



PATENTS ACT 1977

APPLICANT	Cathal Greaney
ISSUE	Whether patent application GB1804674.8 satisfies the requirements of sections 1(1)(d) and 1(2)(c)
HEARING OFFICER	B Micklewright

DECISION

Introduction

- 1 Patent application GB 1804674.8, entitled “A border control system and method of operating same”, was filed on 23 March 2018 in the name of Cathal Greaney. It was published on 25 November 2019 as GB 2572214 A. The examiner considered the invention to be excluded from patentability as a program for a computer, a method of doing business, and the presentation of information as such and deferred all other substantive matters. The applicant disagreed. After several rounds of correspondence the examiner issued an examination report maintaining the excluded matter objection but also, for the first time, making novelty and inventive step objections. The applicant subsequently requested a hearing. There has been no correspondence between the examiner and the applicant in relation to the novelty and inventive step objections.
- 2 The matter came before me at a hearing on 20 December 2022 at which the applicant was represented by their attorney Mr Michael O’Connor of the firm O’Connor Intellectual Property. Mr O’Connor was a little unclear as to whether the hearing would cover the novelty and inventive step issues. I decided that it was best that all the issues be considered together, and the hearing proceeded on that basis. I did however give Mr O’Connor a further opportunity to make written submissions on novelty and inventive step after the hearing. None were however received but Mr O’Connor was able to make submissions on these matters at the hearing.

The invention

- 3 The invention relates to border control systems, specifically to permitting easier passage of containers through customs checkpoints and to making more efficient and effective use of customs resources. To achieve this a monitoring device is placed on a portable container, the device having a location sensor and also sensors to capture data relating to other activities such as motion or acceleration of the

container, the atmospheric conditions inside the container, the presence of a person, or of a specified gas, in the container, or the level of the container. The device may also include means for recording video or audio.

- 4 A communications unit included in the device periodically transmits the location of the container to a remote processor. Any other captured data is also transmitted to the processor. This processor then calculates a risk score for the container based at least in part on this data. This risk score is presented to a customs official who then determines whether or not to inspect the container at the customs checkpoint based on the risk score of the container.
- 5 Other factors can also feed into the risk score, such as inspection data following an inspection by a customs official, or historical data relating to the container, the haulier or the driver. Machine learning could be used to refine the risk score. The system could alert the customs official to the impending arrival of the container along with the risk score. They could also be alerted if there is an interruption in the provision of data from the monitoring unit. The data could be stored as a block chain ledger or a trusted ledger.
- 6 The latest set of claims was filed on 19 October 2022. Claims 1 and 11 are independent claims and relate to a method and system respectively. They are equivalent in scope and it will be sufficient for the purposes of this decision to consider claim 1 alone, which reads (including references to the features of the claim added by myself to be able to refer to specific features in the claim):

(1) A method of operating a border control system comprising:

(a) placing a monitoring device on a portable container to be monitored, the monitoring device having at least a location sensor to determine the location of the monitoring device and a communications unit for communications with a remote processor;

(b) the location sensor monitoring the location of the container over time;

(c) the communications unit periodically transmitting the location of the container to the remote processor;

(d) the remote processor processing the received location data of the container and calculating a risk score for the container, based, at least in part, on the location data of the container;

(e) displaying, on a user interface of a user computing device operated by a customs official, the risk score for the container;

(f) a customs official determining whether or not to inspect the container based on the risk score of the container; and

(g) in which the method comprises the step of the monitoring device capturing one or more of: (i) the motion of the container; (ii) the acceleration of the container; (iii) a pictorial image recording; (iv) a sound recording; (v) the atmospheric conditions outside the container; (vi) the atmospheric conditions internal the container; (vii) presence of a person in the container; (viii) the presence of a specified gas in the container; (ix) the level of the container; and thereafter transmitting the captured data

to the remote processor, and the remote processor thereafter calculating the risk score for the container, based, at least in part, on the captured data.

7 The dependent claims are relevant to inventive step. Claim 2-10 are dependent on claim 1 and read:

(2) A method of operating a border control system as claimed in claim 1 in which the method comprises the step of a customs official inputting inspection data relating to the container, transmitting that inspection data to the processor, and the processor thereafter calculating the risk score for the container, based, at least in part, on the inspection data.

(3) A method of operating a border control system as claimed in any preceding claim in which the method comprises the step of the processor calculating the risk score for the container, based, at least in part, on historical data relating to one or more of (i) the container; (ii) the haulier; and (iii) the driver.

(4) A method of operating a border control system as claimed in any preceding claim in which the method comprises the step of alerting a customs official of the impending arrival of a container along with the risk score of the container.

(5) A method of operating a border control system as claimed in any preceding claim in which the method comprises the step of storing in memory the raw data received from the monitoring device.

(6) A method of operating a border control system as claimed in any preceding claim in which the method comprises the step of storing in memory the processed data produced by the processor.

(7) A method of operating a border control system as claimed in any preceding claim in which the data is stored in one of: (i) a block chain ledger; and (ii) a trusted ledger.

(8) A method of operating a border control system as claimed in any preceding claim in which upon an interruption to the provision of data from the monitoring unit, an alert is transmitted to the customs official.

(9) A method of operating a border control system as claimed in any preceding claim in which each monitoring device is provided with a unique identifier in a machine readable format, and in which the method includes the step of the customs official interrogating the monitoring device and capturing the unique identifier.

(10) A method of operating a border control system as claimed in any preceding claim in which the method comprises the step of refining the risk scoring algorithm with a machine learning technique.

8 Claims 12-16 are dependent on claim 11 and are equivalent in scope to claims 2,3,7 and 10 respectively.

The law

Novelty and inventive step

9 Section 1(1) of the Patents Act 1977 ("the Act") states:

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

(a) the invention is new;

(b) it involves an inventive step;

(c) it is capable of industrial application;

(d) the grant of a patent for it is not excluded by subsections (2) and (3) or section 4A below;

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

10 Section 2(1) of the Act states:

An invention shall be taken to be new if it does not form part of the state of the art.

11 Section 2 then defines the state of the art in the case of an invention.

12 Section 3 of the Act states:

An invention shall be taken to involve an inventive step if it is not obvious to a person skilled in the art, having regard to any matter which forms part of the state of the art by virtue only of section 2(2) above (and disregarding section 2(3) above).

13 In *Windsurfing*¹, the Court of Appeal formulated a four-step approach for assessing whether an invention is obvious to a person skilled in the art. This approach was restated and elaborated upon by the Court of Appeal in *Pozzoli*² where Jacob LJ reformulated the Windsurfing approach as follows:

- (1)(a) *Identify the notional “person skilled in the art”*
 - (b) *Identify the relevant common general knowledge of that person;*
- (2) *Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;*
- (3) *Identify what, if any, differences exist between the matter cited as forming part of the “state of the art” and the inventive concept of the claim or the claim as construed;*
- (4) *Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?*

¹ *Windsurfing International Inc v Tabur Marine (Great Britain) Ltd* [1985] RPC 59

² *Pozzoli SPA v BDMO SA* [2007] EWCA Civ 588

Excluded subject matter

14 Section 1(2) of the Act states:

1(2) It is hereby declared that the following (amongst other things) are not inventions for the purpose of the Act, that is to say, anything which consists of-

(a) a discovery, scientific theory or mathematical method;

(b) a literary, a 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 program for computer;

(d) the presentation of information;

but the foregoing provisions shall prevent anything from being treated as an invention for the purposes of the Act only to the extent that a patent or application for a patent relates to that thing as such.

15 The provisions of Section 1(2) were considered by the Court of Appeal in *Aerotel*³ where a four-step test was set out to decide whether a claimed invention was excluded from patent protection:

(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.

16 It was stated by Jacob LJ in *Aerotel* that the test is a re-formulation of and is consistent with the previous 'technical effect approach with rider' test established in previous UK case law. Kitchen LJ noted in *HTC v Apple*⁴ that the *Aerotel* test is followed in order to address whether the invention makes a technical contribution to the art, with the rider that novel or inventive purely excluded matter does not count as a 'technical contribution'.

17 Lewison J in *AT&T/CVON*⁵ set out five signposts that he considered to be helpful when considering whether a computer program makes a technical contribution. Lewison LJ reformulated the signposts in *HTC v Apple* in light of the decision in *Gemstar*⁶. The signposts are:

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

⁴ *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451

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

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.

Assessment

Novelty and inventive step

18 The examiner cited the following documents in relation to novelty and inventive step:

D1: US 2011/0050423 (Cova & Smith)

D2: US 7312702 (Willms & Rothkopf)

D3: US 2005/0197844 (Ng et al.)

19 The examiner considers D1 to disclose all the features of claim 1-9,11-13,15 arguing that, in relation to dependent claims 2 and 12 it is implicit that the customs officials have some means of input into the system in order to report findings after an alarm is raised. The examiner considers that the feature of claims 10, 14 and 16, relating to the use of machine learning to refine the risk score and to the use of blockchain technology to store the data, are obvious in the light of D1.

20 According to the examiner, neither D2 nor D3 disclose the use of a user interface to provide the risk analysis/score to a customs official. The examiner however considers that this would be an obvious way to provide the relevant information.

21 At the hearing Mr O'Connor stated that the inventor considered D1 and D2 to be "practically irrelevant" and not particularly similar to the present invention on close inspection. The inventor considered D3 to be the most similar document. I will consider each document in turn.

D1: US 2011/0050423

22 D1 discloses a system whereby location tags, which could use GPS, are fixed to shipping containers and the like (called "assets" in D1). Either the buyer (receiver of the asset) or the seller (sender of the asset) can send a request to a tag provider requesting tracking of a shipment. The tag can be programmed to wake up periodically and send event notifications to the tag provider and can include an accelerometer or velocimeter to record "details of the movement of the asset". It can

also send event information relating to temperature, humidity, shock and acceleration to the tag provider, and can report security events such as tampering. According to paragraph [0076], the system receives a notification that the tag has arrived at a destination location. The tag can have a machine-readable code such as a barcode. According to paragraph [0082], an information service module provides an interface through which users can view track and trace data, event and exception notifications, risk management information and customs inspection risk scores amongst other things. In paragraph [0092] D1 discloses the storage of the most recent data in an operational data store and stores all data in a data warehouse. The data from the operational data store is used to provide track and trace data to end users so that they can see the progress of their assets and see any event notifications that were received for the assets. This data is used to generate a user interface showing the progress of the asset. In paragraph [0098] of D1 a user notification is generated which includes a dynamic estimated time of arrival of the asset. User notifications can also include a report of an event notification.

- 23 Details of a customs inspection risk score are disclosed in paragraph [0099] of D1. This paragraph states (emphasis mine):

“[0099] In some implementations, the user notification is a customs inspection risk score. The customs inspection risk score predicts whether an asset should be inspected by customs. The customs risk score can be derived from various factors that influence whether the asset should be a customs target. For example, these factors can include the contents of the asset, the locations through which the asset has travelled, whether there was a security event for the asset, and whether individuals involved with the journey of the asset are flagged as suspicious persons (e.g., by being included on a terrorist watch list) Individuals involved with the journey of the asset include, for example, the individuals who requested the asset be shipped, the individuals receiving the asset, the individuals who stuffed the asset, the individuals who sealed the asset, and the individuals who transported the asset. Some contents, and some countries, are more likely to lead to customs inspections than other countries and contents. The system can determine the risk from various contents and various countries, for example, from an analysis of historical data that indicates what types of content are more likely to be inspected, and what countries increase the risk of customs inspection. For example, the system can maintain a list of “low risk,” “medium risk” and “high risk” contents, and a list of “low risk,” “medium risk” and “high risk” countries. Contents and countries can be placed in the appropriate category, for example, from an analysis of the historical data. Similarly, assets that have had a security event are more likely to be high risk than assets that have not, because the security event indicates that the contents of the asset may have been tampered with. If the individuals associated with the journey of the asset are suspicious, then the asset is higher risk. The system can then generate the customs inspection risk score according to the various factors described above. For example, the system can plug the factors into a formula with pre-determined weights that assigns a risk score to the asset. The weights can be determined, for example, empirically, from an analysis of historical data for assets known to be high risk, and not high risk. The system can provide the customs inspection risk score to an end user, e.g., a user who is tracking the asset, or can provide the customs risk score to customs officials for use in determining whether to inspect the asset.”

- 24 This customs risk score predicts whether an asset should be inspected by customs. It can be derived from various factors, for example the contents of the asset, the locations through which the asset has travelled, whether there was a security event

for the asset, and whether individuals involved with the journey of the asset are flagged as suspicious persons. Historical data can be considered such as which contents are more likely to be inspected by which countries. The customs inspection risk score can be calculated by plugging the various factors into a formula with pre-determined weights. The weights can be determined, for example, empirically from an analysis of historical data for assets known to be high risk and not high risk. This customs risk score can be provided to the end user or to customs officials for use in determining whether to inspect an asset.

- 25 D1 defines in paragraph [0021] “security events, environmental events, process events and tracking events”. Security events can indicate that the asset 108 or tag 114 may have been tampered with. Environmental events can indicate that one or more environmental variables (e.g., temperature, humidity, shock, acceleration) are beyond an acceptable range (e.g., a range specified by the user). Process events indicate that various procedural events in the journey of the asset have occurred. Tracking events are periodic reports of the tag 114's location. For example, the tag 114 can send a report of its current location according to a schedule, for example, at fixed intervals of time, regardless of whether any other events have been issued.
- 26 Paragraph [0099] only explicitly refers to security events and “the locations through which the asset has travelled”, which seems to relate to tracking events, as factors affecting the customs risk score. In particular there is no explicit mention of environmental events. Paragraph [0099] does however make clear that these are examples of various factors which can influence whether the asset should be a customs target and the list is not intended to be exhaustive.
- 27 Mr O'Connor considered there to be significant differences between all three documents and the present invention in that the present system is a passive system. It doesn't require any change in behaviour or operating business processes except the for the initial task of signing up and installing devices on the containers. The systems of D1-D3 require some sort of haulage or transport company change in procedures, in some cases needing to dedicate a member of staff to a security role. This would be infeasible unless made a legal requirement, and even then the security personnel would be a weak link in those systems, shifting the weak link from the truck driver to security personnel.
- 28 I asked Mr O'Connor which claimed features resulted in this difference. He referred me to the inputs from several sources which are used to determine the risk score, particularly those listed in part (g) of claim 1. The risk score informs the likelihood of contraband being present in the container and the likelihood that it must be stopped at that particular customs border or can pass through. This, according to Mr O'Connor, has a knock-on effect on scheduling, queues at checkpoints, and resource allocation for those customs officials. The process is streamlined by not needing to check every container. Mr O'Connor submitted that the additional features in part (g) of claim 1 are not shown in any of the prior art documents, or at least do not contribute to the risk score.
- 29 D1 is focussed on a different type of use, one more aimed at enabling the senders and receivers of the asset to monitor progress as their asset is transported to its destination. In that sense I agree with Mr O'Connor that its focus is different to that of the present invention. It does however also disclose, in paragraph [0099], a customs

risk score which can be used by a customs official for use in determining whether to inspect an asset. This can be based on location data amongst other things. It therefore discloses all the features of elements (a) to (f) of claim 1. It is not however clear that element (g) is disclosed in D1. Although the system of claim 1 collects and transmits details of other physical parameters such as temperature, which are called “environmental events” in D1, there is no explicit disclosure of these parameters being used in the calculation of the customs risk score. It refers only to “security events” (which relate to tampering and the like) and tracking events.

30 Element (g) includes in the list “motion data of the container”. Page 3 lines 28-30 state “For example, the method can detect if the container has stopped for a prolonged period of time but experienced motion of the container over that time, indicative of the container being loaded or unloaded.”. Similarly page 8 lines 29-32 states “Alternatively, the monitoring device may determine that the container stopped for an unscheduled stop off a main route and during that time, movement sensed by a motion sensor included in the monitoring device indicates that the container was loaded or unloaded during the stopover”. I therefore construe element (g)(i) to refer not to a location sensor such as a GPS sensor, but to a local motion sensor which uses sensors to detect local movement of the container. Moreover, although the list of factors included in the calculation of the risk score in D1 is not an exhaustive list, there is no explicit or implicit indication that the environmental factors could be used. I therefore conclude that feature (g) of claim 1 is not disclosed in D1. Claim 1 is therefore novel over D1.

31 I now need to consider whether the claimed invention is obvious in the light of the disclosure of D1 and the common general knowledge of the person skilled in the art. I will follow the *Windsurfing/Pozzoli* approach in my analysis.

(1)(a) Identify the notional “person skilled in the art”; (b) Identify the relevant common general knowledge of that person

32 The examiner defined the person skilled in the art as follows in their report of 3 November 2022:

“19. The person skilled in the art is considered to be an engineer or team of engineers that design and produce tracking and monitoring systems for use with cargo. They would have good knowledge of existing types of tracking systems their capabilities and flaws. Being largely computer-based systems, the individual/team would have good knowledge of the various aspects of implementing such systems including algorithms and machine learning models. They would also have a good background in the types of data which is useful to a system of this type the means of collecting, securely storing and displaying it.”

33 The only point I would add is that the skilled person would also have knowledge of existing customs checking processes.

(2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it

34 The inventive concept relates to a border control system whereby a monitoring device is placed on a portable container, the monitoring device having at least a location sensor and another sensor or element for capturing further information

relating to the container, so that the monitoring device captures one or more of the parameters listed in part (g) of claim 1, whereby the location data is periodically transmitted to a remote processor and the additional data is also transmitted to a remote processor. A risk score is then calculated based at least in part on the location data of the container and the additional data and displayed on a user interface to a customs official who then determines whether or not to inspect the container based on the risk score of the container.

- 35 Mr O'Connor submitted that the inventive concept should include the advantages arising out of the invention, namely improvements in scheduling, in queues at checkpoints, and in resource allocation. Whilst these advantages may arise out of the inventive concept, the inventive concept itself relates to the technical features of the invention which realise these advantages. According to Mr O'Connor the way the risk score is calculated, with a particular emphasis on part (g) of claim 1, are key to realising these advantages, and I have included this in my identification of the inventive concept.

(3) Identify what, if any, differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim or the claim as construed

- 36 I have identified in my analysis of novelty above that element (g) of claim 1 is not disclosed in D1. The calculation of the customs risk score is not explicitly based on the environmental factors disclosed in D1, some of which read onto those listed in element (g) of claim 1.

(4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

- 37 The skilled person would understand from D1 that monitoring environmental events could influence the integrity of the contents of the asset, for example if the asset received a sudden knock or a change in temperature or humidity. In my view they would also understand that such events could impact on whether any suspicious activity had taken place which would be relevant to the customs risk score. The main focus of D1 is to give the end users, i.e. the sender and the recipient of the asset, a means for tracking progress of their asset and a means for monitoring its contents. The calculation of the customs risk score is framed initially as being aimed at these users. It is however explicitly stated that it could be used by customs officials and, although not its main purpose, it is apparent from paragraph [0099] of D1 that various factors should be considered when considering whether the asset should be a customs target. I consider that it would be obvious to the skilled person that the defined environmental events could be one of the "various factors that influence whether the asset should be a customs target", given that these events are clearly useful and relevant events in the context. Although not all the elements in part (g) of claim 1 are disclosed in D1, at least some of them are and I note that the claim does not require monitoring of all these parameters but only "one or more" of them. I therefore conclude that claim 1 is obvious in the light of the disclosure of D1. Even if the claim was restricted to monitoring all elements in part (g), there is a reasonable argument that these are all obvious things the skilled person would consider monitoring in order to make the system of D1 as effective as possible.

D2: US 7312702 (Willms & Rothkopf)

- 38 D2 relates to expediting release procedures of cargo containers at border crossings or at customs entry points by tracking and reporting threats while cargo containers are in transit. In particular it does this by *“detecting each statistically significant threat (SST) signal associated with at least one cargo container while in transit, and by tracking and reporting to each appropriate party the position coordinates and a security status of each cargo container that generated at least one SST signal.”*
- 39 Each SST signal generates a threat signal having a threat probability higher than a predetermined threshold. Each container is equipped with a “Smart Container Lock/Strongbox device” which comprises at least one active threat detector, at least one passive threat detector, a tracking/navigation device, a reporting means, a programmable locking device and a communication means having access to the internet (column 13 lines 42-49).
- 40 The “threat probability” serves the same function as the risk score of the present invention, that is to assist customs officials in determining whether to inspect a particular container. The system of D2 clearly tracks the location of the container. Moreover, it also uses “passive threat detectors” and “active threat detectors”. These are defined in terms of two earlier patents US7151447 and US7180418 respectively. These patents disclose different types of threat detectors. US’447 discloses determining a threat signature which includes detecting an exchange of kinetic or electromagnetic energy, including detecting vibrations, thermal energy, detecting an exchange of particles, or detecting a human, animal, plant or insect. The interior environment of the cargo container is continuously monitored to detect at least one threat signature. US’418 discloses the use of electromagnetic sensors or acoustic sensors to monitor the interior of a container. Temperature, pressure, strain and flow can be monitored, as well as other parameters. These two applications therefore disclose the features of elements (f) and (g) of claim 1 of the present invention.
- 41 Mr O’Connor’s arguments in relation to D2 are essentially the same as those presented for D1. He questions whether the parameters monitored by the threat detectors contribute to the risk score (or the “threat probability”). He commented that the prior art systems are binary systems which make decisions in relation to whether to search a container based on tampering rather than based on the various factors claimed. I have however found that D2, as well as the other documents, do take into account a wider range of parameters in calculating their equivalents to the risk score, and it is clear in D2 that the threat probability does involve these parameters.
- 42 There is however no explicit reference to displaying the threat probability to a customs official on a user interface in D2, as in element (e) of claim 1 of the present invention. Although there is clearly a reference to using a user interface in the process as a whole, there is not in my view sufficient disclosure to argue the element (e) is implicitly disclosed in D2. Claim 1 is therefore novel over D2.
- 43 It is, in my view, apparent to the skilled person that the calculated threat probability is a useful parameter to display to, for example, a customs official, alongside whether or not this probability exceeds a threshold. It would be therefore obvious to the person skilled in the art to display such a parameter in a user interface in the system

of D2. As element (e) is the only element not disclosed in D2, I therefore conclude that claim 1 lacks an inventive step over D2.

D3: US 2005/0197844 (Ng et al.)

- 44 D3 discloses a system whereby a cargo container includes a container security unit (CSU) that provides a container status and a container identifier, and a container seal. Container processing systems each have a report generator and an interface to a digital network. A central server communicates via the digital network to monitor the cargo container from the origination point to the destination and to identify any security issues arising during shipment of the cargo container, receiving periodic updates from the CSU. This monitoring includes position sensing such as GPS. Information sent to the central server may include location, status (e.g. "moving"/"not moving") as well as any available security information such as the status of the lock, presence of any hazardous materials or the like. Such hazard sensors may detect, for example, one or more types of chemical, biological, nuclear, radiological, explosive and/or other hazards. The system assesses risks posed by containers or other aspects of the shipping chain. A worldwide secure data network is provided to enhance information availability to supply chain participants, authorized government agencies and/or other interested parties. It is made clear in paragraph [0018] of D3 that various CSUs and electronic seals having widely varying capabilities and resources are available commercially from multiple sources.
- 45 The central server, described as a network operations center (NOC), receives data from the various container processing and/or status systems. It obtains packing information, status information, arrival information and/or the like to identify changes in the contents of container, intrusions into the container and/or other events during shipment. Moreover, various further embodiments of the NOC additionally include data mining software or the like to identify non-obvious relationships, risk patterns and/or issues to thereby identify those cargo containers posing greater risks than other containers.
- 46 The information gathered can be used to evaluate the threat level posed by a container being monitored. A risk analysis module identifies situations which may result in an alert which could result in security action by a government enterprise. The alert can then be investigated, and the container further monitored or intercepted and inspected prior to further transport. The system can use the data it collects to identify threat patterns that were not previously apparent. Containers may be classified or scored to assess the level of threat presented. This seems to be akin to the "risk score" of the present invention.
- 47 Mr O'Connor considered the system of D3 to be heavily reliant on tamper seals and infrastructure and intermediate waypoints such as ports or depots. D3 compares manifests at departure and arrival points. Only then does it determine that something has gone awry during transport of the container. D3 does disclose some of the broader aspects but a point of difference, according to Mr O'Connor, is that the present invention monitors the container during transit far more closely than the system disclosed in D3. For example the present invention monitors whether the container has already been inspected by customs officials during that journey which is important to avoid duplication of effort, as is claimed in claim 2. It also monitors whether a vehicle stops, and any activity during a period where it is stopped, e.g. by

using the tilt sensors which may indicate loading or unloading. The present invention also provides alerts to customs official when a container is on route and approaching their station (this is claimed in a dependent claim). None of these are, according to Mr O'Connor, mentioned in D3. Continuous monitoring of the container during transit and determining whether it may be considered necessary or unnecessary to search the container are key features of the present invention.

- 48 I will consider the features of the dependent claims below. In considering whether the present invention is novel and inventive over D3, it is important to consider the features of the claims themselves. Although it may be that the intention of the present invention is to monitor the container more closely during transit, this is not brought out in the claims. The inventive concept merely requires monitoring of position and other parameters and transmitting this data "periodically". It is apparent that the system of D3 sends various information relating to the status of the container during transit, and the threat score is determined at least in part based on these parameters.
- 49 D3 does not explicitly disclose the use of the threat score or level to inform customs officials as to whether to inspect a container at a border, but it does disclose intercepting and searching a container in the event of an alert, the alert being related to the calculated threat level. The application does not explicitly seek to solve the problem of more efficient customs controls at borders. I note however that claim 1 is not specifically limited to solving such a problem. Element (f) relates to "a customs official determining whether or not to inspect the container based on the risk score of the container" and D3 does disclose this element, albeit with the purpose of managing a security threat rather than a more efficient border control.
- 50 There is no disclosure of element (e) in D3, namely displaying the risk score to a customs official in a user interface. The present invention is therefore novel over D3. This is however the only difference between the present invention and D3 and I believe that it would be obvious the skilled person to indicate the threat score/level to a customs official in this manner in D3. I therefore conclude that claim 1 does not make an inventive step over D3.
- 51 In summary, claim 1 is novel over the cited prior art but lacks an inventive step over the disclosure of each of D1, D2 and D3. Claim 11 is equivalent in scope to claim 1 and also therefore does not involve an inventive step over the cited prior art.

The dependent claims

- 52 For completeness I will also consider the dependent claims.
- 53 Dependent claims 2 and 12 relate to a customs official inputting inspection data relating to the container, the inspection data being transmitted to the processor and the risk score being calculated, at least in part, on the inspection data. D1 does not explicitly disclose the use of inspection data input by the customs official contributing to the calculation of the risk score. Because D1 discloses very little about customs officials I do not consider claims 2 and 12 to be obvious over D1. D2 however discloses a website or portal where all kinds of data and reports can be displayed. A pre-shipment cargo inspection report is explicitly disclosed, and other types of inspection reports would, in my view, be obvious to include. Customs officials can

input data into the system. Claims 2 and 12 are therefore obvious over D2. D3 also discloses the input of various reports into the system and indicates that customs officials may inspect a container at any port or point during transit. It would be obvious that the results of that inspection would be fed into the system which calculates the threat level. Claims 2 and 12 are therefore obvious over D3.

- 54 Dependent claims 3 and 13 relate to the risk score being calculated based at least in part on historical data relating to one or more of the container, the haulier and the driver. D1 clearly discloses the use of such historical data in calculating the risk score. These claims therefore lack an inventive step over D1. D2 discloses use of information relating to the shipper and so claims 3 and 13 also lack an inventive step over D2. D3 discloses the use of data mining software to identify non-obvious relationships and risk patterns and/or issues to thereby identify those cargo containers posing greater risks than other containers. Historical data relating to the manifest created at the time the container was packed is considered, and this could be considered historical data. Moreover the system can use data obtained from a container to predict future threats, further suggesting that historical data is used to determine the threat level. Claims 3 and 13 are therefore obvious over D3.
- 55 Dependent claim 4 includes the step of alerting a customs official to the impending arrival of a container along with the risk score of the container. In paragraph [0076] of D1 an alert is generated when a tag has arrived at a destination. In my view it would be obvious, if the customs risk score was transmitted to customs officials for use in determining whether to inspect an asset as is disclosed in paragraph [0099] of D1, for the customs official also to receive such notifications and alerts. Claim 4 is therefore obvious in the light of the disclosure of D1. D2 discloses “confirming that the cargo shipment of containers is nearing a physical border crossing or is nearing customs entry point by using the navigational and the container ID technology”. It would in my view also be obvious to include in this confirmation information regarding the threat probability. In D3 containers can be inspected by customs officials at any port or point. It would be obvious for the system to generate an alert when a container reaches that point, along with some indication of the threat level. Claim 4 is therefore also obvious over D2 and D3.
- 56 Claims 5 and 6 relate to the storage of data. In claim 5 raw data received from the monitoring device is stored in memory. In claim 6 processed data produced by the processor is stored in memory. In my view either means of storing data would be obvious alternatives to the skilled person in any of the systems of D1, D2 and D3.
- 57 Claims 7 and 14 relate to using a block chain ledger or a trusted ledger to store the data. This has become a well known way of storing data in a secure manner and I believe it would be obvious to use block chain technology in any of the systems of D1, D2 and D3 to ensure the data has a secure audit trail.
- 58 In claim 8, an alert is transmitted to the customs official upon an interruption of the provision of data from the monitoring unit. It seems to me that, in the event that expected updates in the data being received from a monitoring unit are not being received, some sort of alert would be generated for the person monitoring the updates to indicate that some sort of error has occurred. This is commonplace in computing where a data stream is interrupted. I therefore consider claim 8 to be obvious over the cited prior art and the skilled person’s common general knowledge.

- 59 Claims 9 and 15 define a unique identifier for each monitoring device in a machine readable format, and the customs official interrogates the monitoring device to capture the unique identifier. D1 discloses scanning the tag to identify it, for example using a barcode. It also discloses RFID enabled tags from which data can be received by RFID readers which would include a unique identifier in a machine readable format. Claims 9 and 15 are therefore obvious over D1. D2 similarly discloses the use of RFID tags to identify and locate containers with a detected SST signal. D3 discloses “an electronic code or identifier that is capable of uniquely identify the container” to the system. It would be obvious in both documents for customs officials to use these codes or tags to obtain data in relation to the monitoring device.
- 60 In claims 10 and 16, the risk scoring algorithm is refined with a machine learning technique. The application does not expand on how machine learning can be used in any level of detail. It would be obvious to the skilled person to use machine learning techniques to calculate risk scores in any of the systems of D1, D2 and D3.

Excluded matter

- 61 I will use the *Aerotel* approach to determine whether the claimed invention relates to a program for a computer as such, a method of doing business as such, and to the presentation of information as such.

(1) Properly construe the claim

- 62 No particular construction issues arise in relation to claim 1. I note that the risk score is calculated based at least in part on the location data and on one or more of the parameters listed in part (g) of the claim. This risk score is displayed on a device used by a customs official who then determines whether or not to inspect a container based on the risk score of the container.

(2) Identify the actual contribution

- 63 Identifying the contribution in the second step of this test is critical and I refer to paragraph 43 of *Aerotel* for guidance:

“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.”

- 64 I have found that the claims do not make an inventive step over the prior art. For the purposes of this decision I will however consider the contribution separately, with reference to the cited prior art as necessary. In their letter of 23 September 2023 Mr O’Connor submitted that, whilst the invention may incorporate known components, they have been combined in a new and non-obvious way and therefore relate to a new physical combination of hardware. It is however, in my view, evident from a brief perusal of the prior art documents cited that such hardware arrangements are well known in the art. I do not therefore consider that the contribution includes a new arrangement of hardware.

65 Claim 1 is directed to “a method of operating a border control system”. The method calculates a risk score for the container and displays this to a customs official who uses the score to determine whether or not to inspect the container. The risk score is calculated in part based on data received from a monitoring device placed on the container. The monitoring device has a location sensor and communications unit and periodically transmits the location of the container to a remote processor. The monitoring device also captures one or more of parameters (i)-(ix) listed in part (g) of claim 1.

66 This captured data is also transmitted to the remote processor. The remote processor calculates the risk score based, at least in part, on the location data and the other captured data received from the monitoring device.

67 The advantages of the invention relate to providing the customs official with a risk score so that they can make a reasonable assessment of which containers to inspect, and which may pass through the border without inspection, thereby potentially providing a more efficient and effective border control, speeding up the border control process and ensuring that containers with a higher risk score are inspected.

68 Mr O’Connor, in his letter of 23 September 2022, argued that the invention further addresses resource allocation problems, scheduling issues and traffic congestion. More specifically, the present invention enables Customs to more effectively identify the correct containers that require inspection and those that it is safe to allow to pass through customs checks. It also allows Customs to allocate their resources more effectively and efficiently so that they are more likely to be searching the containers of interest. It also enables Customs to more effectively schedule the checks and ensure they have adequate resources in place, thereby avoiding lengthy queues at ports and borders. Furthermore, the present invention enables containers to be intercepted and checked at a point remote from the port or border. He emphasised these arguments at the hearing and considered that the examiner had oversimplified the contribution. Whilst the invention did give the customs official a visual representation of the risk factor, it is the manner in which the risk factor is determined which is important. It does much more than merely detecting whether a tamper-proof seal has been interfered with.

69 I agree that, in general, the present invention can assist in improving border checks in these manners and thus can improve the effectiveness and efficiency of border control. The specific advantage however lies in the ability for customs officials to make a better assessment of which containers to inspect, thereby potentially reducing the numbers of containers inspected and/or reducing the risk of containers which should have been inspected passing through the border. I will however consider the advantages highlighted by Mr O’Connor in my analysis below.

70 Taking the above points into account, I would categorise the contribution as:

A method or system for operating a border control system whereby a monitoring device is placed on a portable container, the monitoring device transmitting data relating to the container to a remote processor and the central processor calculating a risk score based at least in part on this data so that a customs official can determine whether or not to inspect the container based on the risk score, the data

transmitted to the remote processor, and on which the risk score is at least in part based, including the periodic transmission of the location of the container and also one or more of the parameters listed in (i) to (ix) above. The invention therefore helps enable a more efficient and effective border control whereby a customs official can determine which containers to inspect based on the risk score, the other containers not needing to be inspected at the border control, thereby at least potentially addressing problems such as resource allocation, scheduling and traffic congestion.

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

71 For convenience I will consider signposts (3) and (4) together.

72 In relation to the business method exclusion, the courts have provided some helpful guidance. For example, in Merrill Lynch's Application [1989] RPC 561 Fox LJ said at page 569:

"The end result, therefore, is simply 'a method of doing business', and is excluded by s.1(2). The fact that the method of doing business may be an improvement on previous methods of doing business does not seem to me to be material. The prohibition in s.1(2)(c) is generic; qualitative considerations do not enter into the matter. The section draws no distinction between the method by which the mode of doing business is achieved. If what is produced in the end is itself an item excluded from patentability by s.1(2), the matter can go no further..."

A data processing system operating to produce a novel technical result would normally be patentable. But it cannot, it seems to me, be patentable if the result itself is a prohibited item under s.1(2). In the present case it is such a prohibited item."

73 It is therefore the case that the fact that a method of doing business is an improvement on previous methods of doing business is not material. It is still a method of doing business.

74 Mr O'Connor argued in his letter of 23 September 2022 that resource allocation problems, scheduling issues and traffic congestion are inherently technical in nature, and reinforced these points at the hearing. I however disagree that this is necessarily the case. Whilst it is possible that technical solutions can help with these issues, they are essentially administrative problems. The question is whether the specific advantage claimed in the present invention, namely the provision of the risk score to the customs official so that they can better determine whether or not to inspect a particular container, is a technical solution to these problems or an administrative solution.

75 At the hearing Mr O'Connor submitted that, if the invention related to the throughput of data through a telecommunications switch, particularly to more efficiently prioritising the data, allocating resources and facilitating passage through the switch, then this would no doubt be technical. According to Mr O'Connor the present invention solves identical problems and should also therefore be considered technical. Moreover, just as *Aerotel* was originally allowed because it related to a new physical system, so the system claim 11 should be allowed in the present case as it relates to a new system, a new configuration of components. Mr O'Connor confirmed that in the present case the "system" would include the monitoring devices and also the risk assessment program. I however consider that the risk assessment

program is not part of a new hardware configuration and have found that the hardware arrangement for the present invention is conventional.

76 Mr O'Connor, in his letter of 19 October 2022, also argued that, with the inclusion of the various sensors claimed in the part (g) of the claim, the system can detect with more accuracy whether a vehicle is likely to have been tampered with or be smuggling contraband. For example, the method can detect if the container has stopped for a prolonged period but experienced motion of the container over that period, indicative of the container being loaded or unloaded. This, according to Mr O'Connor, addresses the technical problem of identifying the correct containers to search. I am not convinced that this feature necessarily indicates a technical contribution. The data collected by the sensors, collected in a conventional manner, is used to calculate the risk score. It seems to me to be a matter of administrative choice as to which data is used in the calculation of the risk score, which then feeds into the customs official's decision as to which containers to search.

77 In considering the business method exclusion, I note that the hardware arrangement is known. It is known to place monitoring devices on containers and to use them to transmit information to a central server. There is nothing new in the monitoring devices themselves, nor in the communication method. The key advantage relates to improving border control inspections by calculating a risk score based, at least in part, on data collected by the monitoring device. The end result is that the system displays the risk score for a particular container to a customs official so that they can then decide whether that container should be inspected. The contribution lies in the way the risk score is calculated, including the parameters selected to feed into the calculation, which is then communicated to a customs official. This seems to me to be an administrative process aimed at improving the way customs officials decide which containers to inspect based on the logistics of the cargo haulage and factors considered relevant to whether a container should be inspected. The choice of these factors is one of administrative choice aimed at improving the administrative process of deciding which containers to inspect. Whilst it could then assist in improving through-flow of containers through a border control, thereby potentially realising the advantages Mr O'Connor highlights, these improvements arise out of improvements made to the administrative process of deciding which containers to inspect. The end result is a risk score that helps the customs official determine which containers to inspect. The contribution therefore lies solely in the excluded field of a method of doing business as such.

78 In determining whether an invention implemented as a computer program makes a technical contribution, the *AT&T* signposts are a helpful guide. I note that signposts ii)-iv) are not especially relevant in the present case and can be briefly dealt with. There is no technical effect at the architecture level of the computer, and the computer does not operate in a new way or run more efficiently or effectively. I will therefore focus on signposts i) and v).

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

79 In the present invention a monitoring device on a container sends data to a remote processor, which then calculates a risk score and displays this to a customs official who uses it to determine whether or not to inspect the container. The only effect

outside the computer relates to the administrative step of the customs official determining whether to carry out an inspection. This is not a technical effect on a process which is carried on outside the computer.

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

- 80 In the present case the perceived problem relates to how to improve the efficiency or effectiveness of a border control. It is solved by providing customs officials with a risk score which is, at least in part, based on data received from a monitoring device on the container, the data relating to the location of the container and also at least one other element from those listed in the claim. The problem is not solved, for example, by new technology which helps to inspect containers more quickly. Rather the problem is solved in an administrative sense, namely by providing customs officials with a risk score by which they can determine whether or not to inspect a particular container. The manner in which the risk score is calculated, including the data used in the calculation, is a matter of administrative choice, based on the various logistics of cargo haulage, rather than a technical contribution. Thus the problem is not solved in any technical sense but rather in an administrative manner.
- 81 Taking a step back, the invention relates to implementing an administrative process as a program for a computer running on conventional hardware. At its core it calculates a risk score based on various factors listed in the claim and presents this to a customs official who uses it to determine whether to inspect a container. It does not make a technical contribution but rather the contribution is of an administrative nature. The contribution therefore lies solely in the excluded fields of a method of doing business as such and a program for a computer as such.
- 82 I do not consider this invention to relate to the presentation of information as such. Although it does ultimately present information to the customs official the invention itself also relates to how this risk score is calculated and the contribution does not relate to the presentation of information as such.

Conclusion

- 83 I have found that the claims do not involve an inventive step over the cited prior art and are also excluded from patentability as a program for a computer as such and a method of doing business as such. I therefore refuse the application under section 18(3) of the Act.

Appeal

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

B MICKLEWRIGHT

Deputy Director, acting for the Comptroller