



## PATENTS ACT 1977

APPLICANT	International Business Machines Corporation
ISSUE	Whether patent application GB2113830.0 is excluded from patentability under section 1(2)
HEARING OFFICER	B Micklewright

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## DECISION

### Introduction

- 1 Patent application GB 2113830.0 was filed on 28 September 2021 in the name of International Business Machines Corporation, with a priority date of 15 October 2020. A first, abbreviated examination report was issued 7 March 2022, in which all the claims were considered by the examiner to relate to the presentation of information, a method for doing business and a program for a computer as such. Other aspects of the examination were deferred and no search was performed.
- 2 There followed several rounds of correspondence without agreement being reached regarding allowability of the claims. At the examiner's invitation, the applicant's attorney requested a decision by a hearing officer on the basis of the papers on file, at the same time filing new first and second sets of claims. The examiner has considered these claims, and maintained the same objections, and accordingly the matter has come before me.
- 3 I note that no search has been carried out and that other aspects of the examination remain deferred. If I find either the first or the second set of claims to be allowable, it will therefore be necessary to remit the application to the examiner for completion of the search and examination.

### The invention

- 4 The invention concerns asset performance and upgrade management using digital twins, specifically to managing changes in requirements or upgrades to hardware, software or firmware. The term "asset performance management" relates to software tools used in operating and monitoring physical assets, such as equipment or plants. Digital twins are virtual representations of physical objects or systems, based on real-time data collected from the real-world asset. Information concerning upcoming changes to assets is used to update the corresponding digital twin for each asset. Usage metrics are then calculated based on the output of the digital twin and a report is produced based on these metrics and the upcoming changes.

5 The claims comprise three independent claims: claim 1 to a computer-implemented method, claim 8 to a computer program and claim 15 to a computer system. The latest claims were filed on 8 December 2022, with minor additions to the independent claims. As noted above, a second, auxiliary set of claims was also filed. These include further additions to the independent claims. The independent claims in each set are equivalent in scope and, for the purposes of this decision, it will be sufficient to consider claim 1. Claim 1 as amended in the first set (with the amendments underlined) reads:

1. A computer-implemented method for digital twin based asset management, the computer implemented method comprising:

receiving, by one or more computer processors, a continuous feed of information comprising one or more upcoming changes for one or more assets, wherein the one or more upcoming changes for the one or more assets include at least one of one or more hardware requirements, one or more firmware requirements, one or more software requirements, one or more hardware upgrades, one or more firmware upgrades, and one or more software upgrades;

storing, by the one or more computer processors, the one or more upcoming changes for the one or more assets into one or more repositories, wherein an appropriate repository of the one or more repositories is determined using topic modeling;

updating, by the one or more computer processors, one or more digital twins, wherein each digital twin of the one or more digital twins is a virtual hardware replica of an asset, and further wherein each digital twin of the one or more digital twins is continuously updated with the one or more upcoming changes in the one or more repositories;

calculating, by the one or more computer processors, a continued usage metrics for each asset of the one or more assets based on an output of the one or more digital twins, wherein the continued usage metrics are specific to each asset of the one or more assets; and

creating, by the one or more computer processors, a first report based on the one or more upcoming changes and the continued usage metrics, wherein the first report includes at least one of hardware dependencies, firmware dependencies, software dependencies, and upgrade dependencies, according to the continuous feed of information.

6 The amended claims emphasise that a continuous feed of information is received regarding upcoming changes, and that the report created is in accordance with this continuous feed of information. I note that the original independent claims specified that each digital twin is continuously updated with the upcoming changes, and that the report is based on these upcoming changes. The amendments therefore add emphasis rather than materially affecting the scope of the independent claims.

7 The auxiliary claim set 2 further adds:

1. ...and

notifying, by the one or more computer processors, respective procurement teams by classifying all software that will be obsolete and alternate software, including open

source software, that is potentially a replacement for the obsolete software, based on the hardware or firmware changes.

## The law

- 8 Sections 1(1) and 1(2) of the Patents Act 1977 (“the Act”), with my emphasis added, state:

1(1) A patent may be granted only for an invention in respect of which the following conditions are satisfied, that is to say –

(a) ...

(b) ...

(c) ...

(d) The grant of a patent for it is not excluded by subsections (2)...

And references in this Act to a patentable invention shall be construed accordingly.

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) ...

(b) ...

(c) a... **method for... 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**.

- 9 Whether or not an invention falls within these excluded categories is assessed on the basis of the four-step approach set out by the Court of Appeal in *Aerotel/Macrossan*<sup>1</sup>. The steps are:

*(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.*

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<sup>1</sup> *Aerotel Ltd v Telco Holdings Ltd & Ors Rev 1* [2007] RPC 7

- 10 The Court of Appeal in *Symbian*<sup>2</sup> made clear that the *Aerotel* test is not intended to provide a departure from the previous requirement set out in case law, namely that the invention must provide a "technical contribution" if it is not to fall within excluded matter. The *Aerotel* test has subsequently been endorsed by the Court of Appeal in both *HTC*<sup>3</sup> and *Lantana*<sup>4</sup>.
- 11 In determining whether or not a program for a computer makes a relevant technical contribution which takes it beyond being "a program for a computer... as such" it is helpful to consider the five "signposts" first set out in *AT&T/CVON*<sup>5</sup>, and later reformulated in *HTC*<sup>6</sup>. The signposts are:

*i. whether the claimed technical effect has a technical effect on a process which is carried on outside the computer;*

*ii. whether the claimed technical effect operates at the level of the architecture of the computer; that is to say whether the effect is produced irrespective of the data being processed or the applications being run;*

*iii. whether the claimed technical effect results in the computer being made to operate in a new way;*

*iv. whether the program 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.*

## **Assessment**

### **(1) Properly construe the claim**

- 12 The examiner and the attorney agreed that there is no difficulty in construing the claims. The claim defines the term "digital twin" as "a virtual hardware replica of an asset". I note that a continued usage metric is based on "an output of the one or more digital twins" and defined as being specific to each asset. There is no indication as to what data is output by the digital twin. For the purposes of this decision I will construe this as indicating that the output is in some way dependent on the updating of the digital twin.

### **(2) Identify the actual contribution**

- 13 As no search has been performed I will identify the alleged contribution rather than the actual contribution. Identifying the contribution in the second step of this test is critical and I refer to paragraph 43 of *Aerotel* for guidance:

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<sup>2</sup> *Symbian Ltd's Application* [2009] RPC 1

<sup>3</sup> *HTC Europe Co Ltd v Apple Inc* [2013] RPC 30

<sup>4</sup> *Lantana Limited and The Comptroller General of Patents, Designs and Trade Marks* [2014] EWCA Civ 1463

<sup>5</sup> *AT&T Knowledge Ventures/Cvon Innovations v Comptroller General of Patents* [2009] EWHC 343 (Pat) (*AT&T/CVON*)

<sup>6</sup> *HTC v Apple* [2013] EWCA Civ 451

*“The second step – identifying 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 judgement 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 the substance not form – which is surely what the legislator intended.”*

- 14 Following discussion with the attorney in the correspondence the examiner has identified the contribution of the amended independent claims as:

“A method for digital twin based asset upgrade management whereby upcoming changes for the assets are received through a continuous feed of information, stored in an appropriate repository determined by topic modelling and used to update digital twins, which are used to calculate usage metrics for the assets which, along with the upcoming changes are used in the creation of a report concerning dependencies.”

The examiner further noted that:

“This addresses the problem of how to ensure the reliability and compatibility of computer assets in the face of enduring software, firmware and hardware upgrades and incompatibilities giving the advantage of saving human labour and effort, whilst maintaining reliable operation of the assets.”

- 15 The examiner has assessed the contribution of the auxiliary claims (the “second set”) as:

“A method for digital twin based asset upgrade management whereby upcoming changes for the assets are received through a continuous feed of information, stored in an appropriate repository determined by topic modelling and used to update digital twins, which are used to calculate usage metrics for the assets which, along with the upcoming changes are used in the creation of a report concerning dependencies and notifications concerning obsolete software are sent to relevant procurement teams.”

- 16 The attorney however argued that the contribution is broader than that identified by the examiner. In their letter of 17 May 2022 they proposed as the contribution:

“To ensure the continued performance, and continued technical compatibility, of a computer system.”

They added:

“By testing and modelling changes upon the digital twin rather than on the real system (and, incidentally, reporting on the impacts and compatibility), the continued operation and reliability of the real system can be maintained.”

- 17 The attorney submitted in their letter of 12 August 2022 that *“the contribution of the invention is broader than automating the management of upgrading assets”* and that *“the invention does not simply automate the process, but additionally allows risks and problems to be identified”*. So that the contribution *“must include identification of forthcoming risks and allowing them to be overcome through intervention.”*

- 18 In the correspondence there was considerable discussion as to how risks, problems and incompatibilities in assets, when there is an upgrade or a change of requirements in software, hardware and firmware, are managed, and how the present invention

automates the management of upgrading assets. It is however important to understand what the invention actually produces as its end result. It produces a report based on the upcoming changes and the continued usage metrics, including hardware, software and firmware upgrade dependencies. The action an asset manager chooses to take after receiving the report is a matter for the asset manager. They could choose to take extensive action to manage dependencies or obsolescence, or may choose to take no action at all, based on any number of factors relevant to the business. I accept that various issues following the changes are identified in the report, but in my view the contribution does not extend to overcoming these issues.

- 19 The auxiliary claim set is slightly different in that, in addition to the creation of the report, procurement teams are notified in relation to obsolete software and alternative software which may potentially be a replacement. But once again the claimed invention merely notifies the procurement team, presumably in some form of further report. It is up to the procurement team to determine what action to take in the light of the information in the notification. The contribution does not extend to overcoming the issues with obsolete software but merely informing the procurement team that the issues exist and suggesting some possible alternatives.
- 20 Thus the present invention does not automate the management of upgrading assets, rather it provides an output which might be used for such a purpose. It provides a tool, in the form of a report or notification, which can be used by asset managers or procurement teams to manage the assets in the light of upcoming changes to those assets. Whilst the report created in accordance with the invention may be used to inform the upgrade of a computer system, so that it continues to perform as required and remains compatible with current technology, neither the created report itself, nor the process by which it is generated, actually ensures continued performance or technical compatibility.
- 21 The contribution submitted by the attorney relates to potential benefits which may be realised, and to which the present invention may partially contribute. But whilst the invention may be useful towards achieving this end, it does not fully accomplish it. I will therefore adopt the alleged contribution as given by the examiner in his latest report (as above), noting that, as acknowledged by the examiner, upgrade management will include identifying risks and problems.

**(3) Ask whether it falls solely within the excluded subject matter and (4) Check whether the actual or alleged contribution is actually technical in nature**

- 22 For convenience I will consider steps (3) and (4) together.
- 23 The attorney referred to several prior cases in the correspondence. Firstly they referred to *Protecting Kids The World Over (PKTWO)*<sup>7</sup>, quoting from paragraph 18 of that judgment (which is based on *Gemstar*<sup>8</sup>): "*If the effect outside the computer can in principle fairly be described as a physical concept, process or effect then the same considerations do not, in my judgement apply.*" The attorney's view submitted that, in the present case, there is a clear physical concept, process or effect, namely the generation of notifications and incompatibility reports and the corresponding

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<sup>7</sup> *Protecting Kids the World Over (PKTWO) Ltd's Patent Application* [2012] RPC 13

<sup>8</sup> *Gemstar-TV Guide International Inc v Virgin Media Limited* [2010] RPC 147

intervening actions on the real computer system (to prevent the foreseen compatibility problems). This, they argue is similar to *PKTWO* which involved an alarm. I note however that *PKTWO* was allowed because “*it solves a technical problem lying outside the computer, namely how to improve on the inappropriate communication alarm generation provided by the prior art*” (paragraph 35). As the examiner has pointed out, the courts have warned against relying too heavily on precedent cases with differing facts. The present invention does not involve an inappropriate communication alarm generator but rather generates reports and notifications reporting the outcome of the updates to the digital twins to identify potential problems with assets in the light of upcoming upgrades or changes. It does not give live alerts or notifications as to the physical assets, nor does it carry out any actions on the assets, but rather reports on potential future problems to the assets should the upgrades and other changes be applied to them without intervention. The present invention is therefore distinguished from *PKTWO*.

- 24 The attorney also referred to an IPO decision, BL O/809/18<sup>9</sup>, in which the hearing officer found that the invention was not excluded from patentability. This, the attorney argued, related to displaying a warning, and the notifications and incompatibility reports of the present invention are analogous to this and should also therefore be considered patentable. This case however does not relate to notifications regarding usage metrics and dependencies in relation to upcoming changes to assets, but rather to congestion on a construction site based on measured data from the site compared with design data so as to identify non-design data such as scaffolding and the like. The present invention is not in my view analogous to this and it seems to me that the invention in the present case is quite different in nature. I do not therefore find this decision particularly helpful in deciding the present case.
- 25 Finally, the attorney referred to a well-known EPO Board of Appeal decision T 0115/85<sup>10</sup>. This case is in fact one of the cases which forms the basis of signpost (ii) of the *AT&T* signposts, although the attorney has not made any specific submissions in relation to this signpost. In this case, the attorney argued, it was found that giving visual indications automatically about conditions prevailing in an apparatus or system is basically a technical problem. In *AT&T Lewison J* reviewed this case and, in paragraph 25, reached the following conclusion:

*“The point that the Board is making is that the computer output results in something happening in the real world, namely the giving of visual indications. The claim related to things going on inside the workings of the computer, rather than any form of data processing. It was that, I think, that led the Board to describe the claim as directed to use in the solution of a technical problem.”*

- 26 The present invention does not provide a visual indication about the things going on inside the workings of the computer, nor does it provide a visual indication concerning a status of the asset. Rather it reports on potential future risks and problems to assets based on output from the digital twins should upcoming upgrades and other changes be applied to the assets without intervention. This case is not therefore helpful in deciding the present case.

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<sup>9</sup> *Hitachi Limited's Application* (BL O/809/18)

<sup>10</sup> *IBM/Computer-related invention T0115/85* [1990]

27 The invention is implemented as a program for a computer. It is not however the case that it is necessarily excluded from patentability. What is important is whether the claimed invention makes a technical contribution. The *AT&T* signposts are useful indicators as to whether a computer-implemented invention makes a technical contribution. I will consider them in turn.

***(i) Whether the claimed technical effect has a technical effect on a process which is carried on outside the computer***

28 There was disagreement between the examiner and the applicant in relation to whether, for the purposes of this signpost, “the computer” related to both the computer system on which the invention is run and the computer system of the asset being modelled as a digital twin. In their letter of 17 May 2022 the attorney argued that signpost (i) is satisfied on the basis that: “*The invention may be run on a number of related computer systems... but these are removed from the ultimate technical effect, which occurs on the real system that is being monitored in the digital twin(s).*” Further submissions were made in their letter of 12 August 2022 that “*there is a clear process which exists independently of the computer system upon which the invention is being implemented.*” The attorney considered that the invention could be considered similar to a process control system in that it ensures that the computer system continues to run reliably by avoiding unexpected stoppages.

29 I can agree with this up to a point. The invention is run on a computer (or on related computer systems), but the digital twin is modelled on an “asset”, potentially a separate computer system, and the report generated relates to that separate real-world system or systems, including hardware, firmware or software dependencies.

30 I note however that the signpost requires there to be “a technical effect on a process outside of the computer”. The present invention merely produces a report based on continued usage metrics and software, hardware and firmware dependencies. Although the report relates to the asset, the invention does not in itself make any changes to the asset. Nor does it relate to the actual status of the asset, but rather highlights future risks and problems as and when the upcoming changes are applied to the asset. Even though the invention receives information from the asset and uses this information to update the digital twin, there is no technical effect on the asset itself. Rather the effect is on the digital twin which lies entirely within “the computer” for the purposes of this signpost. Thus, even if the “asset” is considered a separate system to that on which the present invention runs, there is no technical effect on the asset itself.

31 A similar argument applies to the auxiliary claim set. Merely notifying a procurement team of obsolete software does not have any effect on the asset itself. I therefore conclude that this signpost is not satisfied by either the main claims or the auxiliary claims.

***(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***

32 I will deal with signposts (ii) to (iv) together. These have not been discussed in any detail in the correspondence between the agent and the examiner. There is no suggestion that the claimed technical effect operates at the level of the architecture of the computer, or causes it to operate in a new way or run more efficiently or effectively as a computer. I note that the asset is unchanged by the invention and, although the invention may facilitate the making of decisions which can cause the asset to run more efficiently and/or effectively, it does not do this directly. These signposts are not therefore relevant in the present case.

***(v) Whether the perceived problem is overcome by the claimed invention as opposed to merely being circumvented***

33 The attorney argued in their letter of 17 May 2022 that the invention satisfies signpost (v), *“since the problem of ensuring the continued, reliable operation of the real system is tackled head on rather than circumvented, by testing proposed upgrades on a digital twin, before implementing any changes on the real system.”* In their subsequent letter of 12 August 2022 the attorney further argued that the problem is tackled head on *“since the notifications and warning reports allow e.g. alternative software to be used, thereby eliminating the problem of incompatibility.”* In their final letter of 8 December 2022 the attorney re-iterated that the present invention provides a solution to a technical problem, namely, how to ensure reliability and compatibility of a computer system in the face of enduring upgrades, obsolescence and incompatibilities.

34 I am not however convinced that this problem is solved by the present invention. The invention provides reports, or notifications, of problems with real systems relating to upcoming upgrades or changes in requirements to those systems, and may, in the case of the second claim set, suggest alternative software, but it does not provide a mechanism for solving these problems or ensuring reliability and compatibility. Rather it acts more like a software test bed for understanding the impact of upcoming upgrades and changes on the assets, thereby highlighting the problems that may occur. I do not therefore consider the present invention to solve this problem. Rather it solves the problem of identifying problems with incompatibility, obsolescence and the like when changes are to be made to assets. This is solved by updating the digital twins, but this solution lies solely in the field of computer programming, namely by using the digital twins as a test bed to test the impact of upcoming changes and reporting on the outcomes. The problem is not solved in any technical sense, for example in a reconfiguration of hardware, and in that sense the problem is circumvented rather than solved.

35 I therefore conclude that none of the signposts point to the contribution I have identified making a technical contribution. Taking a step back, the invention updates digital twins to understand the impact of upcoming changes to assets. It outputs a report and, in the case of the second claim set, a notification to a procurement team highlighting any obsolete software and suggesting possible alternative software. Overall this contribution relates to providing a software tool to help manage upgrades and changes to the assets. It does not in and of itself ensure ongoing compatibility but informs the asset manager of problems, so that the asset manager can make appropriate decisions for the business (whether the asset manager is a person or some sort of

automated system). It relates entirely to a program for a computer and does not make any changes to the assets themselves. Moreover the tool provides an administrative tool to assist asset managers in making decisions in relation to changes and upgrades to the assets in question. It therefore relates to a program for a computer as such.

- 36 To the extent that the invention relates to an administrative tool, it also relates to a method of doing business as such. I am not however convinced that it relates to the presentation of information as such. Whilst ultimately its output is a report indicating risks and problems with assets in the context of upcoming upgrades and changes in requirements, the invention does more than merely present information in the manner in which it creates the report.

### **Conclusion**

- 37 I have found that the invention claimed in the current claims (i.e. claim set 1) is excluded from patentability as it relates to a program for a computer as such and a method of doing business as such. I have reached the same conclusion in relation to the auxiliary claims (i.e. claim set 2). I therefore refuse the application under section 18(3).

### **Appeal**

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

### **B Micklewright**

Deputy Director, acting for the Comptroller