



PATENTS ACT 1977

APPLICANT	Hitachi, Ltd.
ISSUE	Whether patent application GB1918881.2 complies with section 1(2) of the Patents Act 1977
HEARING OFFICER	Ben Buchanan

DECISION

Background

- 1 This decision relates to the issue of whether patent application GB1918881.2 meets the requirements of section 1(2) of the Patents Act 1977 (“the Act”). GB1918881.2 was filed on 19 December 2019 and was published as GB2582195A on 16 September 2020.
- 2 The application was first examined on 27 May 2020, when the Examiner reported that the application related to a program for a computer and/or a method for doing business, and as such considered that it was excluded from patentability under section 1(2)(c). All other considerations, including updating the search for prior art, were deferred and that remains the position.
- 3 Several rounds of correspondence and amendment ensued during which the Applicant was unable to persuade the Examiner that the objections were overcome. In their letter dated 10 December 2020 the Agents for the Applicant requested a hearing, in the event that the Examiner considered that the application should be refused. A hearing was subsequently arranged and took place by video-conference on 8 December 2021. The Examiner’s arguments are very comprehensively summarised in the pre-hearing report of 28 July 2021.
- 4 The Agents filed submissions to be considered at the hearing and politely requested that I consider main and auxiliary requests in place of the claims previously on file, to which I agreed. During the hearing I invited submissions on two further points and on 14 January 2022, an amended main and further auxiliary claims requests were formally filed along with comments addressing my request. This decision considers the arguments made before, during and after the hearing insofar as they apply to these latest claims.
- 5 The hearing was attended by Graeme Moore and Richard Howe acting as Agents for the Applicant. I was assisted by Jason Scott; Tom Davies, the Examiner was also present.

- 6 The specification including the full list of claims, the objections raised by the Examiner and the Applicant's arguments and submissions can all be viewed at the IPO's online file inspection service:

<https://www.ipo.gov.uk/p-ipsum.htm>

The invention

- 7 The application seeks to address the problem of identifying a medical institution to which a patient should be transferred, based on a prediction of a patient's sequential treatment¹ needs (called a "flow") and the ability of a medical institution to fulfil those needs. The claimed invention comprises a selection server including a flow prediction model for predicting treatment processes to be carried out on the patient, and institution information describing the state of resources available in receiving institutions. The flow prediction model includes a patient classification model generated by machine learning, which uses patient symptom information entered via a terminal to classify the patient and determine a required flow. That is used in conjunction with the medical institution information to deal with the predicted flow of such a patient. As a result, an appropriate institution may be identified to treat the patient and that information transmitted to a terminal. A method of operating the server and subsequently transferring the patient is also claimed.

The claims

- 8 The claims at issue in this decision are those filed on 14 January 2022, after the hearing. These are main and auxiliary requests identical to those filed on 1 December 2021 prior to the hearing, with the amendment by deletion of the phrase "or a past history" from the independent claims. This deleted feature related to an optional form of the "state information" representing patient symptoms. Following a brief conference between the Agents at the hearing I agreed to this deletion on the basis that it was optional and would not add matter. The first and second auxiliary requests respectively specify (i) that the predicted flow is a diagnosis and treatment flow and (ii) further features of the invention to include timing and availability of flow steps, conditions and required resources to refine the identification of an appropriate medical institution. Claims 1 of the two auxiliary requests are included in the Appendix.
- 9 There are two independent claims, 1 and 11. Claim 1 is to a selection server and claim 11 relates to a method of running the server and afterwards transporting the patient. Claim 1 reads:

A medical institution selection server configured to select a medical institution to which a patient is transported, the medical institution selection server comprising:

*a processor; and
a memory, wherein
the memory is configured to hold*

¹ Although "treatment" is later distinguished from diagnosis, here I use it to cover both

a flow prediction model that predicts a flow which includes one or more processes to be executed on the patient from state information of the patient, wherein the state information of the patient is a patient symptom, and wherein the state information of the patient includes one or more variables having values indicating the state of the patient, and

medical institution information that indicates a state of a resource for executing each process included in an executable flow for each medical institution,

wherein the flow prediction model includes

a patient classification prediction model configured to predict a patient classification of the patient from a state information of the patient, the patient classification model being generated by performing machine learning on the values of the one or more variables having values indicating the state of the patient,

and acceptability information configured to indicate, for each medical institution, acceptability of the patient classification and a flow executed for a patient who can be accepted in a patient classification, and

the processor is configured to

acquire the state information of the patient from a terminal connected via a network,

predict a patient classification of the patient based on the acquired state information of the patient and the patient classification prediction model, specify a medical institution that accepts the patient in the predicted patient classification with reference to the acceptability information and predict a flow to be executed on the patient in the medical institution based on the acquired state information of the patient and the flow prediction model,

acquire, periodically or in real time, a state of a resource for executing each process included in the predicted flow in each medical institution with reference to the medical institution information,

select medical institution candidates to which the patient is transported based on the acquired states of the resources, and

output information of the selected medical institution candidates to the terminal.

10 Claim 11 reads:

A method for selecting, by a medical institution selection server, a medical institution to which a patient is transported,

the method comprising:

by the medical institution selection server, holding a flow prediction model configured to predict a flow which includes one or more processes to be executed on the patient from state information of the patient, wherein the state information of the patient is a patient symptom, and wherein the state information of the patient includes one or more variables having values indicating the state of the patient;

by the medical institution selection server, holding medical institution information configured to indicate a state of a resource for executing each process included in an executable flow for each medical institution;

the flow prediction model including

a patient classification prediction model configured to predict a patient classification of the patient from a state information of the patient, the patient classification model being generated by performing machine learning on the values of the one or more variables having values indicating the state of the patient,

and acceptability information configured to indicate, for each medical institution, acceptability of the patient classification and a flow executed for a patient who can be accepted in a patient classification

by the medical institution selection server, acquiring the state information of the patient from a terminal connected via a network;

by the medical institution selection server, predicting a patient classification of the patient based on the acquired state information of the patient and the patient classification prediction model,

by the medical institution selection server, specifying a medical institution that accepts the patient in the predicted patient classification with reference to the acceptability information

by the medical institution selection server, predicting a flow to be executed on the patient based on the acquired state information of the patient and the flow prediction model;

by the medical institution selection server, acquiring, periodically or in real time, a state of a resource for executing each process included in the predicted flow in each medical institution with reference to the medical institution information;

by the medical institution selection server, selecting medical institution candidates to which the patient is transported based on the acquired states of the resources;

by the medical institution selection server, outputting information of the selected medical institution candidates to the terminal; and

transporting the patient to a medical institution based on the output information of the selected medical institution candidates.

The law

- 11 The Examiner raised an objection under section 1(2) of the Act that the invention is not patentable because it relates to one or more categories of excluded matter. The relevant provisions of this section of the Act are shown below:

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...

(c) a scheme, rule, or method for performing a mental act, playing a game or doing business, or a program for a computer;...

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.

- 12 The assessment of patentability under section 1(2) is governed by the judgment of the Court of Appeal in *Aerotel*², as further interpreted by the Court of Appeal in *Symbian*³. In *Aerotel* the court reviewed the case law on the interpretation of section 1(2) and set out a four-step test to decide whether a claimed invention is patentable:

(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.

- 13 The Court of Appeal in *Symbian* made it clear that the four-step test in *Aerotel* was not intended to be a new departure in domestic law; it was confirmed that the test is consistent with the previous requirement set out in case law that the invention must provide a “technical contribution”. Paragraph 46 of *Aerotel* states that applying the fourth step of the test may not be necessary because the third step should have covered the question of whether the contribution is technical in nature. It was further confirmed in *Symbian* that the question of whether the invention makes a technical contribution can take place at step 3 or 4.

- 14 Lewison J (as he then was) in *AT&T/CVON*⁴ set out five signposts that he considered to be helpful when considering whether a computer program makes a technical contribution. In *HTC/Apple*⁵ the signposts were reformulated slightly in light of the decision in *Gemstar*⁶. The signposts are:

² *Aerotel Ltd v Telco Holdings Ltd & Ors Rev 1* [2007] RPC 7

³ *Symbian Ltd v Comptroller General of Patents* [2009] RPC 1

⁴ *AT&T Knowledge Ventures/CVON Innovations v Comptroller General of Patents* [2009] EWHC 343 (Pat)

⁵ *HTC v Apple* [2013] EWCA Civ 451

⁶ *Gemstar-TV Guide International Inc v Virgin Media Ltd* [2010] RPC 10

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 makes the computer a better computer in the sense of running more efficiently and effectively as a computer

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

- 15 There is no dispute concerning the relevant law and its application to the facts of this case, although it is worth noting that the latest arguments put forward by the Applicant cite the EPO Guidelines for Examination.

Argument and analysis - Patentability

- 16 The analysis below pertains to independent claims 1 and 11 of the latest amended claims “main request” dated 14 January 2022. Should the arguments be accepted for the main claims, then they would be acceptable for the auxiliary requests. Should they not be accepted for the main claims, then allowance of the auxiliary requests would turn on the additional features of those claims. In respect of the arguments made during the hearing, the same arguments would be pertinent to both auxiliary claims sets, with specific features explicit in the claims. The Agents agreed that this was intended to be the case.
- 17 The relevant law is defined in section 1(2) of the Act. The Manual of Patent Practice explains the IPO’s practice under the Act and makes helpful references to relevant case law. In particular, sections 1.18-1.25.1 and 1.35-1.39.2 are helpful which relate to the *Aerotel* approach to assessing excluded matter and the *AT&T/CVON* signposts as amended in *HTC/Apple* which provide guidance in considering whether a computer program provides a technical contribution. The Examiner has referred to each of these precedents in their pre-hearing report of 28 July 2021 in arguing that the claims do not define a patentable invention because they relate only to a program for a computer and a method for doing business as such and so the application as it stands was considered excluded under section 1(2).
- 18 The *Aerotel* test comprises four steps, which are analysed as follows:
- (1) Properly construe the claim;
- 19 Having considered the claims, I do not think they present any serious issues of construction. I would note that although the “state information” defined in the claim is stated to be “a patient symptom”, it is clear that this should not necessarily be taken as a single symptom, but may include multiple symptoms. Similarly, “specifying a medical institution that accepts the patient” is construed as specifying at least one medical institution. Finally, as I have alluded above, the predicted flow comprises

diagnosis and treatment, which I referred to simply as “treatment” earlier. This is made explicit in the auxiliary requests.

- 20 There is one particular aspect which merits particular consideration, however. I have to admit to some confusion regarding the specification in the claim that:

“...the patient classification model being generated by performing machine learning on the values of the one or more variables having values indicating the state of the patient...”

- 21 This implies that the patient classification prediction model is generated in real time by machine learning performed upon the patient state information acquired from the terminal at the time. I find this hard to believe and whilst I make no finding on this point, I am far from confident it is supported by the description. What if there is insufficient patient data relating to that particular patient? Moreover, the feature of a “past history” of a patient being provided as state information has been removed from the latest claims which further obscures this point. The description at paragraphs [0042]-[0045] refers and specifies that the prediction model may be given in advance or may be generated on the values of the patient classification history table. I suppose if the patient classification history table contains enough data (presumably relating to multiple patients, not just the patient to be treated), then generation of an up to date prediction model in real time might be feasible, but that is not what the claim clearly defines.

- 22 Instead I think what it means is that the patient classification prediction model is generated (probably in advance but possibly in real time) using historic training data relating to multiple patients. The data comprises values for patient state information variables. Once the patient classification prediction model is generated, values for those same variables, relating to the specific patient to be treated at the time, are entered via the terminal at the time the invention is carried out and are used by the (by then) trained model to predict the patient classification.

- 23 We did discuss this point briefly at the hearing, and I said I would carefully consider the comments made. Having now done so I shall interpret the claim as including a prediction model which is generated by machine learning, using historic data relating to patient state information variables. I do not understand that the historic values used for machine learning must originate from the specific patient of the claim, or that the classification prediction model is necessarily generated in real time. The patient classification itself (the output of the trained prediction model when applied to the input of specific patient state information) *is* generated in real time.

- 24 I do not think much turns on this, not least because not a lot was made of the machine learning aspect, beyond it relating to more than a mathematical model (e.g. a look-up in a concordance table) as such and machine learning being indicated by EPO Guidelines as technical. Notwithstanding the ambiguity of the claim, it is clear that machine learning takes place and is used at some point leading to the generation of the patient classification.

- 25 Claim 1 is therefore construed as a medical institution selection server comprising a processor and a memory. The memory holds a flow prediction model which predicts required diagnosis and treatment processes based on known patient symptoms

represented by values for variables. Medical institution information is acquired indicating availability of resources at medical institutions. The flow prediction model further includes a classification prediction model which is generated by performing machine learning on data representing patient symptoms, and also includes acceptability data relating to whether the institutions can accept the patient and execute an appropriate process. The processor is configured to acquire state information of the patient, predict a classification based on the state information, specify medical institutions which can accept such a patient, predict a flow of processes based on the state of the patient in combination with a flow prediction model, acquire the state of resources at each medical institution for the processes predicted and use the information of the state of resources to identify candidate medical institutions. The candidate institutions are outputted to a terminal.

26 Claim 11 is an equivalent method, including the step of transporting the patient to the identified institution.

(2) identify the actual contribution;

27 Jacob LJ outlined the considerations to be applied when identifying the contribution made by the claims in paragraph 43 of *Aerotel*:

“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.”

28 In the submissions accompanying the amendment of 14 January 2022 the Agents suggested that the contribution could be reasonably assessed as:

“Means for selecting the most appropriate medical institution candidate to which to transport a patient for subsequent diagnosis and treatment, based on 1) the patient’s current symptoms, 2) a predicted flow to be executed based on the patient’s current symptoms, and 3) the up-to-date state of resources required for executing the flow on the patient at the available medical institutions.”

29 Claim 11 further includes the feature of explicitly “transporting the patient to a medical institution based on the output information of the selected medical institution candidates”. In respect of claim 11, then, contribution allegedly further includes the step of transporting the patient.

30 In support of this formulation the Agents explained how the invention works, by taking state information based on symptoms and past history [now deleted from the claim] of the patient, performing “machine learning” on the variables to provide a classification model and a predicted flow of actions to be executed. The server then calculates the probability that particular medical institutions can accept the patient and outputs suggestions to a terminal. In claim 11, the patient is further transported based on a decision made by someone accessing the terminal. The stated

advantage is the increased probability that a selected institution can process the flow because of the server's ability to assess symptoms and triage or pre-diagnose the patient and then compare the requirements to up to date resource information. The claim is clear in that the state of resources themselves can be acquired periodically or in real-time. This does not substantially change the contribution as comparison with resources whether acquired in real time, or periodically, is a similar operation.

31 Although the term "diagnosis" has been used liberally during the submissions and at the hearing, the Agents acknowledged that this is not necessarily a fully-fledged evaluation of a disease or injury state based on the symptoms. "Triage" is a better term (which was also used in the hearing but is not in the language of the claim) in that the predicted flow could include the requirements for further testing prior to an actual diagnosis. For instance, the medical institution may need to be one where a CAT scanner can be accessed to confirm a suspected stroke. This is reflected in the Agents' suggested contribution specifying "subsequent diagnosis and treatment". At the hearing the Agents discussed the use of machine learning to triage the patient which is not reflected in their assessment of the contribution. As explained above, I accept that the patient classification prediction model is generated by machine learning, and the patient state information is used by the model to predict the patient classification. The prediction model is therefore essential to the invention, but I agree that the machine learning element is incidental to the contribution and does not form a part of it.

32 The Agents further argued the relevance of the timing, symptoms and the state of resources in the institutions. In the submissions filed on 14 January 2022 these are summarised as:

"Means for the selection of the most suitable medical institution for a particular patient presenting particular symptom(s) at a particular time"

33 The former aspect reflects a change to the claims filed after the hearing to define the state information as a symptom rather than optionally as a patient history. The up-to-date nature of the state of resources is more difficult to assess. Accurate real time assessment is reliant on the persistent accuracy of information acquired from the institutions and may not reflect the most recent state of resources available if information is not updated and acquired in real time. There is no hint that the present invention does anything to improve the recording of the state of resources at the relevant institutions. Similarly, "periodic" is not clarified with regard to frequency. It could mean hourly, daily or weekly for example. Therefore there is no guarantee that the information held on the state of resources is accurate. It therefore does not form part of the contribution beyond updating the information in that it is as accurate ("up-to-date") as the system permits.

34 Following careful consideration of the above, and with due consideration to the comments I have made, I am prepared to accept the Agents' formulation of the contribution. In respect of claim 11, I am content that the contribution includes the further step of transporting the patient.

(3) ask whether it falls solely within the excluded subject matter; (4) check whether the actual or alleged contribution is actually technical in nature.

- 35 Superficially, the contribution appears to be nothing more than a computer program for controlling an administrative procedure. Such procedures were considered as business methods by the Examiner whose position was that the claim was excluded as a combination of a program for a computer and a method for doing business.
- 36 Steps (3) and (4) may be considered together and since the Agents' main argument is that there is technicality in the claim (and so that by virtue of being technical in nature it does not relate to any excluded thing as such), I will do so.
- 37 Over the course of prosecution of the application, the focus of argument appears to have migrated from being a program for a computer, to a method for doing business. As both objections are outstanding I will consider each of them.
- 38 The Examiner, in their earlier examination reports, applied the signposts derived from *AT&T/CVON* and *HTC/Apple* and found no technical contribution. In their most recent report dated 28 July 2021 the objections of the report dated 27 May 2020 are reiterated and include reference to the *AT&T* signposts. A further report is then reiterated and reference is made to *PKTWO*⁷ and *Cappellini*⁸ as well as a number of office decisions. Finally, the most recent part of the report addresses the Applicant's response of 10 December 2020, again referencing precedent and office decisions but not the *AT&T* signposts.
- 39 In their submissions prior to the hearing, dated 1 December 2021, at the hearing and in their submissions filed after the hearing on 14 January 2022 the Agents made no reference to the *AT&T* signposts (or other precedent other than *Aerotel* and *Halliburton*⁹) but rather to EPO Guidelines for Examination.
- 40 In general, the most recent argument for patentability seems to be that the contribution is technical, and therefore not excluded. In the submissions dated 1 December 2021 the argument is that the contribution *serves a technical purpose* according to the EPO Guidelines. They argue that this is consistent with the requirement for technical contribution expressed by HHJ Birss in *Halliburton* is being "technical in nature". This assertion is applied primarily to the business method category and extended to the computer program. I will deal with this line of argument reiterated at the hearing, and the further submissions filed after the hearing first, and then return to the specific question of whether the contribution provides more than a program for a computer as such as indicated by the *AT&T* signposts. Although the claims have changed since the Examiner's report of 28 July 2021 that report may still be relevant to the question of whether the claimed invention relates to a program for a computer, at least.

Method for doing business

- 41 In submissions and during the hearing it was correctly noted that because the IPO is compliant with the European Patent Convention (EPC) according to section 130(7) of the Act, then EPO practice should be non-binding but relevant to UK practice. This is true. I am not bound to follow EPO decisions nor the EPO Guidelines. EPO

⁷ Protecting Kids the World Over (PKTWO) Ltd's Patent Application [2012] RPC 13

⁸ Bloomberg LLP and Cappellini's Applications [2007] EWHC 476 (Pat)

⁹ Halliburton Energy Services Inc's Applications [2012] RPC 129

decisions can be considered very relevant when developing UK practice. Although we should comply with the requirements of the EPC, UK practice regularly arrives at the same result via a different formulation for considering the issue at hand. However, the EPO Guidelines can be very instructive. The Applicant has suggested that Guidelines G-II-3.3 is one such area; it provides a list of reasons why applications should be considered to serve a technical purpose in the context of mathematical methods. The Guidelines state “providing a medical diagnosis by an automated system processing physiological measurements” is considered technical.

- 42 Notwithstanding that there is no outstanding objection on the basis the claimed invention relates to a mathematical method as such, nor to the fact that only the auxiliary requests explicitly specify that the process flow predicts a *diagnosis and treatment* flow, there is quite a lot to consider here.
- 43 The term “medical diagnosis” comes first. The contribution does not provide a diagnosis, but rather a patient classification. Any diagnosis is performed as part of the predicted patient flow. In UK law section 4A of the Act disallows patenting of methods of diagnosis practiced on the human body, while article 53(c) of the EPC states the corresponding requirements. These methods are dealt with in separate sections/articles from exclusions under section 1(2).
- 44 Methods of diagnosis practised on the human body are indeed considered technical. It should be noted that “practised on the human body” is highly relevant as it is largely the activity of taking samples from the human body which generates the technical effect. An excellent summary is provided in the *Examination guidelines for patent applications relating to medical inventions in the Intellectual Property Office* explaining UK practice on the official website¹⁰, with ample reference to EPO decisions.
- 45 Paragraph 55 of the guidelines states “Diagnosis is the determination of the nature of a medical condition, usually by investigating its history, aetiology and symptoms and by applying tests. Diagnosis in itself is an intellectual exercise which is not patentable in view of section 1(2)(c).”. The patient classification may perform a useful function during the process, but it is not, in isolation, a technical process (nor, I have to say, do I consider it diagnosis).
- 46 Immediately prior to the hearing my attention was also drawn to the EPO Guidelines in G-II-3.5.3 which discuss a medical support system which was found to be non-technical. The final paragraph of G-II-3.5.3 states:

“Business method features, e.g. administrative features, can be found in different contexts. For example, a medical support system may be configured to deliver information to the clinician on the basis of data obtained from patient sensors, and only if such data is not available, on the basis of data provided by the patient. The prioritisation of the sensor data over the data provided by the patient is an administrative rule. Establishing it lies within the competence of an administrator, e.g. the head of the clinic, rather than within that of an

¹⁰ <https://www.gov.uk/government/publications/examining-patent-applications-for-medical-inventions/examination-guidelines-for-patent-applications-relating-to-medical-inventions-in-the-intellectual-property-office>

engineer. As an administrative rule with no technical effect, it does not contribute to the technical character of the claimed subject-matter and may be used in the formulation of the objective technical problem as a constraint that has to be met when assessing inventive step (G-VII, 5.4)”

- 47 As this was relevant to the argument at hand, I asked the Agents to consider the section and provide submissions later. In the response filed on 14 January 2022, with the amended claims, the Agents have effectively differentiated the quoted example from the present case. Their view was that G-II-3.5.3 is an administrative process as it refers to prioritising one set of information over a different set of information. I concur.
- 48 In summary then, I consider that neither the claimed invention, nor the identified alleged contribution relate to a method of diagnosis and thereby derive any technical purpose. As noted previously, I do not consider that the contribution includes a machine learning step. Even if a step of machine learning (e.g. using historic data) is necessary to provide the prediction model defined in the claim and is considered to provide a “technical purpose” to the underlying algorithm, it lies outside the contribution. As such the mathematical element of the invention which provides the patient classification prediction model does not provide a technical purpose or therefore the required technical contribution.
- 49 During the Hearing I also drew the Agents’ attention to an Office decision BL O/209/18 (*Vetana*)¹¹ which appeared relevant and invited submissions based on the same. The decision in question dealt with the processing of images to facilitate diagnosis. That case determined that the application was not technical. In the submissions of 14 January 2022, the Agents assert that the present case goes beyond merely presenting information to aid diagnosis. Instead it is the combination of the classification of the patient based on current symptoms, prediction of patient flow and recent acquisition of information about the state of resources available which is relevant. Having considered *Vetana* and the Agents’ comments, I agree that the present case is not simply presenting information in a different way, but is taking information, processing it to provide patient classification and subsequently making a decision based on that in combination with information regarding resources. The present application is thus distinct from the reasoning applied in *Vetana*.
- 50 The contribution identified above differs from the examples cited. However, I have seen no persuasive evidence that it is technical in nature. As such I consider that it does relate to a method for doing business as such.

Program for a computer

- 51 This leads on to the question of whether the invention also relates solely to a program for a computer as such or whether it provides a technical contribution, for example indicated by the *AT&T* signposts. This specific question was not addressed at the hearing although as I noted above, it has been raised previously by the Examiner. It is clear that the invention is implemented on a computer and there is no suggestion that the hardware of the terminal, the server, its processor or memory is

¹¹ [Intellectual Property Office - Patents Decision \(ipo.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/544443/ipo-2018-0209.pdf)

not conventional. The invention then is implemented on a program, but just because that is the case does not mean it is excluded as a *program for a computer as such*.

- 52 Referring to the examination report of 28 July 2021 (which reiterates the earlier examination report of 27 May 2020) I should firstly note that the claims and the identified contribution have changed since the Examiner's assessment. However, having carefully considered the Examiner's application of the signposts I think the reasoning holds. The Examiner objected as follows:

"The alleged invention relates entirely to data processing carried on within the computer. It does not involve an effect on a process carried on outside the computer. The first signpost is not met.

The alleged invention operates at the application level of the computer, and operates on specific types of data (state information, medical institution information etc.) It does not involve an effect at a higher level of generality within the computer. The second signpost is not met.

The alleged invention involves executing the claimed program, but this does not result in the computer being made to operate in a new way beyond the matter of it executing a new program. The third signpost is not met.

The alleged invention may provide an improved way of selecting medical institution candidates, but it does not do so by making the computer on which the program is run operate more efficiently or effectively as a computer. The fourth signpost is not met.

The perceived problem is that prior methods for selecting a medical institution to which to transport a patient do not take into account the treatments required by each patient, whether the institutions offer those treatments, or the times at which treatment may commence based on the state of resources required to perform the treatment. This problem is not technical in nature as it relates to properties of data processing for supporting a business decision. As the problem is not technical the fifth signpost does not apply. Therefore it is not necessary to enquire whether the problem is overcome."

- 53 No specific argument was made in respect of the signposts at the hearing, or in recent submissions. I would add to the Examiner's analysis by saying that any effect that might be considered to relate to a process arguably conducted at least in part outside the computer, such as the prediction of a patient classification based on observed patient state information using a model generated by machine learning, or the determination of the most appropriate medical institution having resources available to treat a patient is not technical in effect for reasons explained previously.
- 54 The computer (which may be a network of computers) operates conventionally and under the control of software specific to the purpose and data processed.
- 55 In light of the most recent claims, the problem to be solved could be regarded as how to identify a medical institution with the appropriate resources for a particular patient at a particular time. Even though, as the submissions of 14 January 2022 emphasise, the solution classifies the patient based on a model trained by machine

learning, thereby predicts the flow of treatments required and thereby establishes which institution(s) can best meet the patient's determined needs in time, this is an administrative problem, which is considered to be a method for doing business. If the problem were one of diagnosis or computer architecture – which might be regarded as technical – then the problem is circumvented.

- 56 Claim 11 includes the additional step of transporting the patient. For reasons the Examiner has set out in their examination reports, (for example paragraph 57 of the examination report dated 28 July 2021 citing *Cappellini*), moving vehicles and cargos according to a routing algorithm does not provide a technical effect and this extends to transporting a patient.

Auxiliary claims

- 57 For the avoidance of doubt, as foreshadowed above, the auxiliary claims are also excluded as the additional features do not add anything technical in nature. Any derived “further contribution” is to the performance or outcome of the administrative method implemented by software. In the case of the first auxiliary request, the specification of the predicted patient flow being a “diagnosis and treatment flow” does not add technical character and so these claims too are excluded. The second auxiliary request defines a more sophisticated predicted patient flow including timings and probabilities and takes account of these when establishing the availability of resources at candidate medical institutions. This amounts to a more sophisticated administrative method so is also excluded.

Conclusion

- 58 Since the invention fails to comply with section 1(2)(c) of the Act because it relates to a method for doing business and a program for a computer as such, the application is refused under section 18 of the Act.

Appeal

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

Ben Buchanan

Deputy Director, acting for the Comptroller

Appendix – Auxiliary claims

Auxiliary request 1: Claim 1

A medical institution selection server configured to select a medical institution to which a patient is transported, the medical institution selection server comprising:

a processor; and
a memory, wherein
the memory is configured to hold

a flow prediction model that predicts a diagnosis and treatment flow which includes one or more processes to be executed on the patient from state information of the patient, wherein the state information of the patient is a patient symptom, and wherein the state information of the patient includes one or more variables having values indicating the state of the patient, and

medical institution information that indicates a state of a resource for executing each process included in an executable flow for each medical institution,

wherein the flow prediction model includes

a patient classification prediction model configured to predict a patient classification of the patient from a state information of the patient, the patient classification model being generated by performing machine learning on the values of the one or more variables having values indicating the state of the patient, and

acceptability information configured to indicate, for each medical institution, acceptability of the patient classification and a flow executed for a patient who can be accepted in a patient classification, and

the processor is configured to acquire the state information of the patient from a terminal connected via a network, predict a patient classification of the patient based on the acquired state information of the patient and the patient classification prediction model,

specify a medical institution that accepts the patient in the predicted patient classification with reference to the acceptability information and predict a diagnosis and treatment flow to be executed on the patient in the medical institution based on the acquired state information of the patient and the flow prediction model,

acquire, periodically or in real time, a state of a resource for executing each process included in the predicted flow in each medical institution with reference to the medical institution information,

select medical institution candidates to which the patient is transported based on the acquired states of the resources, and output information of the selected medical institution candidates to the terminal.

Auxiliary request 2: Claim 1

A medical institution selection server configured to select a medical institution to which a patient is transported, the medical institution selection server comprising:

a processor; and
a memory, wherein
the memory is configured to hold

a flow prediction model that predicts a diagnosis and treatment flow which includes one or more processes to be executed on the patient from state information of the patient, wherein the state information of the patient is a patient symptom, and wherein the state information of the patient includes one or more variables having values indicating the state of the patient,

flow information that indicates a start condition and an execution time of each process included in a flow indicated by the flow prediction model and medical institution information that indicates a state of a resource for executing each process included in an executable flow for each medical institution, the state of the resource indicated by the medical institution information being configured to indicate a possible use start time of the resource, and the one or more processes including treatment actions,

wherein the flow prediction model includes a patient classification prediction model configured to predict a patient classification of the patient from a state information of the patient, the patient classification model being generated by performing machine learning on the values of the one or more variables having values indicating the state of the patient, and

acceptability information configured to indicate, for each medical institution, acceptability of the patient classification and a diagnosis and treatment flow executed for a patient who can be accepted in a patient classification, and the processor is configured to

acquire the state information of the patient from a terminal connected via a network,

predict a patient classification of the patient based on the acquired state information of the patient and the patient classification prediction model,

predict the probability that the patient is relevant to each patient classification based on the acquired state information of the patient and the patient classification prediction model,

specify a medical institution that accepts the patient in the predicted patient classification with reference to the acceptability information and predict a diagnosis and treatment flow to be executed on the patient in the medical institution based on the acquired state information of the patient and the flow prediction model,

calculate a probability that each flow is executed on the patient in each medical institution based on the predicted probability and the acceptability information,

acquire, periodically or in real time, a state of a resource for executing each process included in the predicted flow in each medical institution with reference to the medical institution information,

refer to the medical institution information to acquire a possible use start time of the resource for executing each process included in each flow,

refer to the flow information to acquire the start condition and execution time of each process included in each flow,

refer to the medical institution information to acquire a possible use start time of the resource for executing each process included in each flow,

calculate a start time of each process included in each flow based on the acquired start condition, the acquired execution time, and the acquired possible use start time,

calculate, for each flow, a possible treatment start time that is an earliest time among the calculated start times of the processes which are the treatment actions,

calculate an expected value of the possible treatment start time in each medical institution based on the calculated possible treatment start time and the probability that each flow is executed, and

select medical institution candidates to which the patient is transported based on the acquired states of the resources and the calculated expected values, and output information of the selected medical institution candidates to the terminal.