

This document includes some recent decisions of the EPO in 2021 with regards to software related inventions and shows relevant extracts from the respective decisions.

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T 0753/16 () of 14.1.2021

European Case Law Identifier: ECLI:EP:BA:2021:T075316.20210114

**VERFAHREN ZUM ERSTELLEN VON INDIVIDUELLEN  
REGALBILDERN FÜR VERSCHIEDENE  
VERKAUFSSTELLEN**

**Erfinderische Tätigkeit - (ja)**

**Erfinderische Tätigkeit - nicht naheliegende Alternative**

Anmeldenummer: 12718907.4

IPC-Klasse: G06Q 10/00, G06Q 30/00

Name des Anmelders: Hoffrogge GmbH

Kammer: 3.4.03

<https://www.epo.org/law-practice/case-law-appeals/pdf/t160753du1.pdf>

Der unabhängige Anspruch 1 des Hauptantrags lautet wie folgt:

Verfahren zum Betreiben mindestens einer Datenverarbeitungsanlage gemäß mindestens einem Programm zum Erstellen von individuellen Regalbildern für eine Vielzahl verschiedener Verkaufsstellen eines Handelsunternehmens, bei dem

(1.1) das Programm auf Sortimentsdaten zugreift, die für jede Verkaufsstelle ein individuelles Sortiment aus verschiedenen Artikeln mit zugehörigen Attributen definieren,

(1.2) das Programm einem Anwender anbietet, interaktiv über Ein- und Ausgabegeräte verschiedene Blöcke zu definieren, die jeweils Artikel mit einem Attribut umfassen, das für den jeweiligen Block spezifisch ist,

(1.3) das Programm nach erfolgter Definition von Blöcken durch den Anwender auf die Blöcke in einem Datenspeicher zugreift,

(1.4) das Programm auf Regaldaten mit den individuellen Daten mindestens eines Regals jeder Verkaufsstelle in einem Datenspeicher zugreift,

(1.5) das Programm dem Anwender anbietet, interaktiv eine sequentielle Reihenfolge von Platzierungsregeln zu erstellen, die die Platzierung verschiedener Blöcke in Regalen betreffen

und vorgeben, nach welchen Regeln die verschiedenen Blöcke in den Regalen zu platzieren sind,

(1.6) das Programm nach erfolgter Eingabe auf die sequentielle Reihenfolge von Platzierungsregeln in einem Datenspeicher zugreift und

(1.7) das Programm für jede Verkaufsstelle nacheinander die gespeicherten Platzierungsregeln entsprechend ihrer Reihenfolge auf die gespeicherten Blöcke mit den Artikeln aus dem Sortiment der Verkaufsstelle anwendet und unter Berücksichtigung der Regaldaten die Stellplätze der verschiedenen Artikel in dem Regal der Verkaufsstelle ermittelt und

(1.8) das Programm die Stellplätze der verschiedenen Artikel in einem Regalbild darstellt.

## 1. Neuheit

1.1 Das in Anspruch 1 definierte Verfahren ist aus den im Folgenden erläuterten Gründen neu gegenüber der aus dem Dokument D1 bekannten Lehre.

1.2 Das Dokument D1 zeigt ein Verfahren zum Betreiben mindestens einer Datenverarbeitungsanlage gemäß einem Programm zum Erstellen von individuellen Regalbildern für eine Vielzahl verschiedener Verkaufsstellen eines Handelsunternehmens.

Hierbei greift das Programm, wie in Merkmal 1.1 definiert, auf Sortimentsdaten zu, die für jede Verkaufsstelle ein individuelles Sortiment aus verschiedenen Artikeln mit zugehörigen Attributen definieren.

...

1.3 Dokument D1 offenbart nicht, dass die einzelnen, spezifischen Blöcke, welche gemäß Merkmal 1.2 festgelegt wurden, entsprechend den Merkmalen 1.5 und 1.7 in den Regalen platziert werden. Im vorliegenden Verfahren werden Platzierungsregeln interaktiv gemäß Merkmal 1.5 festgelegt, welche in Merkmal 1.6 gespeichert werden, um dann in Merkmal 1.7 abgerufen zu werden. Diese Platzierungsregeln werden auf die zuvor festgelegten Blöcke angewandt, um diese auf die Regale der Verkaufsstelle zu verteilen und hierdurch die Stellplätze der jeweiligen Artikel in den Regalen der jeweiligen Verkaufsstelle zu ermitteln.

In D1 hingegen sind die Blöcke ("fixture blocks") fester Bestandteil der Regale; sie stellen eine Art Unterabteilung im Regal dar, eine Unterteilung der Regalfläche in eine zweidimensionale Gitterstruktur (vgl. Absatz [0008]). Auf diese zuvor festgelegten Blöcke werden die Artikel gemäß dem zuvor zugeteilten Attribut verteilt, wobei, wenn ein Block für eine Artikelmenge zu klein ist, die verbleibenden Artikel in einem angrenzenden Block angeordnet werden.

Zusammenfassend kann vereinfacht gesagt werden, dass im vorliegenden Verfahren zunächst die Artikel einem Attribut entsprechend auf hierdurch definierte Blöcke verteilt werden und diese Blöcke dann in die Regale geräumt werden. Im Gegensatz hierzu sind in der D1 die

Blöcke in den Regalen verankert und ihre Größe wird dort angepasst. Erst dann werden die Artikel in die zugewiesenen Blöcke und somit in die Regale eingeräumt.

Die Merkmale 1.5 bis 1.7 sind somit in dem Dokument D1 nicht offenbart.

1.4 Die Prüfungsabteilung, welche die Neuheit gegenüber Dokument D1 verneint hat, hat in ihrer Argumentation nicht mitberücksichtigt, dass die dem Merkmal 1.2 entsprechend festzulegenden Blöcke in dem Dokument D1 bereits an Regalbereiche gebunden sind (D1: Absätze [0008], [0039]). Erst nach Festlegung der Blöcke in den Regalen werden die Blöcke mit Produkten bzw. Artikeln gefüllt. In der Lehre der D1 hat zwar jeder Block gemäß dem Merkmal 1.2 für ihn spezifische (bevorzugte) Attribute, sodass Merkmal 1.2 noch auf die Lehre der D1 gelesen werden kann. Hinsichtlich der Platzierungsregeln gemäß den Merkmalen 1.5 bis 1.7, die dann auf die mit Artikeln gefüllten Blöcke anzuwenden sind, hat die Prüfungsabteilung die Absätze [0028], [0029], [0039] und [0041] aus der D1 zitiert (sh. Entscheidung Seite 3, letzte zwei Absätze). In diesen Textstellen werden aber die Platzierungsregeln bzw. die Platzierungsreihenfolge (Priorisierung) nicht auf die Blöcke angewandt, sondern auf die Artikel, was eben den entscheidenden, oben erläuterten Unterschied ausmacht.

## 2. Erfinderische Tätigkeit

Das Dokument D1 wird als nächstliegender Stand der Technik herangezogen, da es sich, wie oben erläutert, ebenfalls mit einer **optimalen Regalbefüllung in Verkaufsstellen** beschäftigt.

Die gegenüber der Lehre des Dokuments D1 **unterscheidenden Merkmale 1.5 bis 1.7 haben den technischen Effekt, ein für die Verkaufsstelle individuelles Regalbild mit Hilfe der für jede Verkaufsstelle individuellen Daten der Artikel, Regalinformationen und bevorzugten Artikelplatzierungen zu erstellen.**

Somit wird die objektive **technische Aufgabe der Erfindung darin gesehen, ein alternatives Verfahren für die Erstellung von Regalbildern** zu dem aus Dokument D1 bekannten Verfahren zur Verfügung zu stellen.

Dies wird insbesondere durch die Merkmale 1.5 bis 1.7 des unabhängigen Anspruchs 1 gelöst.

**Weder in Dokument D1 noch auf Grund sonstiger verfügbarer Information oder durch das allgemeine Fachwissen ist das hier definierte Verfahren, zunächst die Artikel auf Blöcke zu verteilen, welche unabhängig von den Regalen sind, und dann diese Blöcke auf die Regale gemäß den interaktiv festgelegten Platzierungsregeln zu verteilen, nahegelegt.** Es ist kein Grund erkennbar, warum die Rangfolge der Befüllungsschritte, so wie sie in Dokument D1 offenbart ist, ausgetauscht werden sollte, um zur nun definierten Rangfolge zu gelangen. Insbesondere sind in D1 die Blöcke fest im Regal verankert, deren Größe durch die Regalgrößen der jeweiligen Verkaufsstelle festgelegt ist. Die Blöcke von dem Regal zu entkoppeln, ist für die Kammer nicht naheliegend.

Auch ist es nicht gleichbedeutend, ob zuerst die Blöcke in dem Regal entsprechend der Regalabmessungen der individuellen Verkaufsstelle festgelegt werden, um die Regale optimal auszunutzen, und dann mit Ware zu befüllen (wie in Dokument D1), oder ob zuerst die

Blöcke mit Hilfe von Attributen der Artikel definiert werden und dann diese Blöcke und somit auch die Artikel auf die Regale verteilt werden (wie in Anspruch 1 definiert). In Dokument D1 werden den Blöcken zwar allgemeine Artikel-Attribute zugeordnet (sh. D1, Absätze [0008], [0039] und [0040]), beim Verteilen der Artikel auf die Blöcke können aber überschüssige Artikel auch in einem angrenzenden Block Platz finden (sh. D1, Absatz [0041]). Dies trifft auf das Verfahren gemäß Anspruch 1 nicht zu. Hieraus ergibt sich in beiden Verfahren im Endergebnis ein anderes Regalbild, sodass die Austauschbarkeit der beiden Befüllungsschritte nicht gegeben ist.

**Schließlich bleibt noch festzustellen, dass die Unterschiede, welche hier zur erfinderischen Tätigkeit diskutiert werden, technischer Art sind. Die Definition von Blöcken unabhängig von den Regalen, das Zuteilen der Ware/Artikel auf diese einzelnen Blöcke sowie das "Einräumen" dieser Blöcke in die Regale wird als technisch beurteilt.**

Die Abfolge einzelner Ausführungsschritte des Regalbefüllungsvorgangs und die daraus resultierenden Unterschiede des Regalbefüllungsvorgangs sind zunächst unabhängig von marktstrategischen oder administrativen Überlegungen. Es handelt sich um konkrete technische Schritte die Befüllung des Regals betreffend, auch wenn diese zur Erstellung des Regalbildes nur innerhalb eines Algorithmus auf Grundlage eingelesener Daten erfolgen.

Somit beruht der im unabhängigen Anspruch 1 definierte Gegenstand auf einer erfinderischen Tätigkeit gemäß Artikel 56 EPÜ.

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## T 2372/17 (Multi-word autocorrection/APPLE) of 25.2.2021

European Case Law Identifier: ECLI:EP:BA:2021:T237217.20210225

### **Multi-word autocorrection**

#### **Inventive step - (no)**

Application number: 13730715.3

IPC class: G06F 17/27

Applicant name: Apple Inc.

Board: 3.5.07

Cited decisions: T 1802/13, T 0336/14

<https://www.epo.org/law-practice/case-law-appeals/pdf/t172372eu1.pdf>

Claim 1 of the main request reads as follows:

"A computer-implemented method, comprising:

receiving (100) a first set of one or more touch points on a touch-sensitive keyboard;

## Examples of recent 2021 Board of Appeals decisions related to Software Innovations

inserting (102) a first typed word into an input string, including, for each touch point of the first set, inserting a corresponding typed character of the touch-sensitive keyboard into the input string;

selecting (104) an initial corrected word;

replacing (106) the first typed word in the input string with the initial corrected word;

maintaining a correspondence between one or more characters of the input string and each of the first set of touch points;

receiving (108) a second set of one or more touch points on the touch-sensitive keyboard;

inserting (110) a second typed word into the input string, including, for each touch point of the second set, inserting a corresponding typed character of the touch-sensitive keyboard into the input string;

retrieving the first set of touch points based on the maintained correspondence;

selecting (112) one or more additional corrected words based on the retrieved first set of touch points; and

replacing (114) the initial corrected word and the second typed word in the input string with the one or more additional corrected words."

The board explained its interpretation of claim 1 of the main request and expressed its **preliminary opinion that claim 1 specified non-technical features relating to text correction**. Even if a technical effect were recognised, the subject-matter of claim 1 of each of the three requests would not be considered inventive over document D1. Some of the features of claim 1 of the second auxiliary request were known from documents D2 and D3.

1. The invention as described in the application concerns multi-word auto-correction of text input using a touch-sensitive keyboard or any type of keyboard and display system.

1.1 In the multi-word auto-correction according to the invention, a selection of an initial corrected word is revisited if a subsequently typed word indicates that it would be more appropriate to select a different correction for the initial word instead. For example, the system may select an initial corrected word "new" based on a user's input of "nes". However, if the subsequently typed word is "york", then the system can revisit the selection of "new" and instead correct the initial word to "New" and select a corrected word "York" to replace the typed word "york". Further, the typed words "tech ology" could be automatically corrected to "technology" (paragraphs [0005] and [0006]).

1.2 The method for multi-word auto-correction according to the invention includes the steps of inserting a first typed word into an input string, replacing the first typed word in the input string with a selected initial corrected word, inserting a second typed word into the input string, selecting one or more additional corrected words, and replacing the initial corrected

word and the second typed word in the input string with the one or more additional corrected words (paragraphs [0014] to [0038], claim 1 and Figure 1). A typed word is obtained from a set of touch points on a touch-sensitive keyboard. According to paragraph [0033], the selection of the additional corrected words can be based on "any or all of the initial corrected word, the second typed word, the first set of touch points, and the second set of touch points, among other things".

Main request

## 2. Claim interpretation - claim 1

2.1 In its communication pursuant to Article 15(1) RPBA 2020, the board informed the appellant that **text correction as such was not technical**. Text auto-correction **could contribute to a technical effect if it were used in combination with other user-computer interaction techniques for facilitating the user's entering of text in a computer**. The board expressed doubts that the claimed method defined such techniques.

2.2 In its letter dated 13 August 2020 the appellant explained that it understood the board's interpretation to have been that the "input string" and "replacing..." could occur in the background, without involving any continued interaction with the user. The appellant disagreed with this interpretation.

...

The use of touch points in the claimed method was particularly useful for virtual keyboards, for instance keyboards displayed on the touch-screen of a device, where the user's touch point may cover multiple virtual keys. As such, the claimed features related to the technical implementation of the auto-correction process on a touch-based computing system, not to auto-correction per se. Moreover, these features contributed to providing a system which guided the user in inputting text, and so were technical for that reason as well.

2.3 The board agrees with the appellant that it is implicit in claim 1 of the main request that the input string is displayed to the user. However, **linguistic aspects and presentation of information as such are not patentable** pursuant to Article 52(2) and (3) EPC. Such features of a graphical user interface **can be considered to contribute to a technical effect if they credibly assist the user in performing a technical task by means of a continued and/or guided human-machine interaction process** (see decisions T 336/14 of 2 September 2015, Reasons 1.2.4, and T 1802/13 of 10 November 2016, Reasons 2.1.5 to 2.1.7).

However, **the claim does not detail any interaction between the user and the computer in relation to the auto-correction that is taking place**, and there is nothing to suggest that the user is taking into account what is being displayed. It is therefore **doubtful that there is any continued and/or guided such interaction**.

With regard to the use of touch points in the claimed method, the board notes that the first touch points are transformed into characters in advance of the correction and that claim 1 does not define any specific way of transforming any of the touch points to input characters or using the touch points to influence the text auto-correction.

In view of this, the **board doubts that the text auto-correction in the context of the claimed method contributes to a technical effect.**

### 3. Inventive step - claim 1

3.1 Document D1 describes a computer-implemented method for automatically detecting and correcting multi-word data entry errors (abstract). The method uses substitution lists including source-target pairs for correcting data entry errors (column 8, line 3, to column 9, line 55; Figures 2A to 2D; column 14, Table I), for example the pairs ("int he", "in the"), ("your a", "you're a") and ("would of been", "would have been"). A substitution list may also include source-target pairs having single-word source terms (column 8, lines 54 to 57).

3.2 In its letter of 13 August 2020, the appellant argued that the method of D1 did not include the following steps of claim 1:

- (i) replacing the first typed word in the input string with the initial corrected word;
- (ii) a correspondence is maintained between one or more characters of the input string and each of the first set of touch points;
- (iii) retrieving the first set of touch points based on the maintained correspondence;
- (iv) selecting one or more additional corrected words based on the retrieved first set of touch points;
- (v) replacing the initial corrected word and the second typed word in the input string with the one or more additional words.

The board recognises that features (i) to (iii) and (v) are not disclosed in combination in the context of the method of Figure 4 of D1. With regard to feature (iv), it should be noted that in its reply to the board's preliminary opinion the appellant expressed its view that in D1 "a typographical error in a first typed word is maintained (not corrected) in order to be able to make the multi-word auto-correction correctly (e.g., int he, oft he, etc.)" (page 3, point 1.2, second paragraph). This means that the only difference is that

- (iv') the first set of touch points is used instead of the first set of typed characters.

The distinguishing features are therefore (i) to (iii), (iv') and (v).

3.3 According to the appellant, the technical problem solved by the distinguishing features was how to guide a user in entering text on a computing device with an auto-correction system.

The **board does not recognise this technical problem.** Even if a technical effect is present, which is doubtful, the method of document D1 already provides an auto-correction solution to support a user in entering text on a computing device.

3.4 The appellant also argued that by using touch points in features (ii) to (iv) the system could "reach back" to the original touch points to determine the second correction, rather than relying on the initial input string which was the computer device's interpretation of the keys the user intended to touch in the touch-sensitive keyboard. The use of touch points improved the accuracy of detection of user input.

However, in the context of the claimed method the **board cannot recognise any additional text-correction advantage of taking into account the touch points instead of the characters**, because both the first and the second sets of touch points are transformed into typed characters and typed words prior to the corrections, and claim 1 does not specify how the touch points are used in step (iv). The selection of corrected words in step (iv) may be performed by first mapping each touch point to a typed character and then separately using the sequence of typed characters as a typed word to select the corrected word. This is how, according to claim 1, the method performs the initial correction. If the touch points are used in this manner, as described in features (ii), (iii) and (iv'), their purpose is merely that of supporting a touch-sensitive keyboard, no synergistic effect being achieved with regard to text correction. In view of this, using the **touch points in the context of the present invention does not go beyond using the corresponding typed characters, and is not inventive**.

3.5 The appellant further contended that the distinguishing features provided word-to-word auto-correction, whilst still allowing auto-corrections to be re-corrected in the light of the newly entered text. Document D1 did not expressly contemplate the interaction between a single-word auto-correction and a multi-word auto-correction. The appellant stated that in D1 "a typographical error in a first typed word is maintained (not corrected) in order to be able to make the multi-word auto-correction correctly".

According to the appellant's interpretation of document D1, the two-word correction in document D1 is thus also based on the words originally typed (i.e. the typed first and second sets of characters). The difference is that while the method of D1 only displays the result of the two-word auto-correction, the distinguishing features have the purpose of additionally correcting the first typed characters before presenting the result of the two-word correction.

3.6 For the reasons given under point 2.3 above, the **board doubts that a technical effect can be established by the distinguishing features, which concern presentation of information**.

**Even assuming, for the sake of argument, that the method of claim 1 assists the user in entering text, the board is not convinced that the claimed method is inventive**. As acknowledged in the application, single-word auto-correction was commonly known before the priority date of the present application (see paragraph [0004] of the international publication). The skilled person was aware of the advantages of prompt correction inherent in single-word auto-correction. It would therefore have been **obvious to add single-word correction as defined in feature (i) before the two-word correction of D1 in order to provide correction feedback more promptly**. Since, as argued by the appellant, in document D1 the two-word correction is based on the word originally typed, adding single-word correction to the method of D1 would have required keeping the non-corrected first word for the multi-word correction. Implementing this as described in the distinguishing features (ii), (iii) and (v), would have been a matter of ordinary programming.



3.7 In view of the above, claim 1 of the main request does not meet the requirements of Article 56 EPC.

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## T 0755/18 (Semi-automatic answering/3M INNOVATIVE PROPERTIES) of 11.12.2020

European Case Law Identifier: ECLI:EP:BA:2020:T075518.20201211

### **User feedback in semi-automatic question answering systems**

#### **Inventive step - mixture of technical and non-technical features**

Application number: 11827611.2

IPC class: G06F17/30, G06F9/44

Applicant name: 3M Innovative Properties Company

Board: 3.5.07

Cited decisions: G 0003/08, T 0258/97, T 0258/03, T 0756/06, T 2230/10, T 1463/11, T 0817/16, T 0697/17, T 0886/17

Catchwords:

*If neither the output of a machine-learning computer program nor the output's accuracy contribute to a technical effect, an improvement of the machine achieved automatically through supervised learning to generate a more accurate output is not in itself a technical effect*

<https://www.epo.org/law-practice/case-law-appeals/pdf/t180755eu1.pdf>

Claim 1 of the main request reads as follows:

"A method performed by at least one computer processor executing computer program instructions tangibly stored on at least one non-transitory computer-readable medium, the method for use with a system including a data source and a first billing code, the first billing code being derived from a set of forward logic applied to first and second concept extraction components, the concept extraction components able [sic] to extract concepts from the data source, the method comprising:

(A) receiving input from a user, wherein the input represents a verification status of the first billing code;

(B) applying first inverse logic to the input, the billing code, and the set of forward logic, to identify the first and second concept extraction components; and

(C) applying reinforcement to the first and second concept extraction components, comprising: (C)(1) determining whether the verification status indicates that the first billing code is accurate; (C)(2) if the verification status indicates that the first billing code is inaccurate, then applying negative reinforcement to the first and second concept extraction components, comprising apportioning the negative reinforcement between the first and second concept extraction components."

## Application

1. The present application is concerned with the generation of billing codes to be used in medical billing. Billing codes may, for instance, be associated with a hospital stay of a patient based on a collection of the documents containing information about the medical procedures that were performed on the patient during the stay and other billable activities performed by hospital staff in connection with the patient during the stay. This set of documents may be viewed as a corpus of evidence for the billing codes that need to be generated and provided to an insurer for reimbursement.

1.1 ... computer-based support systems have been developed to guide human coders through the process of generating billing codes.

The application describes such a system which includes "concept extraction components" to extract concepts from data sources, for example extracting "allergy" or "prescription" from a medical report, to generate concept codes for these concepts and then generate a "draft transcript". A reasoning module (also referred to as "inference engine") generates or selects appropriate billing codes on the basis of the content of the draft transcript and/or other data sources. The reasoning module includes "forward logic components", each of which implements a distinct set of logic for mapping document content to billing codes.

1.2 The invention relates in particular to improving the accuracy of billing codes generated by such a system (page 2, paragraph [0005]).

A human operator provides input specifying whether the codes generated by the system are accurate. The user input may be a "verification status" value selected from a set of permissible values, such as "accurate" and "inaccurate" or "true" and "false". The feedback provided by the user may be captured and interpreted automatically to assess the performance of the automatic billing coding system. In particular, the reasoning process may be inverted in a probabilistic way to assign blame and/or praise for an incorrectly/correctly generated billing code to the constituent logic clauses which led to the generation of the billing code. In order to achieve that, "inverse logic components" may be used to implement logic for reasoning backwards over the rule set of the reasoning module.

The system identifies its components, for instance concept extraction components, responsible for generating the billing codes corresponding to the feedback and assigns positive or negative reinforcement to each of those components.

Associating praise (positive reinforcement) with a particular component may include increasing a reliability score counter associated with the component or assigning a particular reliability score to the component. Similarly, associating blame (negative reinforcement) may

include decreasing a reliability score counter associated with the component or assigning a particular reliability score to the component.

The system may take any of a variety of actions in response to concluding that a component is unreliable, for example subsequently and automatically requiring the human operator to review and approve any concept codes (subsequently and/or previously) generated by the unreliable concept extraction component.

Main request

## 2. Claim 1 - interpretation

2.1 Claim 1 defines a method for use in a software system for generating billing codes, the system including two concept extraction components and forward logic. The system receives input from a user to determine whether the generated billing code is inaccurate and identifies two concept extraction components which were involved in the generation of the billing code. If the billing code is considered inaccurate, it applies a negative reinforcement to the identified concept extraction components.

2.2 The appellant argued that the claimed method affected future iterations of the otherwise unclaimed forward process and therefore improved the system so that it would generate more accurate billing codes in the future. Subsequent execution of the forward process was improved because the concept extraction components which provided inaccurate billing codes were negatively reinforced based on the previous iteration.

2.3 Claim 1 does not define what happens as a consequence of or after applying the negative reinforcement. However, for the sake of argument, in the following the board interprets claim 1 of the main request, in accordance with the appellant's arguments, as specifying a method in which negative reinforcement output is applied to the first and second extraction components to improve the accuracy of billing codes to be generated by the system in the future.

## 3. Inventive step - claim 1

3.1 Claim 1 specifies a computer-implemented method for improving the accuracy of automatically generated billing codes. The method is specified in terms of computer program features of the implementation of the task of modifying the computer program which generates billing codes in order to improve the accuracy of the generated billing codes.

Since a computer program as such is not patentable under Article 52(2) and (3) EPC, computer program features which do not make a technical contribution are not to be taken into account for inventive step.

**A billing code is non-technical administrative data** which may take the form of a textual representation, for instance "Unspecified diabetes" (see paragraph [0050] of the international publication). **Generating a billing code (see also point 1. above) is a cognitive task** (paragraphs [0002] and [0015]). The process of **generating a billing code on the basis of documents is thus a non-technical administrative task**, which, as such, is not patentable pursuant to Article 52(2) and (3) EPC.

In the grounds of appeal, the appellant argued that simply because a claimed set of features offered a solution to an administrative, economic or business problem, it did not in and of itself prohibit those same features from simultaneously solving a technical problem for which an applicant was entitled to seek protection. The examining division had applied the COMVIK approach incorrectly, which required, as a first step, an assessment of which features conferred technical character to the claimed subject-matter. Only then could features not contributing to the solution of a technical problem be ignored.

The board agrees that the presence of non-technical features in the claim does not mean that the claimed subject-matter is not patentable and that features which are non-technical when taken in isolation but which interact with technical features of the invention to solve a technical problem should be taken into account in assessing inventive step. It is therefore important to take into account all the claim features to identify those making a technical contribution. In order to assess inventive step, either a "conventional approach", starting with a selection of the prior art, or an approach relying on an initial analysis of the technical character of the claim features may be adopted, depending on the circumstances (see T 697/17 of 17 October 2019, Reasons 4.2 and 4.3; T 258/03, OJ EPO 2004, 575, Reasons 3.5 and 3.6; T 756/06 of 18 April 2008, Reasons 5; G 3/08, OJ EPO 2011, 10, Reasons 10.13.2).

Therefore, **the board does not agree with the appellant that the first step has to be that of identifying the features making a technical contribution.**

3.2 The appellant argued that the invention used machine-learning techniques to improve the accuracy of the machine output. According to the appellant, the invention was technical because it improved the system so that it would generate more accurate billing codes in the future.

In the board's opinion, **if neither the output of a learning-machine computer program nor the machine output's accuracy contributes to a technical effect, an improvement of the machine achieved automatically through supervised learning for producing a more accurate output is not in itself a technical effect**. In this case, the learning machine's output is a billing code, which is non-technical administrative data. The accuracy of the billing code refers to "administrative accuracy" regarding, for example, whether the billing code is consistent with information represented by a spoken audio stream or a draft transcript (paragraph [0051]) or is "justified by the given corpus of documents, considering applicable rules and regulations" (paragraph [0002]). Therefore, **improving the learning machine to generate more accurate billing codes or, equivalently, improving the accuracy of the billing codes generated by the system, is as such not a technical effect**.

3.3 A technical contribution could reside in a technical solution to the problem of achieving the effect of improving the accuracy of the billing codes generated by the system.

The appellant argued that the invention had the advantage of avoiding wasting system resources. If an inaccurate billing code was produced which could not be used, a negative reinforcement was applied, which caused the system to improve the future generation of billing codes. In this way, inaccurate billing codes were used to their maximum utility. Moreover, by generating more accurate billing codes, resources were saved because less iterations were necessary to obtain the desired result.

The board **does not find these arguments convincing**. Even though the case law generally recognises a technical contribution by non-technical features if they are causally linked to a technical effect, such as reducing resource usage, not every such physical change qualifies as a technical effect. **A physical change caused by non-technical features is to be regarded as a technical effect for the purpose of assessing inventive step if the non-technical features are based on technical considerations aimed at controlling that physical change** (T 697/17, Reasons 5.2.2; T 2230/10 of 3 July 2015, Reasons 3.7). The physical change has to be purposively used in the solution of a technical problem (T 258/97 of 8 February 2002, Reasons 6; T 886/17 of 6 March 2020, Reasons 5.4.1). The **computer program features of claim 1 are not purposively directed to reducing the system resources**. Instead, they are the **result of non-technical administrative and programming considerations**. The set of forward logic and the concept extraction components are **computer program components which mimic the administrative procedure of generating a billing code from input data**. They are the **result of non-technical administrative considerations by the administrative expert about how to generate a billing code and non-technical programming considerations about how to program a computer to generate a billing code according to the chosen administrative procedure**.

Similarly, the steps of **receiving verification and applying reinforcement of features (A) to (C)(3) correspond to administrative steps of improving the process of generating billing codes** by identifying the sources of inaccuracy and negatively reinforcing them. The **decisions** to let a human expert evaluate the accuracy of the billing code generated by the system and apply a negative reinforcement on the persons or entities responsible for the inaccuracy **are taken by the non-technical administrative expert**. Implementing this solution in the system by using inverse logic to identify the responsible components, receiving input and applying negative reinforcement to the identified components is the result of a non-technical programming task. Features (A) to (C)(3) are thus the result of non-technical administrative considerations about how to improve the generation of a billing code and programming considerations about how to program a computer to improve the billing code generation according to the chosen administrative procedure.

3.4 The appellant further argued that providing billing codes was not the main aspect of the invention, which relied on the system architecture rather than on the type of data or the cognitive content of the data. The technical contribution of the invention was independent of the type of data dealt with.

The **board does not find this argument relevant, because the claim is limited to the generation of billing codes**.

3.5 The appellant also argued that the choices to provide the claimed system were not administrative. Instead, they were technical choices made by a computer engineer in the realm of machine learning who, when seeking to solve the technical problem of improving the accuracy of billing codes generated by the system, recognised the need to minimise the use of limited computer resources.

Since computer programming involves technical and non-technical aspects (G 3/08, Reasons 13.5.1; T 1463/11 of 29 November 2016, point 21), the **test of whether program features**

would have been formulated by a software expert is not sufficient to conclude whether those features are technical (T 697/17, Reasons 5.2.4; T 817/16, Reasons 3.12). In the present case, the question of whether the features of the claimed method were made by a "computer engineer in the realm of machine learning" is not decisive for the question of whether the features make a technical contribution. Since the work of an expert in machine learning includes non-technical computer-programming tasks, which are not patentable under Article 52(2) and (3) EPC, what is decisive is whether those features were the result of "technical considerations beyond 'merely' finding a computer algorithm to carry out some procedure" (see T 697/17, Reasons 5.2.4; G 3/08, Reasons 13.5). As the board explained above, in the present case, the features of the invention are based only on non-technical administrative and programming considerations.

According to the appellant, the considerations underlying the invention were not about which lines of code to use in a particular programming language, such as Java or HTML, but technical considerations regarding which components to use. The board is however of the opinion that the claim does not describe any non-trivial technical characteristics of the "components", e.g. the concept extraction components, and that the choice of the components is not driven by technical constraints.

**3.6 Claim 1 specifies an automated method of performing the administrative task of improving the accuracy of the generated billing codes. Using a computer to automate an administrative task is well known.** From the above it follows that, with the exception of its implementation using a general purpose computer, the method is specified in claim 1 in terms of non-technical features which are not to be taken into account for inventive step.

3.7 Therefore, the subject-matter of claim 1 is not inventive over a general purpose computer (Article 56 EPC).

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G 0001/19 (Pedestrian simulation) of 10.3.2021

European Case Law Identifier: ECLI:EP:BA:2021:G000119.20210310

## **SIMULATION OF THE MOVEMENT OF AN AUTONOMOUS ENTITY THROUGH AN ENVIRONMENT**

### **Admissibility of referral - (yes)**

Referral: T 0489/14  
Application number: 03793825.5  
IPC class: G06F17/50  
Applicant name: Bentley Systems (UK) Limited

Board: EBA

Headnote:

## Examples of recent 2021 Board of Appeals decisions related to Software Innovations

*A computer-implemented simulation of a technical system or process that is claimed as such can, for the purpose of assessing inventive step, solve a technical problem by producing a technical effect going beyond the simulations implementation on a computer.*

*For that assessment it is not a sufficient condition that the simulation is based, in whole or in part, on technical principles underlying the simulated system or process.*

*The answers to the first and second questions are no different if the computer-implemented simulation is claimed as part of a design process, in particular for verifying a design.*

Cited decisions: G 0002/07, G 0003/08, G 0001/12, G 0002/12, G 0001/13, G 0002/19, G 0003/19, T 0208/84, T 0022/85, T 0163/85, T 0110/90, T 0453/91, T 0769/92, T 0939/92, T 0072/95, T 1173/97, T 0641/00, T 1148/00, T 0619/02, T 0258/03, T 0154/04, T 0388/04, T 1351/04, T 0471/05, T 1227/05, T 1784/06, T 1670/07, T 0531/09, T 0533/09, T 1000/09, T 1265/09, T 1358/09, T 1635/09, T 0091/10, T 1842/10, T 2331/10, T 0625/11, T 1503/12, T 0215/13, T 1082/13, T 1798/13, T 0438/14, T 0817/16, T 0697/17, T 1924/17

<https://www.epo.org/law-practice/case-law-appeals/pdf/g190001ex1.pdf>

This decision should be read in its entirety. Therefore, only some important statements are highlighted below.

Claim 1 of the main request underlying the referring decision reads as follows (reference signs omitted):

"1. A computer-implemented method of modelling pedestrian crowd movement in an environment, the method comprising:

simulating movement of a plurality of pedestrians through the environment, wherein simulating movement of each pedestrian comprises:

providing a provisional path through a model of the environment from a current location to an intended destination;

providing a profile for said pedestrian;

determining a preferred step, to a preferred position, towards said intended destination based upon said profile and said provisional path, wherein determining said preferred step comprises determining a dissatisfaction function expressing a cost of taking a step comprising a sum of an inconvenience function expressing a cost of deviating from a given direction and a frustration function expressing a cost of deviating from a given speed;

defining a neighbourhood around said preferred position;

identifying obstructions in said neighbourhood, said obstructions including other pedestrians and fixed obstacles;

determining a personal space around said pedestrian;

determining whether said preferred step is feasible by considering whether obstructions infringe said personal space over the course of the preferred step."

The principles set out in the Headnote above for dealing with non-technical features in the assessment of inventive step for computer-implemented inventions will be referred to in the following as the "COMVIK approach".

32. In this context, the term **"non-technical features" refers to features which, on their own, would be considered "non-inventions"** under Article 52(2) EPC. Whether such features contribute to the technical character of the invention has to be assessed in the context of the invention as a whole.

38. It may be that a shift has taken place in the relative level of each of these two hurdles in the sense that it has become easier to clear the eligibility hurdle of Article 52 EPC (see point B.II.a above) and more difficult to pass the inventive step hurdle (see point B.II.b above) of Article 56 EPC. As result of this shift, it could be said that **there is now in effect an additional intermediate step to assess the "eligibility of the feature to contribute to inventive step"**.

42. ... For example, T 1842/10 noted that modelling or simulating processes aimed only at **gaining knowledge about the functioning of a real technical system did not serve a technical purpose**.

47. A "technical system or process" implies that an object is created or a process is run with some purpose based on human creativity (see point E.I.a below). As a contrasting example, the weather is not a technical system that the skilled person can improve but a physical system that can be modelled in the sense of showing how it works (see T 1798/13, Catchword). However, in the **modelling or simulation of a system or process, the same laws of nature and mathematical foundations are applicable, regardless of whether the system or process is natural or technical**. In both cases, the scientific (e.g. mathematical and physical) principles are applied within the boundaries set by the (natural or technical) system or process to be examined.

48. The application underlying the referral concerns the simulation of a process modelled not only using physical, measurable technical parameters but also human factors such as "dissatisfaction function", "inconvenience function" and "frustration function". However, the referring board has explained why it accepted that the simulated processes were technical (see Reasons, point 10 of the referring decision, in which the appellant's argument was accepted that pedestrians' movements could be described similarly to the movements of electrons). The Enlarged Board does not intend to deviate from the referring board's interpretation. **The terms "technical system or process" and "technical principles underlying the simulated system or process" should be interpreted broadly**. In the referral, they do not relate to the



simulation or its patentability, but the system, process and principles reflected by the simulation.

51. ... The "technical effect going beyond the simulation's implementation" can therefore be rephrased as follows: "**technical effect going beyond the simulation's straightforward or unspecified implementation on a standard computer system**" which may therefore contribute to an inventive step in the context of the problem-solution approach.

53 ... Hence, **physical simulations** (such as wind tunnel experiments) **are not simulations as such**; neither are processes which include the measurement of physical values (such as temperature distributions) which are then used for simulations in subsequent process steps (see T 438/14 Method and IR-camera for determining the risk of condensation).

76. It is generally recognised in the case law of the boards of appeal that the cognitive content of data is not technical in nature (see e.g. T 1000/09, Reasons, point 7). The idea of treating information as part of the concept of "forces of nature" did not take root (see Zech in "Methodenfragen des Patentrechts" (Mohr Siebeck, Tübingen 2018, 137, 140)). The fact that the list of "non-inventions" in Article 52(2) EPC was discussed but not changed in the course of the EPC 2000 revision project supports the position that **the term "technical" must remain open, not least in anticipation of potential new developments.**

85. ... In sum, **technical effects can occur within the computer-implemented process** (e.g. by specific adaptations of the computer or of data transfer or storage mechanisms) **and at the input and output of this process**. Input and output may occur not only at the beginning and the end of a computer-implemented process but **also during its execution** (e.g. by receiving periodic measurement data and/or continuously sending control signals to a technical system).

#### d. Direct link with physical reality

87. The referring decision (Reasons, point 31), starting from G 3/08, discussed whether a claimed feature must cause a technical effect on a physical entity in the real world in order to contribute to the technical character of the claim. In G 3/08, this question was found to be inadmissible pursuant to Article 112(1)(b) EPC because it could not be established that two boards of appeal had given differing decisions on this issue. Quoting decisions beyond those considered in G 3/08, the referring board identified cases apparently requiring a technical effect directly linked to physical reality, but also others which suggested that a potential technical effect, i.e. an effect achieved only in combination with non-claimed features, was taken into account (Reasons, points 36 and 37).

88. Following existing case law and taking into account the relevant legal provisions, the **Enlarged Board does not see a need to require a direct link with (external) physical reality in every case**. On the one hand, technical contributions may also be established by features within the computer system used (see point E.I.b above). On the other hand, there are many examples in which potential technical effects - which may be distinguished from direct technical effects on physical reality - have been considered in the course of the technicality / inventive step analysis (see point E.I.e below). **While a direct link with physical reality, based on features that per se are technical and/or non-technical, is in most cases sufficient to**

establish technicality, **it cannot be a necessary condition**, if only because the notion of technicality needs to remain open.

91. The principle developed in T 1173/97 that software (which in itself may only have "potential effects") is treated as software running on a computer is still applied, while the further analysis (i.e. whether the software causes further technical effects) is now carried out according to the COMVIK approach. When run on a computer, the combination of the claimed features must establish a technical invention. In the COMVIK analysis, the features have to be assessed as to their contribution to the technical character of the invention. Decision T 1173/97 did distinguish between the effects produced by every computer program when run on a computer and the "further technical effect" possibly resulting from the running of the program on the computer (Reasons, point 9.4). Of course, such "further technical effect" too may only be achieved when the program is run on the computer, i.e. the program may have the potential to cause such further technical effects which thus could be referred to as "potential further technical effects". However, T 1173/97 did not establish whether the claimed computer program was related to any further technical effect but only made clear that a computer program product is not inevitably excluded from patentability (Reasons, point 12.2). In particular, the decision **does not imply** that, once the software is running on a computer, "potential" technical effects (as understood by the referring board, see point E.I.d above) can always be treated as "real" technical effects for the purposes of the analysis according to the COMVIK approach.

94. The older case law referred to above appears to confirm that data intended for controlling a technical device may be considered to have technical character because it has the potential to cause technical effects. In the context of the problem-solution approach and the COMVIK approach, **such potential technical effects may be considered if the data resulting from a claimed process is specifically adapted for the purposes of its intended technical use. In such cases, either the technical effect that would result from the intended use of the data could be considered "implied" by the claim, or the intended use of the data (i.e. the use in connection with a technical device) could be considered to extend across substantially the whole scope of the claimed data processing method.**

95. On the other hand, **these arguments cannot be made if claimed data or data resulting from a claimed process has relevant uses other than the use with a technical device** (such as for controlling a technical device). In this case, the analysis under Article 56 EPC may reveal that a technical effect is not achieved over substantially the whole scope of the claimed invention (see point E.I.b above).

98. Calculated status information or physical properties concerning a physical object are information which may reflect properties possibly occurring in the real world. However, first and foremost, they are mere data which can be used in many different ways. There may exist exceptional cases in which such information has an implied technical use that can be the basis for an implied technical effect. **Still, in general, data about a calculated technical effect is just data, which may be used, for example, to gain scientific knowledge about a technical or natural system, to take informed decisions on protective measures or even to achieve a technical effect.** The broad scope of a claim concerning the calculation of technical information with no limitation to specific technical uses would therefore routinely raise

concerns with respect to the principle that the claimed subject-matter has to be a technical invention over substantially the whole scope of the claims (see point E.I.b above, referring to T 939/92).

99. The calculation of the physical state of an object (e.g. its temperature) is typically part of a measurement method. It is **generally acknowledged that measurements have technical character** since they are **based on an interaction with physical reality** at the outset of the measurement method. Measurements are often carried out using indirect measurements, for example, the measurement of a specific physical entity at a specific location by means of measurements of another physical entity and/or measurements at another location (see e.g. T 91/10, Reasons, point 5.2.1; T 1148/00, Reasons, point 9). **Even though such indirect measurements may involve significant computing efforts, they are still related to physical reality and thus of a technical nature, regardless of what use is made of the results** (for a combination of measurements and simulations see e.g. T 438/14).

101. Many cases referring to "tangible" effects use their absence as an argument against patentability (see, as a recent example, T 215/13, Reasons, points 5 and 6, no tangible technical problem solved). However, the **Enlarged Board fully supports the view expressed in T 533/09 (Reasons, point 7.2) that a tangible effect is not a requirement under the EPC**. Moreover, it is unclear to what extent the notions of "tangible effect" and "further technical effect" overlap. A criterion based on tangibility - in addition to the requirement of technicality - thus cannot contribute to a more precise delimitation of patentable inventions.

104. The **main features of a computer-implemented simulation** can be summarised as follows:

(i) A **numerical model** of a system or process (which may be technical or non-technical) in the form of data that can be processed by a computer;

(ii) **Equations** representing the **behaviour of the model** (which may include random functions);

(iii) **Algorithms** providing numerical **output that represents the calculated state** of the modelled system or process (in particular, by time increments or as a sum or average calculated on the basis of numerous random events).

i. Model and equations representing the model

106. **A model and the equations representing the model are mathematical, regardless of whether a "technical" or "non-technical" system or process is modelled**. One example in the latter category could be a model based on game theory. **Establishing the model and the equations is a purely mental act**, even though these activities might be supported by computers, for example in the course of establishing a spatial grid adapted to a mechanical system to be simulated.

109. ...Simulating systems which are as yet unrealised improvements of a known system or even simulating dynamic processes which do not occur or which should actually be avoided

in the physical world, appear to be significant applications of simulations (see e.g. T 625/11 establishing a limit value for an operational parameter of a nuclear reactor). A simulation may allow investigation of a system without the need to build the system (see T 1227/05).

110. Following the COMVIK approach, models underlying a simulation form constraints (technical or not) which are not technical for the purposes of the simulation itself. However, **they may contribute to technicality if they are, for example, a reason for adapting the computer or the way in which the computer operates, or if they contribute to technical effects relating to the results of the simulation.**

111. **Whether a simulation contributes to the technical character of the claimed subject-matter does not depend on the quality of the underlying model or the degree to which the simulation represents "reality".** However, **the accuracy of a simulation is a factor that may have an influence on a technical effect going beyond the simulation's implementation and may therefore be taken into consideration** in the assessment under Article 56 EPC. For the purposes of Article 56 EPC, **it can be that an alleged improvement is not achieved if the simulation is not accurate enough for its intended (technical) purpose**, and the claimed simulation process may be considered non-inventive as a consequence even if the simulation contributes to the technical character of the invention. Conversely, **a technical effect may still be achieved by a method involving numerical simulations if certain simulation parameters are inaccurate.** If an improvement or a specific function is reflected in the claim and cannot be achieved by means of a simulation that does not reflect "reality" accurately enough, objections may also arise under Article 83 EPC if the skilled person is unable to find the necessary models and equations without undue burden.

## ii. Algorithms

112. Algorithms are the basis of any computer-implemented invention. **Formulating an algorithm, like establishing a model, is a cognitive exercise.** The definition of an algorithm does not necessarily involve technical considerations (G 3/08, Reasons, point 13.5.1, referring to the travaux préparatoires). **Algorithms contribute to the technical character of a computer-implemented method only if they serve a technical purpose** (see T 1358/09, referring to T 1784/06). For example, an algorithm may be particularly suitable to be run on a computer in that its design was motivated by technical considerations relating to the internal functioning of the computer (see T 1358/09, point 5.5).

115. From the above figure (point E.I.c) and considerations on effects that may be considered technical (points E.I.c to E.I.g), it would appear that most "simulations as such" may have few technical effects as far as input and output (which consist of data in "simulations as such") are concerned. However, **even if there are no real external physical effects, the software, including the underlying algorithms - may still contribute to the technical character of a computer-implemented invention in that it is adapted to the internal functioning of the computer or computer system/network** (see amicus curiae brief (6), page 6; see also T 697/17). Simulations may even require **computer power which is not available from a standard computer** (for example, quantum computing could be necessary for turbulence or molecular simulations). **Technical improvements to simulations as such could also be achieved by particular details of the implementing software.**

120. According to the COMVIK approach, it is not decisive whether the simulated system or process is technical or not. Rather, it is relevant whether the simulation of the system or process contributes to the solution of a technical problem. This question has to be answered using the same criteria as for other computer-implemented inventions. If a simulation is to be used for the verification or improvement of a technical system, it is of course the technical system which is simulated (based on the technical principles underlying the simulated system). However, **the mere calculation of the behaviour of a (technical) system as it exists on the computer, and the numerical output of such calculation, should not be confused with any technical effect of the simulation process.**

121. Even if the simulated system or process is technical, it first has to be translated into models and algorithms (i.e. non-technical information) ahead of the simulation. Only after the first step can this non-technical information represent a technical system or process. **Such models and algorithms first of all define (non-technical) constraints** to be considered in the context of the COMVIK approach. Depending on whether they contribute to any technical effect achieved by the claimed simulation invention, they may or may not in fact be taken into account in the inventive step assessment.

123. At least one amicus curiae brief argued that **avoiding the need to build certain prototypes is a technical effect**. This **argument is not convincing because the decision to build or not to build a prototype is a business decision made by humans**. In a similar way, it could be argued that forecasting bad weather results in lower fuel consumption. This technical effect is not the direct consequence of the output of the weather forecasting process but only occurs if, for example, human decisions are taken to refrain from planned leisure trips by car on a rainy day.

124. Another argument, which underpins some of the existing case law on numerical simulations (see point B.II.d above) and was also put forward in the comments of the President of the EPO, is based on equating the result of the simulation to the "technical effect" to be considered in the problem-solution approach (point 29). The argument that the technical effect thus goes beyond the simulation's computer implementation and its numerical result is used, inter alia, when the simulation is described as an (intermediate) step in the production of a technical system. The "Logikverifikation" decision of the German Federal Court of Justice (Case X ZB 11/98, GRUR 2000, 498, see referring decision, Reasons, point 21) accepted this argument. In the Enlarged Board's view, however, **only those technical effects that are at least implied in the claims should be considered in the assessment of inventive step. If the claimed process results in a set of numerical values, it depends on the further use of such data (which use can happen as a result of human intervention or automatically within a wider technical process) whether a resulting technical effect can be considered in that assessment. If such further use is not, at least implicitly, specified in the claim, it will be disregarded for this purpose.**

125. ... According to the COMVIK approach, "technical considerations" should result in contributions to the technical character of the invention itself. Applied to computer-implemented simulations, only technical considerations relating to a potential contribution to the technical character of the simulation can be relevant for the inventive step assessment.

128. The Enlarged Board understands that, in this particular case, the board concluded that the effect of the claimed simulation could be accepted as a technical effect. Emphasis was put on the "specific" and "limited" purpose of the output of the claimed simulation methods, which was considered to have technical character for the purposes of Article 52 EPC (see the heading of Reasons, point 3). In the context of its conclusion, the board made no explicit reference to its above-mentioned finding that the claimed method provided for a resource-efficient computer simulation. In the Enlarged Board's view, **calculated numerical data reflecting the physical behaviour of a system modelled in a computer usually cannot establish the technical character of an invention in accordance with the COMVIK approach, even if the calculated behaviour adequately reflects the behaviour of a real system underlying the simulation**. Only in exceptional cases may such calculated effects be considered implied technical effects (for example, if the potential use of such data is limited to technical purposes, see point E.I.f above). In this context, it is not the Enlarged Board's role to re-assess decision T 1227/05, which was taken in the specific circumstances of the case, or to judge whether the position envisaged by the referring board would diverge from T 1227/05. As noted above (point 127), the board in T 1227/05 did not rely for its decision solely on its findings that the simulated system was a technical system and that the system could only be understood and modelled by relying on technical considerations.

133. The Enlarged Board agrees with the findings of T 1227/05 and T 625/11 if they are understood as being that the claimed simulation processes in those particular cases possessed an intrinsically technical function. However, **there are rather strict limits for the consideration of potential or merely calculated technical effects** according to the COMVIK approach (see points E.I.d to E.I.g above). The often-quoted criterion of T 1227/05 that the **simulation constitutes an adequately defined technical purpose** for a numerical simulation method **if it is functionally limited to that purpose should not be taken as a generally applicable criterion** of the COMVIK approach for computer-implemented simulations, since the findings of T 1227/05 were based on specific circumstances which do not apply in general.

137. When the COMVIK approach is applied to simulations, the underlying models form boundaries, which may be technical or non-technical. **In terms of the simulation itself, these boundaries are not technical**. However, they **may contribute to technicality if, for example, they are a reason for adapting the computer or its functioning, or if they form the basis for a further technical use of the outcomes of the simulation** (e.g. a use having an impact on physical reality). In order to avoid patent protection being granted to non-patentable subject-matter, such further use has to be at least implicitly specified in the claim. The same applies to any adaptations of the computer or its functioning.

138. The **same considerations apply to simulations claimed as part of a design process**. A **design process is normally a cognitive exercise**. However, it certainly cannot be ruled out that in future case **there may be steps within a design process involving simulations which contribute to the technical character of the invention**. Moreover, "design" is not a clearly defined term, and there may well be software functions that can be associated with or even result in a "design".

T 0505/18 (Advertising-based mobile device navigation features/BLACKBERRY) of 12.11.2020

European Case Law Identifier: ECLI:EP:BA:2020:T050518.20201112

**Wireless communications system providing advertising-based mobile device navigation features and related methods**

**Inventive step - after amendment**

**Inventive step - claim 1 (yes)**

Application number: 09154017.9

IPC class: G06F17/30

Applicant name: BlackBerry Limited

Cited decisions: G 0003/08, T 0641/00, T 1143/06, T 1784/06, T 1235/07, T 0547/08, T 1741/08, T 2035/11, T 0651/12, T 1188/13, T 1802/13, T 0336/14, T 0489/14, T 0370/15, T 1442/16, T 1455/16, T 1091/17

Board: 3.5.07

<https://www.epo.org/law-practice/case-law-appeals/pdf/t180505eu1.pdf>

Claim 1 of the sole request reads as follows:

"A wireless communications system (30) comprising:

an advertising server (35); and

at least one mobile wireless communications device (33) comprising

an output device (32),

a position determining device (33) to determine a position of the device when driving, and

a processor (34) configured to

obtain at least one advertisement from said advertising server,

obtain a current driving location of said at least one mobile wireless communications device from said position determining device,

output at least one advertisement via said output device,

output, via said output device, navigation information, including road intersection information, for a route from the current location to a destination location, and

stop output of the at least one advertisement while said at least one mobile wireless communications device is moving and within a given distance of an intersection."

## Invention

2. The invention concerns displaying, on a mobile wireless communication device, advertisement and location-based navigation information for a route.

## Inventive step - claim 1

7. Document D2 discloses a mobile advertisement information delivery system comprising an advertisement server (paragraphs [0052] and [0053]; Figure 1, network navigation center 10; Figure 2; paragraph [0093]), as well as mobile wireless communication devices carried in automobiles (paragraphs [0053] and [0086]; Figures 1 and 3, instrument 12/41; claims 1 and 2). Each mobile wireless communication device comprises a display unit, position detecting means and a processor, and receives and displays advertisements from the advertisement server, and location-based navigation information while driving (paragraphs [0087] to [0097]; Figures 3 and 5). As did the examining division, the board regards D2 as the closest prior art.

7.1 The subject-matter of claim 1 differs from the system disclosed in document D2 in that it includes the following feature:

**- stop output of the at least one advertisement while said at least one mobile wireless communications device is moving and within a given distance of an intersection.**

7.2 In the decision under appeal, the examining division considered that this feature had the **effect** described in paragraph [0038] of **avoiding the user being distracted by advertisements when the user is within a given distance of an intersection and is more likely to be in need of the navigational information**. In the assessment of the claims then on file, the **examining division considered that this effect was not technical**.

7.3 The appellant contested that opinion, arguing that in accordance with decision T 651/12 of 14 April 2016, **avoiding driver distraction for improving safety was a technical effect**. The subject-matter of T 651/12 was, in the appellant's view, similar to that of the present application, and its reasoning confirmed that there was a technical problem addressed in an improved navigation system which reduced the level of driver distraction and hence improved safety of operation of the vehicle. This was exactly the effect that was provided by the distinguishing feature of the claimed invention.

According to the appellant, the distinguishing feature resulted in the driver being less distracted from the output navigation information close to the intersection. In this way, the driver was more aware of the direction to take at the intersection before reaching the intersection and could thus better focus on the road and traffic at the intersection and was better prepared to avoid a crash or other dangerous sudden situation. Following the rationale of T 651/12, the distinguishing feature provided a technical solution to a technical problem, namely that of improving the safety of operation of a vehicle.

The appellant further argued that the claimed invention provided an **"ergonomically" improved navigation system** running advertisements, which was optimised for use by the driver because the system assisted the driver in making the right decisions at intersections by



stopping the advertisements at a given distance from the intersections. In accordance with T 651/12, in this respect too, the distinguishing feature thus provided a technical solution to a technical problem.

7.4 Even though the claim does not specify how the advertisement is output, the board recognises, as did the examining division in the decision under appeal, **that stopping output of an advertisement reduces the level of distraction**. As a consequence, the board is satisfied that the distinguishing feature **credibly contributes to the safety of operation of the vehicle by reducing the level of driver distraction in a difficult driving phase that requires higher concentration**.

## 8. Decision T 651/12

8.1 With regard to the question of whether that effect is technical, the board agrees with the appellant that decision T 651/12 is pertinent. The claimed invention considered in that decision concerned a map display apparatus capable of displaying a bird's eye view map, which was generated by calculation means of the apparatus. The board was of the opinion that "the outcome of the calculation is used for a technical purpose, namely to display information in an ergonomically improved manner" and that "ergonomics, understood as the applied science of refining the design of products to optimize them for human use, in the context of the map display of [that] case", was a technical field (Reasons 3.2). The board further stated the following (also Reasons 3.2):

"in the context of e.g. a car navigation system, the immediate apprehension of the presented information results in the driver being less distracted from the road and traffic and, thus, also adds to safety. Accordingly, also in this respect, displaying the **three-dimensional bird's eye view map provides a technical solution to a technical problem**.

As such, the board sees no fundamental difference between the present case and a method for operating a computer-controlled machine where the outcome of some calculation is used for operating the machine in an improved manner, which is generally considered technical in all aspects."

8.2 As the appellant pointed out, decision T 651/12 has recently been referenced as being "exceptional" in decision T 1091/17 of 4 June 2020, according to which the view expressed in T 651/12 that the **reference to "presentations of information" in Article 52(2)(d) EPC was meant to relate exclusively to the cognitive content of the presented information ("what is presented") and not to the manner in which it is presented ("how it is presented") has not been adopted by the mainstream case law in the course of legal development**. The board in decision T 1091/17 explains, with reference to several decisions, that the **predominant view in the case law** is what T 1235/07 of 17 March 2011 in point 11 calls the **"wider view", according to which both what is presented and how it is presented are considered to be "presentations of information"** (see T 1091/17, Reasons 1.6). Similarly, decision T 1802/13 of 10 November 2016 does not follow decision T 651/12 on this question either (Reasons 2.1.5).

The board fully agrees with those conclusions in T 1091/17; however, **contrary to the appellant's argument in its letter, the fact that T 1091/17 contradicts decision T 651/12**

**does not mean that T 651/12 is a "different decision" within the meaning of Article 112(1)(b) EPC or that a problem of uniform application of the law** within the meaning of Article 112(1)(a) EPC exists. The statements in T 1091/17 and T 1802/13 merely reflect a development of the law (cf. G 3/08 of 12 May 2010, OJ EPO 2011, 10, Headnote 4).

Moreover, those **two decisions diverge from T 651/12 only on account of the adoption of the "wider view"** as explained above. They **do not contradict T 651/12 with regard to the question of whether features of a navigation system contributing to improving safety by reducing driver distraction during driving are technical**. The board is not aware of any decision clearly diverging from T 651/12 with regard to that point of view. In the following, the board describes relevant case law for the present case.

## 9. Other relevant decisions

9.1 In decision **T 2035/11** of 25 July 2014, the competent board states the following (Reasons 5.2.1):

**"providing real-time route-guidance information to a user in dependence on the user's real-world position is a technical task**. It involves an interaction between the user and the navigation system, wherein the navigation system continuously measures the user's position using technical means and, on the basis of these measurements, **provides the user with information aimed at enabling the user to manage the technical task of moving a vehicle to a desired destination**.

Although the completion of this **technical task depends on the user acting upon the provided route-guidance information and hence on an intervention by the user, it does not rely on subjective considerations by the user or on psychological effects**. The user may still decide to ignore the route-guidance information, but that does not detract from the technical character of the navigation system as a technical tool to be used **interactively in a technical process and not merely in a preparatory phase as a substitution of what could also be done using pencil and paper**."

The board in T 2035/11 then concludes that a **mathematical route-planning algorithm, which as such is not technical, when used in a navigation system comprising a position-determining device and route-planning functionality dependent on the actual real-world position of the system, provides a technical contribution at least to the extent that it produces information that enables the route-guidance functionality** (Reasons 5.1.3 and 5.2.2).

In the present case, claim 1 clearly specifies the **distinguishing feature in the context of a navigation system with means for automatically measuring the driver's position using technical means and displaying the route in real-time in order to continuously provide information aimed at enabling the driver to move the vehicle to a desired destination**. That by itself does not mean that the distinguishing feature is technical. The **presentation of information for business purposes is not technical** (see e.g. T 370/15 of 28 June 2019, Reasons 3.2 and 3.3).

The **distinguishing feature is based on the automatically obtained motion information, the current real-world position of the vehicle and its vicinity to a real-world intersection.** By stopping the advertisement based on those physical conditions of the vehicle and its physical environment, **it provides data about a technical process** (see, for example, decision T 1784/06 of 21 September 2012, Reasons 3.1.1, T 2035/11, Reasons 5.1.3) and **establishes a direct link with physical reality** (T 489/14, OJ EPO 2019, 86, Reasons 11). The **distinguishing feature could nevertheless be a mere straightforward implementation of a non-technical requirement** (see e.g. T 1455/16 of 20 November 2019, Reasons 5.5), for example **location-based advertisements for improving sales.** However, **the board is not convinced that the distinguishing feature has a business motivation, since stopping displaying advertisement in the way claimed is contrary to business objectives.** As explained above, **the purpose of the feature is to avoid driver distraction for improving safety, which according to T 651/12 is a technical effect.**

9.2 In decision BGH, X ZR 47/07, GRUR 2011, 125 -Wiedergabe topographischer Informationen of 26 October 2010, the German Federal Court of Justice (Bundesgerichtshof) decided that **features concerning the choice of a cartographic presentation of position-based topographic information for vehicle navigation were not technical** (paragraph 39). However, the decision considered the presentation of cartographic information to be **user-friendly** (see paragraph 40), and **did not address the issue of whether this user-friendly presentation of information was considered to contribute to driving safety.**

In decision BGH, X ZR 27/12, GRUR 2013, 909 -Fahrzeugnavigationssystem of 23 April 2013, the German Federal Court of Justice considered that **providing street names to the driver in a vehicle navigation system was not technical.** The decision recognised that **the purpose of the feature was to relieve the user from looking at the screen of the navigation system** (paragraph 16). However, the decision **did not explicitly address the question of whether improving driving safety is technical or whether the feature was considered to credibly contribute to improving driving safety** (rather than merely contributing e.g. to "user comfort", as mentioned in paragraph 28). It is also **not clear** whether the **street names were seen as necessary for the navigation or simply as being additional optional information to meet user preferences.**

9.3 In deciding whether features relating to presentation of information make a technical contribution, several criteria have been established in the case law of the Boards of Appeal.

**A feature which relates to the manner in which cognitive content is conveyed to the user on a screen normally does not contribute to a technical solution to a technical problem.** An **exception** would be if the manner of **presentation can be shown to have a credible technical effect** (T 1143/06 of 1 April 2009, Reasons 5.4).

According to decision T 336/14 of 2 September 2015, in assessing whether features relating to the presentation of cognitive content to the user of a graphical user interface (GUI) contribute to a technical effect, it has **to be analysed whether the GUI together with the content presented credibly assists the user in performing a technical task by means of a continued and/or guided human-machine interaction process** (Reasons 1.2).

According to decision T 1442/16 of 30 August 2019, one criterion for assessing the credibility of an alleged technical effect in inventions involving presentation of information is to **take into account whether the alleged effect is the result of subjective psychological factors or objective physiological factors, a distinction that has already been made in several decisions** (Reasons 1.8).

The mere fact that mental activities are involved does not necessarily qualify subject-matter as non-technical, but reducing the cognitive burden is not a technical effect in itself (T 1741/08 of 2 August 2012, Reasons 2.1.6; T 1143/06, Reasons 5.4).

In the present case, the board is of the opinion that the **distinguishing feature assists in the continued and guided human-machine interaction**, for the reasons given in point 9.1 above. The **distinguishing feature is not lowering the cognitive burden, but only avoiding driver distraction. The fact that the driver can concentrate better without advertisements is not the result of a subjective psychological effect.** Even if some persons may be less distracted than others by advertisements, and subjective psychological aspects can influence the degree to which an advertisement distracts a person, **anyone at any time is more distracted if an advertisement is displayed than if it is not displayed.**

9.4 Some decisions deal with the question of increased safety, with none of them clearly denying improving safety as a technical effect.

In decision T 547/08 of 10 March 2011, the board considered that **prompting the user to press a hard key in a portion of the screen display in a process of confirming entry of information into a dialysis machine contributed to the technical effect of improving safety when the dialysis machine was operated by non-trained personnel** (Reasons 5.1.1 and 5.1.2).

In decision T 1188/13 of 27 October 2016, the invention concerned a method of producing a graphical representation of a text message in the context of air control messaging. The board found that the steps of parsing a text message, using rules for applying graphical enhancement, retrieving graphic components and assembling them into a graphic representation were not inventive, but the board considered that the skilled person would be aware of the safety of air control messaging and in this context would consider teachings in respect of graphical representation of textual messages on a display (Reasons 3.1 to 3.3, 5).

In decision T 336/14 the board did not believe that the distinguishing features "help[ed] a nurse in setting up the blood treatment machine in a safe and efficient way" because the information provided could not credibly support a continued and guided human-machine interaction process and thus could not assist the user in performing the technical task. However, the board did not address the question of whether improving safety was a technical effect (Reasons 1.2.5).

10. In view of the considerations above, the **board decides, in line with decision T 651/12, to recognise improved safety in the technical context of the invention, that of real-time route guidance of a driver of a vehicle, as being a technical effect, and the considerations regarding improved safety in a vehicle navigation system as being technical considerations made by the technical expert in navigation systems.**

The way the advertisement is implemented is the task of the person skilled in the technical field of navigation systems faced with the non-technical requirement of displaying advertisement in the navigation system (T 641/00, OJ EPO, 352, Reasons 6). **Independently of the prior art, when implementing the system in accordance with the non-technical requirements, the decision to stop displaying advertisements close to an intersection when the vehicle is in motion for safety reasons is made not by the notional business person but by the technical expert in navigation systems.**

The board therefore concludes that the **distinguishing feature is to be considered to make a technical contribution** and has to be taken into account in the assessment of inventive step. The **distinguishing feature solves the technical problem of adapting the navigation system of document D2 in order to improve driving safety.**

11. With regard to the question of whether the distinguishing feature is inventive, document D2 concerns outputting advertisements at any point as an advantage over the previous limitation of providing advertisements on sign boards by the roadside. It does not address the subject of driving safety and, with regard to some embodiments, even discloses providing advertisements close to or at road intersection points. For example, it suggests presenting an advertisement for a restaurant in the vicinity that can be reached by taking the opposite direction, thereby actively using on-screen advertisements close to a point of intersection to influence the driver to possibly change direction (paragraph [0118] and [0119], Figure 5).

12. Even though it was **common general knowledge that driver distraction is to be avoided for safety reasons**, the **board is not convinced that the skilled person, without a hint in that direction, would have arrived at the claimed specific safety measure** on the basis of the proximity to an intersection and the position and motion of the vehicle.

At the oral proceedings, the appellant argued that there were many possible technical options for the skilled person to improve driving safety in general. Since document D2 taught showing advertisements as often as possible at the right points on the driver's route, including at intersections, the skilled person attempting to improve driving safety would not consider stopping advertising as claimed as a matter of routine development, but would opt for other solutions. Consequently, the invention involved an inventive step.

The board agrees with this argument. **Indeed, limiting the advertising negatively impacts the underlying business method of D2 and thus would not be considered as a matter of routine by the skilled person facing the general problem of driving safety.**

The appellant also argued that even if the skilled person at all considered stopping the advertising, they would not arrive at the claimed solution, which was a sophisticated compromise between no advertising and the approach disclosed in D2, which maximised advertising.

Again, the board agrees with the appellant.

13. Document D1 relates to measuring the effectiveness of location-based advertisement and does not address the issue of driving safety either.

14. Therefore, the subject-matter of **claim 1 of the main request is inventive** over the cited prior art (Article 56 EPC).

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T 0179/19 () of 21.1.2021

European Case Law Identifier: ECLI:EP:BA:2021:T017919.20210121

## **Training apparatus, arrangement and method**

**Grounds for opposition - insufficiency of disclosure (no)**

**Inventive step - (yes)**

Application number: 10168003.1

IPC class: A63B21/005, A61B5/11, G01L1/00, G06F19/00, H02P21/00,  
A63B71/00

Applicant name: eGym GmbH

Opponent name: milon industries GmbH

Board: 3.2.04

<https://www.epo.org/law-practice/case-law-appeals/pdf/t190179eu1.pdf>

The independent claims of the main request read as follows:

"1. A training apparatus comprising

a training element (1) for an exercising person, an AC motor (3) and a frequency converter (5) being arranged to control the AC motor (3), wherein the frequency converter (5) comprises measuring means being arranged to measure a voltage and a current of the AC motor (3) and calculation means being arranged to calculate a magnetic state of the AC motor (3) using the measured voltage, the measured current, a reference torque and a reference flux in order to generate a torque of the AC motor (3),

characterised in that the training apparatus comprises a control unit (6) having a machine control module (27) being arranged to calculate the reference flux and the reference torque using an intended overall torque, wherein the machine control module (27) is connected to the frequency converter (5) and arranged to transmit the reference flux and the reference torque to the frequency converter (5), and

wherein the machine control module (27) splits the intended overall torque into a torque component and a flux component within the control unit (6), and calculates the reference flux and the reference torque based on the torque component and the flux component using a characteristic diagram."

The invention relates to a muscle training apparatus comprising a training element and an AC motor. The motor provides the training resistance (just as weights do in a conventional apparatus). The motor is operated in a direct torque control loop (DTC).

The patent aims to improve a training apparatus by providing, amongst other things, a more accurate training resistance.

### 3. Main request (as granted), claim 1, sufficiency of disclosure

3.1 The subject matter of claim 1 is a training apparatus having an AC motor and a frequency converter arranged to control the motor on the basis of reference torque and reference flux input signals.

The training apparatus also comprises a control unit 6 with a machine control module 27 (see figures 1 and 2).

The machine control module 27 calculates the reference flux and reference torque using an intended overall torque, which it then transmits to the frequency converter (5).

3.2 The last two features of claim 1 defines how the reference torque and reference flux are derived. In particular, the machine control module 27 splits [emphasis added by the Board] the intended overall torque into a torque component and a flux component within the control unit (6); and calculates the reference flux and the reference torque based on the torque component and the flux component using a characteristic diagram.

3.3 The impugned decision (see grounds, points 12.2 to 12.6) found that the skilled person would be unable to carry out these two features. In particular they would not know how to split an intended overall torque into a torque component and a reference component. Moreover, with no information given in the patent about the "characteristic diagram" necessary for converting these components into reference values, the skilled person would not be able to carry out the invention.

3.4 The **Board** acknowledges that the final claim features may not be ideally formulated. Indeed, the **idea of splitting what already defines a torque into a torque component and something else (flux component) appears contradictory**.

3.5 **However, this is an issue of clarity**. Sufficiency of disclosure requires that the patent as a whole, including description, drawings and claim, discloses the invention sufficiently clearly and completely for the skilled person to carry it out, CLBA 9th edition 2019, II.C.3.1. Thus, **as long as issues of clarity are resolved in the description or drawings, the requirements of Art 100(b) and 83 EPC should be met**. Therefore the **Board must consider whether the above lack of clarity is resolved when considering the whole disclosure**.

3.6 It appears indisputable that the claimed invention, with its AC motor having a frequency converter control with reference flux and reference torque inputs, relates to a DTC control scheme.

...

3.8 Although the term absolute amount of torque needed is slightly differently formulated from the expression intended overall torque used elsewhere and in claim 1, the Board holds that the **skilled person will recognise these as being one and the same**. Thus, the Board considers that this last cited passage reiterates that the reference flux and reference torque are calculated from the intended overall torque.

3.9 It is with this in mind that the skilled person reads paragraph [0010], which mirrors the claim wording in explaining that the machine control module splits the intended overall torque into a torque component and a flux component within the control unit, and calculates the reference flux and the reference torque based on the torque component and the flux component [...].

In the Board's view, the skilled person will understand this paragraph (and the corresponding part of claim 1) to build on the previous paragraphs, in that it explains how the machine control module calculates the reference torque and flux from the intended overall torque. It repeats the idea, albeit expressed in terms of splitting, that the intended overall torque is the common base from which both the reference torque and the reference flux are calculated. Thus, the skilled person understands that in order to calculate both reference values from the intended torque it first splits the torque into components (which it terms "torque" and "flux"), which are then used to determine reference torque and flux using a "characteristic diagram". They **thus understand the splitting to be nothing more than an initial step in which the intended overall torque is processed to provide separate inputs for calculating the corresponding two DTC outputs in the form of the reference torque and the reference flux**. Thus interpreted, the **Board has no doubt that this aspect of the invention can be carried out by the skilled person using their routine skills**.

3.10 Armed with this interpretation of the above (splitting) feature, the question remains as to whether the skilled person, from the patent's teaching and their general knowledge, would be able to provide a suitable characteristic diagram for deriving the reference torque and a reference flux from the intended overall torque. In the **Board's view, they would**.

3.11 The description (see paragraph [0010] again) mirrors claim 1's characteristic diagram feature without further explanation or example. If the skilled person is to carry out the invention, they must therefore provide this diagram from their general knowledge.

3.12 In the Board's view, it goes without saying that the reference torque is closely related to the intended overall torque, since the latter is the torque needed to provide a training resistance to the user.

3.13 As to deriving the reference flux, the skilled person would be well aware of the ideal characteristics of the training apparatus in particular the machine force (torque) needed to counter a particular user's muscle force performing a particular exercise, having a specific degree of movement, reversal points, speed etc. (cf. published patent specification, column 3, lines 22 to 42 and column 11, line 56 to column 12, line 10). They would also know, or could measure, the electrical and magnetic characteristics of the AC motor that should produce this force.



3.14 The Board agrees with the appellant-proprietor that, **knowing these parameters, the skilled person would be able to provide a suitable characteristic flux-torque diagram from which to calculate the reference flux according to the intended overall torque.**

3.15 Therefore, the Board considers that the **skilled person would be able to carry out the invention** of claim 1 from the information given in the patent and their general knowledge.

#### 4. Inventive step

4.2 ... in its summons to oral proceedings, the opposition division considered the issue of inventive step and gave a preliminary opinion (see communication of 22 November 2017, point 2.1.1, last paragraph and 2.2.2). According to that opinion, if the invention was sufficiently disclosed then it would be trivial with respect to combinations of D1 with the skilled person's general knowledge or D1 with D8. The appellant-proprietor has also commented on this issue in its grounds of appeal.

...

#### 4.4 D1 in combination with the skilled person's general knowledge

4.4.1 D1 (see abstract and figure) discloses an exercise machine with a three phase motor 2. The motor is driven by a frequency converter 5. The training apparatus also has a control unit 6.

4.4.2 However ...

4.4.3 ..., in D1, the torque is controlled in an open loop (see and figure 1, control lines 7 and 8) by controlling the motor current and by setting the frequency to achieve speed control in a closed loop.

4.4.4 The effect of these differing features appears to be more precise torque control (see for example published patent specification, paragraph [0010]). In the context of a training apparatus, and in agreement with the stated aim of the patent (see paragraph [0006]), the **Board considers that the objective technical problem can be stated as: how to modify the training apparatus of D1 to more accurately provide a training resistance.**

4.4.5 In the Board's view, the skilled person would know about direct torque control (DTC) from their general knowledge. Therefore, faced with the objective technical problem the skilled person might, as a matter of obviousness, use such a control scheme to control the motor of D1's training apparatus. This would lead to setting a reference torque and a reference flux as control inputs. Moreover, it stands to reason that the reference torque would be calculated based on the intended overall torque. However, the combination would not lead to calculating the reference flux from the intended overall torque, as the Board interprets claim 1 to require.

In the Board's view, **it would not be obvious for the skilled person to arrive at this further step, without prior knowledge of the invention.**

#### 4.5 D1 in combination with D8

4.5.1 As already explained, the objective technical problem concerns improving a training apparatus. Such an apparatus implies very light loads. **The Board does not consider that the skilled person would look to D8 to solve the objective technical problem because D8's motor drive control is not concerned with light loads. Rather, it is intended to be used in large plant installations of, for example, the metallurgical industry, pulp and paper industry (see page 1, introductory paragraph).**

...

4.6 In the light of the above, the Board finds that the subject matter of claim 1 involves an inventive step.

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