ability to cut rock and so on are technical problems with technical solutions*”, concluding that the applications did satisfy the requirements of section 1(2). Here again he relies upon a more general description of the contribution, his conclusion on whether the more general description of the contribution is actually technical in nature echoing his comments earlier in the judgment (at paragraphs 29-38) after reviewing the

¹⁰ *Halliburton Energy Services, Inc. v Smith International (North Sea) Ltd & Ors* [2005] EWHC 1623 (Pat) (21 July 2005)

judgments in *Merrill Lynch*¹¹, *Gale*¹², *Macrossan*, *Aerotel*, *Symbian*, etc.. Paragraph 38 says:

“38. 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. Put in other language, when the task carried out by the computer program is not itself something within the excluded categories then it is likely that the technical contribution has been revealed and thus the invention is patentable. I emphasise the word “likely” rather than “necessarily” because there are no doubt cases in which the task carried out is not within the excluded areas but nevertheless there is no technical contribution at all.”

- 27 Even though it seems that the applicant, Halliburton, may not have been the first to invent a computer-implemented method for designing drill bits *per se*, it seems from this judgment that one can take a step back from the actual advance over the state of the art when assessing the contribution for the purpose of section 1(2) and simply identify the field of endeavour in which the method is applied. In other words, it might not be necessary to conduct a forensic analysis of the difference between the invention and the prior art in order to assess what the inventor has really added to human knowledge when it is clear that the invention is limited to a very specific task or application that is not itself excluded. The fact that one can specify precisely the difference between the invention and the state of the art within a description of the actual contribution does not alter the fact that a contribution is also made within a general field of endeavour if the invention is claimed and limited in such a way. If that field of endeavour is a technical one then, according to *Halliburton*, there is a reasonable chance of it being a patentable invention under section 1(2). For computer-implemented inventions such as the ones in *Halliburton* and *Vicom*, it can be sufficient to determine whether the general task performed by the computer program is external to the computer and does not fall within one of the excluded areas in order to conclude that a technical contribution has been revealed. For other computer-implemented inventions, where the task performed by the program is limited entirely to what is going on inside the computer, an invention can be patentable if it solves a technical problem relating to the running of computers generally.
- 28 This poses an interesting question in respect of the assessment of contribution as determined in *Halliburton*. Given that HHJ Birss agreed with the narrow description of the contribution identified by the Hearing Officer but then relied upon a more general description of it when assessing steps 3 and 4, would HHJ Birss have come to a different conclusion on the question of patentability had he proceeded on the same narrow basis as the Hearing Officer? In other words, was the reason that a different conclusion was reached by the Hearing Officer a direct consequence of having taken a narrower view of the contribution, which Mr Russell and Dr Jones suggest is the practice of the Office, or simply because he came to a different view of what is technical.
- 29 On reading the Hearing Officer’s decision it seems clear that the latter was the case, However, I shall first set out Mr Russell and Dr Jones’ argument as to how a narrow view of the contribution can lead to inconsistencies in deciding what is and isn’t a

¹¹ Merrill Lynch’s Application, [1989] RPC 561

¹² Gale’s Application [1991] RPC 305

patentable invention before I explain my reasons why. They sought to illustrate their argument by way of example. In an invention where the only difference between a known method of processing particular data sets, e.g. a method for enhancing/modelling image or geophysical data, is the use of a Fast Fourier Transform (FFT) instead of a Fourier Transform (FT), the benefits of doing so being to reduce the processing load of the computer, a narrow assessment of the contribution could lead to a conclusion that what has been added to human knowledge is the mere replacement of a FT with an FFT, and a mistaken assessment that this is nothing more than a mathematical or computational advance. They say that such a narrow approach would be wrong, because the invention remains a method for enhancing/modelling image or geophysical data, which is inherently patentable (per *Vicom*). Once past the hurdle of section 1(2), they say that the act of replacing the FT with an FFT should then be assessed against the requirement for inventive step, this being the proper place for doing so and not confused with any consideration of whether the invention is within the list of exclusions set out in section 1(2)

- 30 I accept Mr Russell's and Dr Jones' point that there is a risk of reaching the wrong conclusion on section 1(2) if the contribution is not properly framed. However, as I have said, I do not believe that the reason the Hearing Officer came to a different conclusion to that of the Court in *Halliburton* was a consequence of having relied upon a much narrower description of the contribution in assessing steps 3 and 4 – the Hearing Officer had simply applied the mental act exclusion on too broad a basis.
- 31 So where does this leave me with regard to the correct approach to assessing the contribution? It seems to me from *Halliburton* that it is quite possible to arrive at either a narrow or a broad view of the actual contribution made by the invention and still be able to come to the same conclusion as to whether the contribution falls solely within excluded subject-matter. I have already noted that HHJ Birss agreed with the narrow form of the contribution set out by the Hearing Officer in *Halliburton* while also relying on a broader description when assessing whether the contribution was technical. The reason for doing so seems clear, in that it allowed him to quickly highlight the nature of the task performed by the computer program as representing something specific and external to the computer, i.e. designing drill bits. This task was included in both the narrow and broad descriptions of the contribution, and illustrated how the computer program was tied to a specific field of endeavour. He then goes on to consider whether the contribution is technical, saying that when the task is not something within the excluded categories then it is likely that that the technical contribution has been revealed and that the invention is patentable. He emphasises the word “likely” rather than “necessarily” because there would no doubt be cases in which the task carried out is not within the excluded areas but nevertheless there is no technical contribution at all.
- 32 It is precisely this approach I intend taking in this decision: when assessing the actual contribution in a computer-implemented invention, I shall take proper account of the task performed by the computer and determine whether the task falls outside the excluded categories. I shall also take account of Mr Russell and Dr Jones' argument that such cases, i.e. the cases in which the task carried out is outside the excluded areas but nevertheless there is no technical contribution at all, would be the exception rather than the norm. If the task carried out is within an excluded area, e.g. a computer program, then HHJ Birss explains at paragraph 37 of *Halliburton* that this is not necessarily the end of the matter because a program that solves a technical

problem relating to the running of computers generally is not excluded by section 1(2). The oft-quoted signposts in *AT&T/CVON*¹³ provide a useful summary of where the Courts have identified a technical contribution in computer-implemented inventions when the task carried out falls within an excluded category, but there are likely to be other areas where a technical contribution is found that have not yet been considered by the Courts.

The applications in suit

- 33 Before addressing each application in turn, Mr Russell and Dr Jones made some general comments regarding the set of applications I am to consider and the field of endeavour in which they lie.
- 34 A parallel is drawn between the geological models in these applications and an image that is manipulated as in *Vicom*, and a quote is taken from the Reasons for the Decision in *Vicom*:

5. There can be little doubt that any processing operation on an electric signal can be described in mathematical terms. The characteristic of a filter, for example, can be expressed in terms of a mathematical formula. A basic difference between a mathematical method and a technical process can be seen, however, in the fact that a mathematical method or a mathematical algorithm is carried out on numbers (whatever these numbers may represent) and provides a result also in numerical form, the mathematical method or algorithm being only an abstract concept prescribing how to operate on the numbers. No direct technical result is produced by the method as such. In contrast thereto, if a mathematical method is used in a technical process, that process is carried out on a physical entity (which may be a material object but equally an image stored as an electric signal) by some technical means implementing the method and provides as its result a certain change in that entity. The technical means might include a computer comprising suitable hardware or an appropriately programmed general purpose computer.

- 35 Mr Russell and Dr Jones reminded me that a similar point was put to me in a previous hearing concerning a method of processing seismic or other geophysical data, namely *WesternGeco Ltd's Application*¹⁴. In that case I agreed "*that Vicom was particularly relevant to the present application because of the similarity in the subject matter of the two inventions*" and I agree that the same is true with the present applications. In *WesternGeco* my decision was that some, but not all, of the claims related to subject matter excluded from patentability under section 1(2), namely the "untethered" claims that did not include a step of determining one or more parameters relating to physical properties of the earth's interior from the processed geophysical data. I came to the same conclusion as the Hearing Officer in *Halliburton* that a tethering step was necessary to make a method of processing seismic data patentable, i.e. technical, which the Court has since found to be incorrect. To the extent that Mr Russell and Dr Jones wish me to draw general conclusions regarding patent applications relating to methods involving geological models, all that I can say is that such methods are not inherently excluded from patentability and that such an invention must be considered upon its own merits.

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¹³ AT&T Knowledge Ventures LP, Re [2009] EWHC 343 (Pat)

¹⁴ [BL O/135/07](#)