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Across Continents: Exploring Common Ground and Contrasts in Patenting Software Inventions in the US, UK and Europe: The EPO approach

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Executive summary

The EPO has developed a robust system called the "COMVIK" approach that provides a significant degree of certainty regarding what will be considered patentable. However, a point of contention lies in the incorporation of previous patent law, which deems what some would consider highly technical areas like natural language processing (including automated translation and chatbots) and financial tech (e.g., blockchain) as non-patentable. It should also be noted that the EPO has recently been critical of sufficiency of disclosure of AI-related inventions, particularly those involving neural networks. Especially the availability of training data (or rather lack thereof) has been criticized (see e.g. decisions T161/18 and T1191/19).

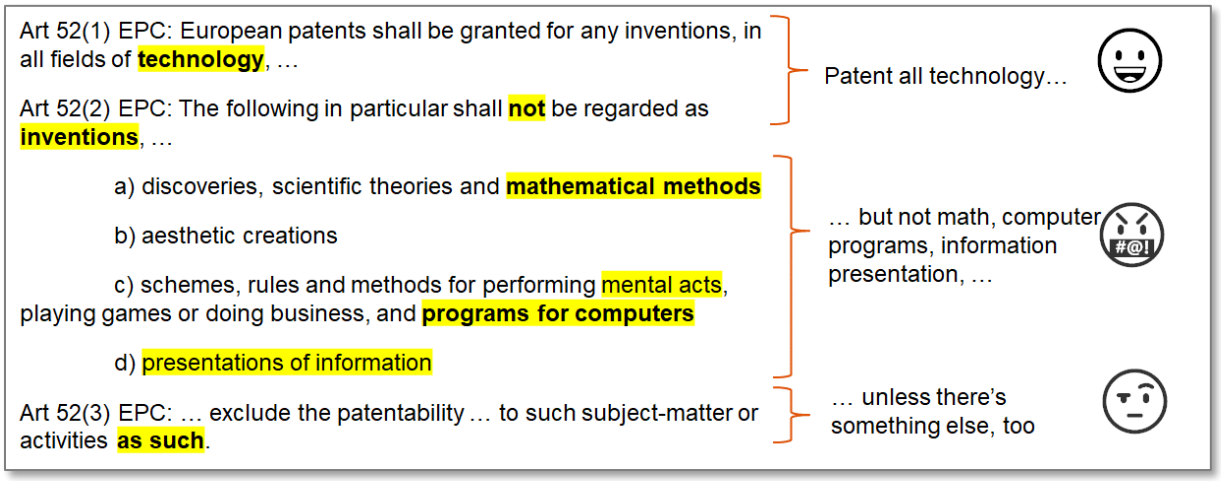
How it all began: Article 52 of the European Patent Convention (EPC)

Article 52 of the European Patent Convention (EPC) provides a framework for determining what can be patented. Notably, the drafters of the EPC chose not to include a formal definition of an invention or what is or is not a field of technology. Instead, they stated that European patents shall be granted "for any invention across all fields of technology".

The second paragraph of Article 52 does enumerate fields that the EPC drafters explicitly did not consider inventions. These include mathematical methods, methods for performing mental acts or doing business, programs for computers, and presentations of information. This might imply that e.g. software and anything involving mathematics are not patentable.

Fortunately (if you like patents), the third paragraph of Article 52 clarifies that the aforementioned subjects are only excluded "as such".

The Boards of Appeal of the European Patent Office (EPO) were effectively tasked with developing case law to define what constitutes an invention and to interpret "all fields of technology", within the boundaries of Article 52 EPC.

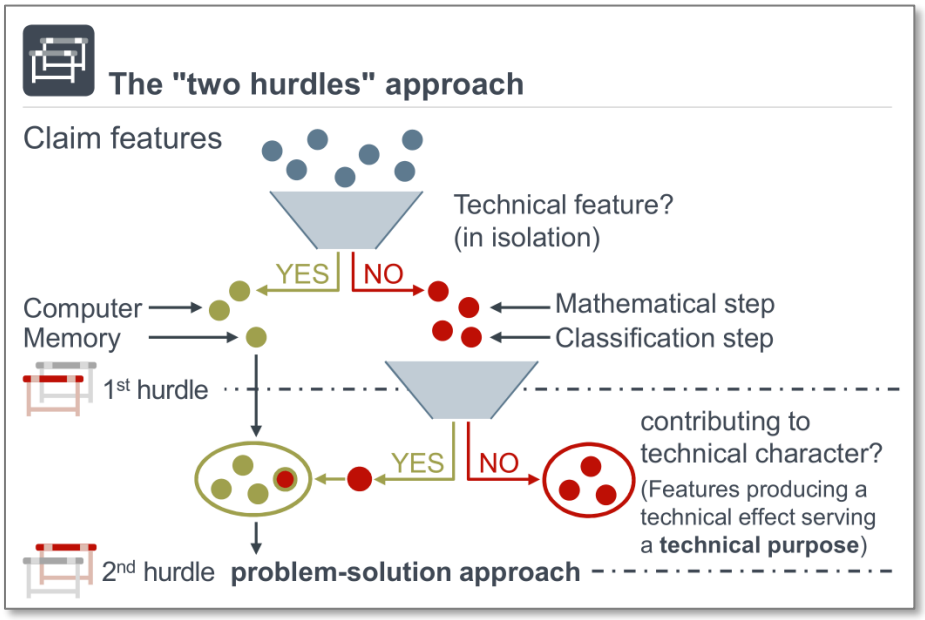


(a very annotated excerpt of Art. 52 EPC)

The methodology that the Boards of Appeal of the EPO came up with, is commonly known as the COMVIK approach, and it is also referred to as the two-hurdle approach. Inspired by "the fields of technology" of Article 52(1), the term "technology" or "technical" plays a pivotal role. Based on Article 52(2), the list of fields not considered inventions is also taken into account, and the "excluded [..] as such" of Article 52(3) plays an important role as well.

The COMVIK or Two-Hurdle Approach Illustrated

We illustrate the COMVIK approach using a creative figure from the EPO. In it, a peculiar machine processes unpainted balls, assigning them a red or green paint, or a combination of both, where each ball represents a claim feature. The claim to be assessed for patentability is divided into features, and each feature is evaluated separately.



(the "COMVIK machine", original image by European Patent Office)

Each claim feature (ball) is first assessed for its technicality in isolation. The machine checks each feature against the exclusion list of Article 52(2) (and the interpretation thereof in the developing EPO case law). If a feature is not patentable in isolation, it is painted red; if it is, it is painted green. Examples of green features are a computer memory, a processor, or a computer-implemented method step. Examples of red features are calculating the distance between two points (mathematics) or generating text (a mental act).

Features that are not technical in isolation are assessed for their potential contribution to the technical character of the claim as a whole. This is how the machine implements the "as such" part of Article 52(3). The question to be answered is, does the non-technical feature help produce a technical effect serving a technical purpose? If no, the ball remains red and is discarded. If yes, the ball is coated green and placed into a basket with other green balls.

Only features that end up in the basket of green balls are evaluated for inventive step. This means that for determining the inventive step, claim features that are non-technical in isolation and do not contribute to a technical effect elsewhere in the claim are simply not considered.

Example Application of the COMVIK Approach

Consider a computer configured to receive a prompt (written text) from a user and produce a written textual output based on that prompt (for example, a computer server running the ChatGPT AI model). The EPO will consider only the computer in that claim as technical or contributing to a technical effect. This is because (aside from a few very specific exceptions such as generating an alarm) generating and outputting text is not considered technical. Hence, all of the considerably complex mathematical steps used by the computer's programming to generate that output text based on the input text also do not contribute to a technical effect.

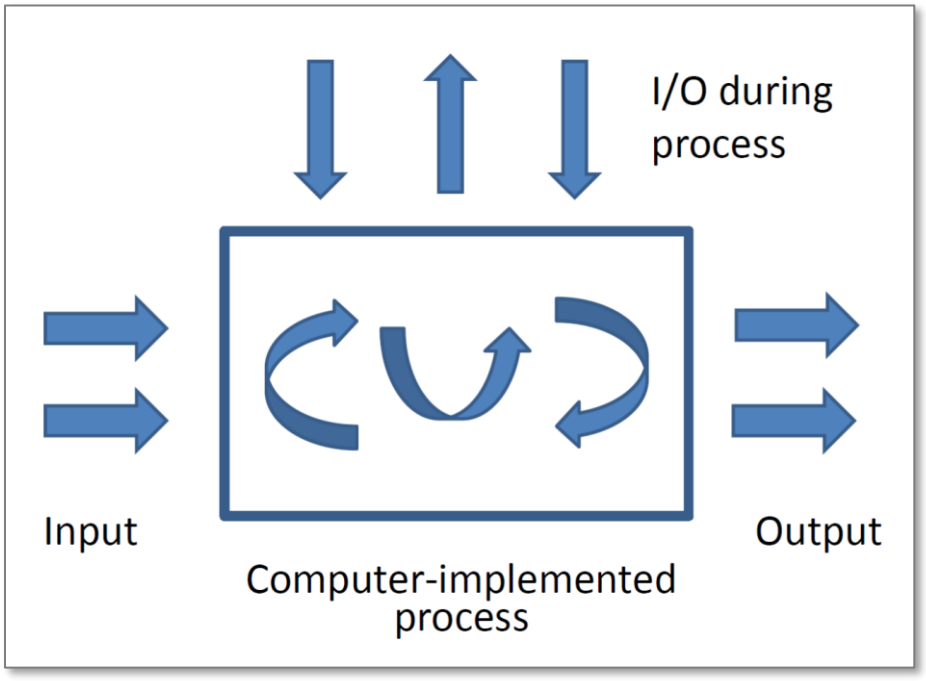
So, when the fictional "COMVIK machine" is done processing the "ChatGPT" claim, the green basket will have only the feature related to the computer in it. All of the other features related to the mathematical steps and the generation and output of text have ended up in the red basket.

The subsequent inventive step analysis is quick and merciless: since a computer, the only feature in the green basket, is already known, the claim is not inventive.

The COMVIK Approach and Enlarged Board of Appeal Decision G1/19

The COMVIK approach was discussed and affirmed in the Enlarged Board of Appeal decision G1/19. For those unfamiliar with the EPO Boards of Appeal, there are the regular (technical) boards producing "T" decisions and there is one Enlarged Board of Appeal above them which produces "G" decisions. Under certain conditions, e.g. when contradictory case law has emerged, a Technical Board of Appeal can ask the Enlarged Board of Appeal to resolve certain questions.

In this specific case, a Board considered it unclear whether computer simulations could be patented, because a simulation takes essentially place inside a computer. The Enlarged Board of Appeal stated that the COMVIK approach also adequately covers simulations. The Enlarged Board took the opportunity to clarify how COMVIK should function and, breaking with tradition, provided a schematic image to illustrate their points, which, to the best of my knowledge, is the only instance where the Enlarged Board of Appeal used an image to support or explain their reasoning!



(image by Enlarged Board of Appeal in G1/19)

General View of a Computer-Implemented Process according the Enlarged Board

The Enlarged Board described a computer-implemented process as a box where certain activities occur, having input and output, and possibly a continuous process with I/O during the process. The Enlarged Board stated that, in principle, provided at least one of the elements (input, output, I/O, or what happens inside the computer) is technical, then it might be patentable.

For simulations, even if the simulated results (the output) are not explicitly used to achieve something technical in the real world, if that is clearly the intention and the only use, then the simulation is also deemed technical. Another example of a technical (in the COMVIK sense) system is when input from a technical system (e.g., measurement data) is processed by your computer-implemented process to calculate something useful (e.g., a temperature distribution) and present that as output. While the calculation is mathematical and the output is presentation of information, the input data is technical in nature, and that generally suffices.

A final example of a technical effect can be inside the computer itself. For instance, if your algorithm, which is not technical as such, achieves a significant saving in computational cycles,

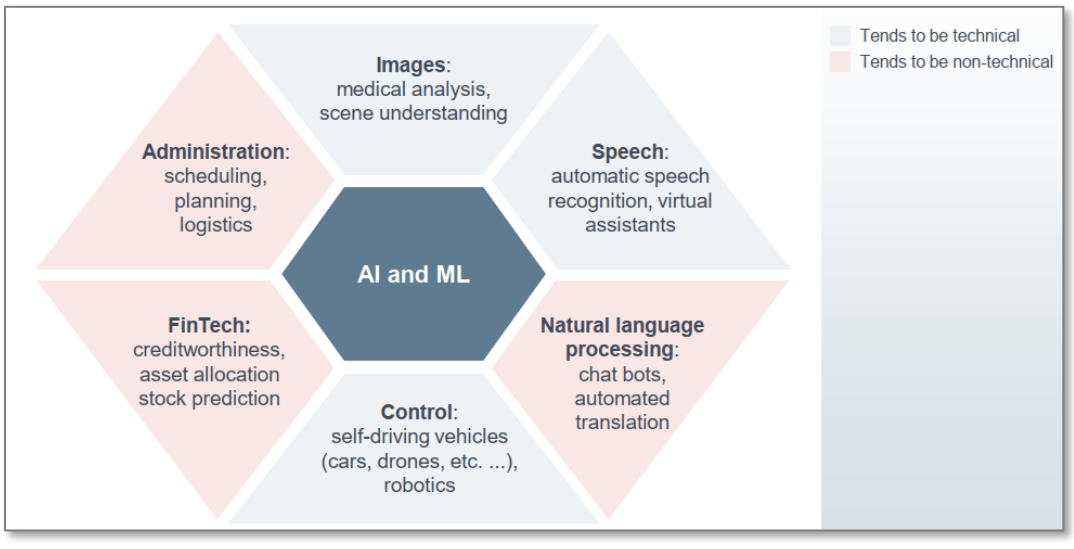
memory usage, or heat generation, then there could be a technical effect. However, the EPO typically sets a high standard for these types of inventions. This may be partly because applicants typically claim such effect as a last ditch attempt to get claims granted which are otherwise considered non-technical!

While this seems like a favourable decision for those who wish to patent computer-implemented inventions, there is a catch. The boards also emphasized that, in line with COMVIK, for features to qualify as technical, they must be technical across the full scope of the claim.

In practice, consider an example where you calculate an output that is useful in a technical process. The claim must then be really limited to such a technical process. If the claim also allows cases in which you use the output for something else, the EPO would likely consider that the claimed invention is not technical across the full scope of the claim. In terms of the "COMVIK machine", it means that the output calculation would be a red ball, not a red ball with a green coating. This catch in G1/19 effectively makes it very hard, if not impossible, to patent general AI methods.

The COMVIK Approach and AI/Machine Learning Patentability

The fourth figure, again provided by the EPO, illustrates which applications, particularly in AI and machine learning, are considered patentable. Applications related to image processing, speech processing, and control are generally deemed technical and thus potentially patentable. However, applications in administration, financial tech, and natural language processing are typically not considered technical, making it challenging to secure a European patent in these fields.



(original image by European Patent Office)

Given that core AI technology can be applied across various fields, due to the "technical across full scope" requirement of G1/19, AI technology itself is typically not patentable, as it can almost always be applied to a non-technical field.

Summary of the EPO System

The EPO has developed a robust system that provides a significant degree of certainty regarding what will be considered patentable. However, a point of contention lies in the incorporation of previous patent law, which deems what some would consider highly technical areas like natural language processing (including automated translation and chatbots) and financial tech (e.g., blockchain) as non-patentable. This is due to historical decisions that categorized anything involving natural language as a linguistic application and not technical, and administrative applications like blockchain as non-technical, which have been incorporated into the standardized approach to computer implemented inventions at the EPO.

Extra topic: Sufficiency of Disclosure in AI Applications

Traditionally, sufficiency of disclosure has not posed a significant challenge for patentees of computer-implemented inventions. However, AI applications, particularly those involving neural networks, have sometimes been deemed insufficiently disclosed in case law, as seen in decisions T161/18 and T1191/19.

In decision, T161/18, from May 2020, the BoA considered that the application did not disclose which input data was suitable for training the artificial neural network according to the invention thereby contravening Art. 83 EPC. The invention was about determining cardiac output in patients based on blood pressure measured at the periphery. The training data was described as being based on a wide range of patients of different ages, genders, constitutional types, health conditions and the like so that the AI would not become too specialised. But the EPO considered that developing the training data set and training the AI would be an undue burden for the skilled person.

In decision T1191/19, from, May 2022, the BoA considered that the application did not disclose any example set of training data thereby contravening Art. 83 EPC. The invention related to using a meta learning scheme to predict personalised interventions for patients in processes of which the substrate is neuronal plasticity. For sufficiency, the Board found that the skilled person could not reproduce without undue burden the application of the meta learning scheme to solve the problem of predicting personalised interventions for a patient in processes the substrate of which is neuronal plasticity. The application did not provide any example of training data and validation data, which were required by the meta-learning scheme as input.

The Board indicated that a full set of training data provided in the application would meet this requirement, although we expect that these requirements could be met with a more limited disclosure, if greater reliance is made on the common general knowledge of the skilled person. For example, a description of how to assemble a set of training data and how to train the AI based on the training data might suffice.

With deep neural networks, as used in the current AI models, several levels of disclosure can be considered. The architecture of the model itself should be disclosed, including at least one example model structure. This is usually not a problem, especially not if the used model is a variant of the published models. One might even include sample code. For example, a working version of the GPT-2 NLP only consists of several hundred lines of Python code, easily included in a patent application.

The disclosure of training data is the hardest part. The minimum disclosure might involve describing the dataset used, while a more comprehensive disclosure might involve releasing the complete training set or making it available, which companies might be reluctant to do due to the difficulty and expense of building a good training set. Disclosing the trained weights of your neural network, which allows for inference but not further training or adaptation of the neural network is an intermediary option. However, there is some doubt whether releasing model weights is sufficient disclosure of an invention because, while it allows one to run inference on the model, it's not possible to build new models on top of it. There is the additional practical difficulty of disclosing billions of parameters in a patent application.

Conclusion

This overview of computer-implemented inventions under the EPC in Europe, with specific attention to machine learning and AI, highlights several challenges. Not only is it difficult to patent core AI, but even when you do patent an AI application, sufficiency of disclosure also becomes a concern. Still, on the bright side, the COMVIK approach as further clarified in G1/19 is practical and predictable. While some of its predictions may not be optimal for the patentability of AI inventions, at least there is a large degree of certainty for patentees on how the EPO will consider the question of patentability.

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