



27 August 2019

## LETTER TO THE ENLARGED BOARD OF APPEAL ON G1/19

Dear Chairman and Members of the Enlarged Board of Appeal,

**Re: G 1/19 – Amicus Curiae Brief from epi**

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The Institute of the European Patent Attorneys, **epi**, is the professional body representing all European Patent Attorneys. Currently the **epi** has about 12,300 European Patent Attorneys as members coming from each of the 38 Contracting States of the European Patent Convention who work either in industry or in private practice.

**epi** welcomes this referral to the Enlarged Board of Appeal (“the EBA”) as it is hoped that this provides an opportunity for increasing the certainty of both applicants/proprietors and 3<sup>rd</sup> parties in relation to the requirements for patentability of computer-implemented simulations before the EPO.

The following comments are provided by the **epi** in order to assist the EBA in its consideration of the questions referred in G 1/19.

### Background

This reference to the EBA arose on the basis of the prosecution of European patent application no. 03793825.5 where Board 3.5.07 in considering Appeal no. T 0489/14 perceived a divergence between existing decisions of the Boards of Appeal in, for example, decisions T 1265/09, T 531/09, T 1630/11, and T 453/91 and decisions such as T 1227/05, T 1820/06, T 625/11, and T 1465/13 in relation to the possibility or requirement for reciting technical features of a simulated system in claims directed towards a simulation.

The questions referred to the EBA are:

1. **Question 1: In the assessment of inventive step, can the computer-implemented simulation of a technical system or process solve a technical problem by producing a technical effect which goes beyond the simulation's implementation on a computer, if the computer-implemented simulation is claimed as such?**

- 1.1. This question appears to require a significant amount of interpretation vis-à-vis the European Patent Convention.
- 1.2. The question starts by seemingly setting a framework for discussion: the assessment of inventive step, i.e. the application of Art. 56 EPC. In this context, as known and accepted unanimously in the case law, assessment of inventive step is to be done using the problem-solution approach, after assessment of the contribution of each feature of the claim to the technical character of the invention.

This seems to indicate that the referring Board of Appeal does not question the applicability of the universally accepted approaches to determine whether the claimed subject matter fulfils the requirements of Articles 52 and 54 EPC but focusses on the applicability of the problem-solution approach as set out in the COMVIK decision (T641/00). It is supported by the fact that the first sentence of the question continues preparing the ground by stating: a “*computer-implemented simulation of a technical system*” is being dealt with, i.e. it is pre-determined that:

- the (simulated) system or process is technical;
- the simulation is computer-implemented, i.e. hardware means are being used for running at least parts of the simulation.

- 1.3. From this point on, the question asks whether such an implementation can be considered to be solving a technical problem by producing a technical effect, however, under a second precise condition that: “*the computer-implemented simulation is claimed **as such***”.

This choice of language is most peculiar.

- 1.4. In the European Patent Convention, the language “as such” is only used in Articles 52(2), 62 (right of the Inventor to be mentioned - mentioning as such), 69(2) (extent of protection – extension of protection as such) as well as in Rules 42(1)(c) (content of the description – expression of technical problem as such) and 153 (attorney-client evidentiary privilege – professional representative in its capacity as such).

Undoubtedly, only Art. 52(2) EPC and Rule 42(1)(c) EPC could at all be relevant in the framework of Question 1 of the present referral. Question 1 does, however, not deal with the technical problem *per se* but with the question of how a specific invention **is claimed**.

- 1.5. Article 52(2) provides a list of subject-matter and activities that are not considered to be inventions and thus excluded from patentability to the extent a European patent application or European patent relates to such subject-matter or activities “as such” (Art. 52(3) EPC).

The exclusions according to Article 52(2) and (3) EPC list neither “computer- implemented methods – as such” nor “computer-implemented simulations – as such”. Consequently, claims directed to a computer-implemented simulation cannot be objected to under Art. 52(2) and (3) EPC for any method involving the use of technical means and any technical means itself (e.g. a computer or a computer-readable storage medium) are considered having technical character and thus represent inventions in the sense of Art. 52(1) EPC (T 424/03, G 3/08).

It is noted that the list of non-inventions listed in Art. 52(2) and (3) EPC are not subject to interpretation or analogy given they represent a closed catalog of exclusions from the otherwise general concept to grant patent protection for inventions in any field of technology. The systematics of the law prescribes that it is forbidden to supplement this list by adding further non-inventions at will.

1.6. Considering the above, the first and second conditions, hereinafter listed as:

1<sup>st</sup> “in the assessment of inventive step”

2<sup>nd</sup> “the computer-implemented simulation is claimed as such”

would be in sharp contradiction since they pertain to two different but tightly-sequenced steps in the assessment of patentability under the problem solution approach.

Indeed, the only solution to resolve this contradiction can be to consider the choice of language by the referring Board unfortunate at best, it representing an attempt to distinguish from a claim as referred to in question 3, i.e. where the computer-implemented simulation would be embedded in a claim referring also to additional aspects than the pure simulation.

1.7. This is supported by the following:

- The Board does not comment on the language “as such” in the context of the referral;
- claim 1 in the case under appeal does not recite a “computer-implemented simulation” but refers to a “*computer-implemented **method** of modeling*”;
- the language of the question proposed by the Appellant for referral was: “*computer-implemented **method** of simulation*”.

1.8. Considering that a general exclusion of computer-implemented simulations has no basis in EPC, one of the issues for the present referral is to examine if, in the assessment of inventive step, the method steps of a computer-implemented simulation, which **does not** include any further steps following the simulation steps “... *can [] solve a technical problem by producing a technical effect that goes beyond the simulation’s implementation on a computer ...*”. Such steps following the simulation steps could, for example, include a step for manufacturing an object based on design values resulting from the simulation, or for controlling a technical process or system, or the like.

1.9. A computer-implemented simulation of a technical system or process is associated with the behavior of such **system or process**, namely by applying the method steps of the computer-

implemented simulation to a respective **model** reflecting the laws of nature governing the system or process. In other words, the model in conjunction with a particular set of simulation parameters produce a potential state of the system/process to which the system/process transitions under the conditions defined by said set of simulation parameters.

- 1.10. The simulation parameters can reflect physical parameters characterizing a corresponding real-world implementation of the simulated system/process. A variation of the simulation parameters allows for prediction of the states and, in particular, a final or optimized state. Such a state may be desirable to be reproduced in the physical world, if the simulation is used for the purpose of avoiding cumbersome experimentation before prototyping, or conversely be avoided, if this would lead to a disastrous situation in the real world (e.g., overheating and failure of safety critical components in a nuclear power plant).

It is important that the result of a computer-implemented simulation may reflect a state of a system or process in the physical world that may not be reached and, in fact, the simulation may even be dedicated to avoid the production of a real-world object or the execution of a real-world process. Therefore, also in cases where a simulation produces results that are never implemented in the real world, such simulation is still linked to the real world by way of the simulation model reflecting the laws of nature governing the simulated system or process.

- 1.11. Models of technical physical world systems or processes implemented in software algorithms, such as, for example, digital twins, are clearly distinct from other software algorithms that perform non-technical calculations, such as, for example, algorithms calculating stock price development. As concerns a model of a technical physical world system or process, the simulated system or process may – or could at least – exist and follows – or would follow – the fundamental laws of nature. In such a case, a technical effect should be considered to be present when the model of the simulated system interacts with the simulation parameters in the computer-implemented simulation to produce an effect on the model that would similarly show in the real world system or process represented by the model.

Both the model and the simulation parameters must be considered linking to physical reality and thus a computer-implemented simulation marrying both must be seen as producing a technical effect as much as the technical considerations of an engineer or scientist is, when conceiving changes in a physical world system or process by predicting the behavior of such system or process on the basis of the laws of nature.

1.12. It is concluded that the method steps of a computer-implemented simulation of a technical system or process, even if not including any further steps following the simulation steps, i.e. a computer-implemented simulation as such, can solve a technical problem by producing a technical effect, which goes beyond the mere implementation of the simulation on a computer.

1.13. Indeed, such a technical effect has already been recognized in the Case Law:

**T 1227/05** acknowledges that a simulation of an adequately defined class of technical items has the technical effect that the simulation performs technical functions typical of modern engineering work and provides for realistic prediction of the performance of the simulated system.

In this case the simulated system which was adequately defined was a circuit and the simulation allows it to be developed so accurately that a prototype's chances of success can be assessed before it is built. The speed and quality of simulation enables a wide range of designs to be virtually tested and examined for suitability before the expensive fabrication process starts.

In this context, specific technical applications of computer-implemented simulation methods are themselves to be regarded as modern technical methods which form an essential part of the fabrication process and precede actual production, mostly as an intermediate step. In that light, such simulation methods cannot be denied a technical effect merely on the ground that they do not yet incorporate the physical end product (point 3.4.2 of T 1227/05).

1.14. The principles of this decision were also followed in the decision **T 0625/11**. In this decision, the claimed computer-implemented simulation, which relates to a method for determining by

a computer system at least one limit value of at least one first parameter for operating a nuclear reactor, was found to have technical character for the following reasons:

*“À l'issue de la délibération de la Chambre, celle-ci est arrivée à la conclusion que la détermination, en tant que valeur limite, de la valeur du premier paramètre de fonctionnement conférerait un caractère technique à la revendication, ce caractère technique dépassant la simple interaction entre l'algorithme de simulation numérique et le système informatique. La nature du paramètre ainsi identifié est, en effet, intimement liée au fonctionnement d'un réacteur nucléaire, que ce paramètre fasse l'objet d'une utilisation effective au sein d'un réacteur nucléaire ou non. Ce faisant, la Chambre reconnaît la pertinence de l'analyse développée dans l'affaire T 1227/05 qu'elle reprend à son compte. De même, de l'avis de la Chambre, la nature des paramètres qui interviennent dans le cadre de la simulation (contraintes, températures, capacités calorifiques, pressions, dimensions...) confère elle aussi un caractère technique à l'invention revendiquée.”* – section 8.4 of T 0625/11

- 1.15. Yet another example of a technical effect generated by a computer-implemented simulation method can be found in **T 1465/13**. The allowed main request in this decision claims a computer-implemented simulation of various objects on direct and indirect fire in a combat.

The Board defined the objective technical problem addressed by the claimed invention as to enable a more realistic simulation of the effect of various objects on direct and indirect fire in a combat simulation.

This means, a more realistic simulation is accepted as a technical effect of the computer-implemented simulation.

- 1.16. The **epi** agrees with the findings of these cases. These computer-implemented simulation methods have rightfully been found to have a technical effect beyond the mere implementation of the simulation method on a computer and, are therefore able to solve a technical problem by technical means.

1.17. As a result, it is submitted that the answer to the 1<sup>st</sup> question must be an unequivocal “yes”.

2. **Question 2A: If the answer to the first question is yes, what are the relevant criteria for assessing whether a computer-implemented simulation claimed as such solves a technical problem?**

2.1. Case law on “computer-implemented methods” requires the definition of an objective technical problem and an identification of characterizing features solving the problem.

In widely followed decision **T641/00**, the Board identified that an invention consisting of a mixture of technical and non-technical features and having technical character as a whole is to be assessed with respect to the requirement of inventive step by taking account of all those features which contribute to said technical character, whereas features making no such contribution cannot support the presence of inventive step.

Where a claim refers to an aim to be achieved in a non-technical field, under the current practice of the EPO, this aim may appear in the formulation of the problem as part of the framework of the technical problem that is to be solved, in particular as a constraint that has to be met.

Otherwise, features distinct from the cited art must be maintained as characterizing a given invention and taken into account when assessing inventiveness according to EPC Article 56.

2.2. While the EPC does not attempt to definitively or canonically define features having a technical character, the Boards of Appeal have provided useful guidance when a feature of a claim should be imported into the formulation of the objective problem of the invention for it being regarded as providing no contribution to the technical character of the invention alone or in conjunction with other features. Any feature contributing to the technical character of the claimed invention must not be indicated to in the objective problem and thus be considered in the assessment of inventive step.



For example, in decision **T 0844/09**, the Board asserted that verification of a user's authorization to use a financial account including the recognition that the retrieval by the user of transaction details offers a convenient and secure channel for forwarding transaction authentication information to the user, and the realization that "verifying" transactions can be generated and initiated to contain the transaction authentication information, *"relies on a technical understanding of the operation of the ... system and its respective components and, thus, lies within the scope of a technically qualified person working in the field of computer-implemented ... systems and notably entrusted with the security aspects thereof"*.

- 2.3. While **T 0844/09** is not in the context of simulation, the Decision provides an excellent criterion for whether any feature of a claimed method involves technical character and so should be retained as a characterizing feature of a claim for the purposes of assessing inventive step or not, i.e. does the feature rely on a technical understanding by a technically qualified person working in the field.

This criterion applies well to computer-implemented simulations: where the features of a computer-implemented simulation rely on the technical understanding of the operation of the simulated system and its respective components, or the simulation system itself, and thus, lie within the scope of a technically qualified person, such features need to be considered adding to the technical character of the invention and thus remain features requiring consideration when assessing inventive step of a computer-implemented simulation.

3. **Question 2B: Is it a sufficient condition that the simulation is based, at least in part, on technical principles underlying the simulated system or process?**

- 3.1. Given a criterion such as provided above, or any equivalent, it will be evident that any features making a technical contribution to a simulated system recited within a claim directed towards a simulation method or system contribute to characterizing a claim and so to the assessment of inventiveness.

There are many such characteristics of simulated systems which may be the subject of simulation and whether being received by the simulation as input or generated by the

simulation as output values to be used in the subsequent control of the simulated system. Such characteristics fall exclusively within the compass of a technically qualified person employing their technical understanding of a simulated system.

Indeed, the features for providing a higher quality supply of artificial noise generated by the simulation claimed in **T 1227/05** for driving the simulation of a circuit is a good example of a characteristic for a simulated system which is wholly and exclusively the concern of a technically qualified person.

3.2. Accordingly, applying, for example, the criterion set out above under section 2.3, the answer to question 2B must be a clear “yes” – technical principles underlying the simulated system or process are a sufficient condition so that such features can be taken into account in the assessment of inventive step of a claim to a computer-implemented simulation.

4. **Question 3: What are the answers to the first and second questions if the computer-implemented simulation is claimed as part of a design process, in particular for verifying a design?**

4.1. This question examines the effect of the claim being shifted from a computer-implemented simulation to a design process involving such computer-implemented simulation.

4.2. Claims directed to design processes *per se* may be considered subject matter related to mental acts and thus non-patentable according to Article 52(2).

In the decisions mentioned by the referring Board under “Decisions relating to methods for design”, **T 453/91**, **T 471/05**, and **T 914/02** which deemed the design processes to be related to non-patentable subject matter all revolved around the fact that there existed an interpretation of the claim where the process is carried out mentally.

It has been consistently – and correctly – decided that when tangible means such as computer systems and computer programs are introduced, this interpretation no longer holds.

- 4.3. The question becomes whether the technical contribution provided by a design process claim involving a computer-implemented simulation differs from a computer-implemented simulation claim, and if so how.

A design process claim involving a computer-implemented simulation needs to be treated just like any claim involving technical and non-technical features in a claim. Accordingly, the COMVIK approach according to **T 641/00** should be used.

Where the features of the design process contribute to the technical character of the claim, e.g. under the principle set out in section 2.3, they should be considered making a technical contribution to the prior art and thus observed in assessment of the inventive step of the claim.

- 4.4. In comparison with a computer-implemented simulation claim, a design process including the computer-implemented simulation can be viewed as including additional features. These additional features may be considered to either further contribute to the technical character or not, depending on their nature (cf. section 4.3). The additional features may also represent the only contribution to the technical character of the invention even if the features referring to the computer-implemented simulation *per se* do not.

However, in no case, there is a situation where the claim to the design process involving a computer-implemented simulation offers less technical contribution than a claim to the computer-implemented simulation itself, whether the features referring to the computer-implemented simulation *per se* are considered technical or not. Non-technical features certainly cannot diminish the technical contribution of a number of technical features in a claim (e.g. **T 769/92**).

- 4.5. This applies equally when the end result is verification of a design: the technical considerations and contribution provided for by the computer-implemented simulation are found in the verified result of the design process which is utilizing said simulation, assuming the computer-implemented simulation is found to involve an inventive step.



Thus, in the case that a computer-implemented simulation is deemed to solving a technical problem by technical means, a corresponding claim directed to a design process involving said computer-implemented simulation would likewise need to be considered solving a technical problem by technical means.

4.6. The answers to questions 1 and 2 would remain unchanged.