Protecting Software Inventions in Europe:

entitled to represent you before the UPC right from the start

How the European Patent Office (EPO) examines Computer-Implemented Inventions

A practical guide to the EPO's examination practice provided by KLUNKER IP

We are living in an era of digital transformation, where innovation is accelerating at an unprecedented pace. Spearheaded by the ICT sector and computing, telecommunications, artificial intelligence, and 4IR technologies, this revolution is fundamentally altering our lives and the way businesses operate. At the heart of this transformation is software.

The task of legally safeguarding these digital inventions, however, presents unique challenges. Other than copyright protection, patents provide effective protection for software inventions.

Understanding this, **KLUNKER IP** has carefully compiled this report on the examination practice of the EPO for software inventions and CIIs, grounded in the EPO's examination guidelines.

Our goal is not only to provide insights into how the EPO navigates the software and AI/4IR patenting process but also to assist inventors, clients and in-house IPR counsels in drafting patent applications that are optimally prepared for a smooth and successful examination process at the EPO.

Top 10 takeaways for practitioners: download HERE

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If it must go fast, here are the essentials (marked in the report):

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I. Introduction

The digital revolution and the role of software

The world is amid a digital revolution enabled by the ubiquity of interconnected computers with internet access and smart mobile devices. It is driven by a wide range of computing technologies, including artificial intelligence and machine leaning (AI/ML), blockchain, internet of things (IoT), advanced robotics and automation, and other 4IR technologies. At the core of this technological transformations and as its underlying enabler is innovative software and software-driven processes and devices.

Patent protection for software inventions

The protection of software through intellectual property rights is vital for securing business models, maintaining a competitive edge and secure investments. While copyright only covers the original source code, patents protect the underlying inventive ideas and concepts themselves. That's why patents play a crucial role in protecting software inventions, even though the patentability of software and AI inventions often presents unique challenges to applicants and their representatives.

Over the years, the European Patent Office (EPO) and EPO's Board of Appeals have established a comprehensive examination scheme for software inventions, at the heart of which is the so called COMVIC approach established by landmark decisions T 641/00 and G 1/19. Nevertheless, navigating the EPO's software examination process can be tedious and complex, which is where **KLUNKER IP** steps in as one of the top European IP law firms in terms of software, AI, 4IR and beyond.

*Navigating the EPO examination process with the help of **KLUNKER IP***

This report is based on the EPO's *Examination Guidelines* and the *CII-Index*. It seeks to shed light on the EPO's practice and to enable applicants, in-house IPR counsels and our clients and colleagues to draft software and AI patent applications that are optimally prepared for successful patent prosecution at the EPO and to smoothly navigate around the EPO's unique pitfalls in the examination process.

Naturally, should you require further guidance or support, we at **KLUNKER IP** stand ready to assist you and make sure your journey through the intricacies of IP is seamless and rewarding.

II. Patentable inventions

Article 52 of the European Patent Convention (patentable inventions) reads:

(1) European patents shall be granted for any inventions, in all fields of technology, provided that they are new, involve an inventive step and are susceptible of industrial application.

(2) The following in particular shall not be regarded as inventions within the meaning of para 1:
- (a) discoveries, scientific theories and mathematical methods;
- (b) aesthetic creations;
- (c) schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers;
- (d) presentations of information.

(3) Para 2 shall exclude the patentability of the subject-matter or activities referred to therein only to the extent to which a European patent application or European patent relates to such subject-matter or activities as such.

II.1 Patentability requirements

While the European Patent Convention (EPC) doesn't specifically articulate the meaning of an "invention", Art. 52 (2) does highlight what are considered "non-inventions", that is, subject-matter which cannot be categorized as an invention in line with Art. 52 (1). This list features primarily abstract elements like discoveries or scientific theories, and non-technical components such as aesthetic creations or information presentations. An "invention" as per Art. 52 (1) should possess a technical character. It can be a part of any technological domain.

The four conditions for patent eligibility are:

(1) The presence of an "invention" that is part of any technological domain (see Sec. II.2);

(2) The "invention" should be "capable of industrial application";

(3) The "invention" needs to be "novel"; and

(4) The "invention" must encompass an "inventive step" (see Sec. IV).

A further requirement for an "invention", implicit to above condition (1), is its technical character (see Sec. II.2). In fact, this requirement is subject to intense scrutiny in cases of software inventions.

Additionally, according to Art. 83, an invention must be implementable for a person skilled in the art considering its disclosure (see Sec. V.3). Circumstances where the invention does not meet this requirement are specified Sec. V.3.2). An invention must also address a technical problem and must include technical features that allow the claim to define the matter for which protection is requested.

Technical progress, advantageous effect

The EPC does not explicitly or implicitly demand that an invention, for it to be patentable, should bring about some technical progress or even any beneficial effect. However, if an advantageous effect exists relative to the state of the art, it should be indicated in the description, since such an effect usually plays a crucial role in establishing "inventive step" (see Sec. V.3.2).

II.2 Examination practice

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Determining whether something is an invention as defined by Art. 52 (1) is an independent process, separate from assessing if it is capable of industrial application, novel, and involves an inventive step.

Nevertheless, patentability exclusions under Art. 52 (2) are relevant in evaluating both patent eligibility and the inventive step because patent protection is dedicated to inventions comprising a "technical teaching", defined as guidance provided to a skilled person on resolving a specific technical problem using technical means. This dual evaluation is known as the "two-hurdle approach" (G 1/19).

The first hurdle, often known as the patent eligibility hurdle, mandates that the claimed subject-matter in totality must not be categorized under the "non-inventions" as defined in Art. 52 (2) and (3). The prohibition of patentability of the subject-matters and activities stated in Art. 52 (2) is restrained by Art. 52 (3) to those subject-matters or activities claimed "as such". This restriction prevents a wide interpretation of non-inventions and suggests that one technical attribute is enough for patent eligibility: if the

claimed subject-matter is geared towards or employs technical means, it is an invention under Art. 52 (1). This evaluation is conducted without referring to the prior art.

The second hurdle is the assessment of inventive step. Alongside technical features, claims may also consist of non-technical features. In this scenario, "non-technical features" pertain to features that, when isolated, would be considered "non-inventions" under Art. 52 (2). The inventive step of claims that comprise a blend of technical and non-technical features is evaluated using the COMVIK approach (see Sec. IV.2 to IV.4).

essential

This method is a specific application of the problem-solution approach which necessitates determining the features of the invention that contribute to its technical character (i.e., contribute to the technical solution of a technical problem by providing a technical effect). A feature might support the existence of an inventive step if and to the degree that it contributes to the technical character of the invention. The contribution of any feature to the technical character of the invention must be assessed in the context of the entire invention.

III. Features related to non-inventions and technical contribution

The non-inventions listed in Art. 52 (2) will be sequentially addressed below, and additional examples will be provided to further elucidate the difference between what is patentable, in the sense of not being excluded from patentability under Art. 52 (2) and (3), and what is not.

III.1 Mathematical methods

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Mathematical methodologies play a crucial role in addressing technical issues across all technological sectors. Nonetheless, when claimed as such (Art. 52 (3)), they are barred from patentability under Art. 52 (2) (a).

This exclusion is applicable if a claim pertains to a purely abstract mathematical method, and the claim doesn't necessitate any technical means. For example, a process to perform a Fast Fourier Transform on **abstract data**, not specifying the use of any technical means, is a mathematical method as such. A purely

abstract mathematical object or concept, such as a specific type of geometric object or graph with nodes and edges, is not a method but is still not an invention as per Art. 52 (1) because it lacks a technical aspect.

If a claim is directed either towards a method that involves the use of technical means (like a computer) or to a device, its subject-matter as a whole possesses a technical character and hence is not barred from patentability under Art. 52 (2) and (3).

Simply indicating the technical character of the data or parameters of the mathematical method might not be enough alone to characterize an invention as per Art. 52 (1). Even if the resultant method wouldn't be seen as a purely abstract mathematical method as such in line with Art. 52 (2) (a) and (3), it might still be categorized under the excluded methods for performing mental acts as such if no use of technical means is implied (Art. 52 (2) (c) and (3); see Sec. III.5.1).

Once it's confirmed that the claimed subject-matter as a whole is not excluded from patentability under Art. 52 (2) and (3) and hence is an invention as per Art. 52 (1), it's examined concerning other patentability requirements, particularly novelty and inventive step (see Sec. II.2).

For the evaluation of the inventive step, all features that contribute to the technical aspect of the invention must be considered (see Sec. IV.2). When the claimed invention is based on a mathematical method, it's evaluated whether the mathematical method contributes to the technical aspect of the invention.

A mathematical method might contribute to the technical character of an invention, that is, contribute to producing a **technical effect** that serves a technical purpose, by its application to a technological field and/or by being tailored to a specific technical implementation (T 2330/13). The criteria for evaluating these two situations are detailed below.

Technical applications

When evaluating the contribution that a mathematical method brings to an invention's technical character, it's necessary to consider whether the method, in the context of the invention, generates a technical effect that serves a technical purpose.

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Examples of technical contributions from a mathematical method include:

- Managing a specific technical system or process, e.g. an X-ray device or a steel cooling process;
- From measurements, determining the necessary number of compaction machine passes to achieve a targeted material density;
- Digital enhancement or analysis of audio, image, or video, like noise reduction, person detection in a digital image, or assessing the quality of a transmitted digital audio signal;
- Separating sources in speech signals; speech recognition, like mapping a speech input to a text output;
- Encoding data for reliable and/or efficient transmission or storage (and corresponding decoding), like error-correction coding of data for transmission over a noisy channel, or compression of audio, image, video, or sensor data;
- Encrypting/decrypting or signing electronic communications; generating keys in an RSA cryptographic system;
- Optimizing load distribution in a computer network;
- Calculating the energy expenditure of a subject by processing data acquired from physiological sensors; deriving the body temperature of a subject from data obtained from an ear temperature detector;
- Providing a genotype estimate based on an analysis of DNA samples, as well as providing a confidence interval for this estimate to quantify its reliability;
- Providing a medical diagnosis by an automated system processing physiological measurements.

A **generic** purpose such as "controlling a technical system" is inadequate to attribute a technical character to the mathematical method. The technical purpose must be **specific**.

Moreover, the mere possibility that a mathematical method could serve a technical purpose is insufficient. The claim must be functionally **restricted** to the technical purpose, either explicitly or implicitly. This can be achieved by establishing a sufficient link between the technical purpose and the mathematical method steps, for instance, by detailing how the input and the output of the sequence of mathematical steps relate to the technical purpose so that the mathematical method is causally connected to a technical effect.

essential

Simply defining the type of data input to a mathematical method doesn't necessarily imply that the mathematical method contributes to the technical character of the invention (T 2035/11, T 1029/06, T 1161/04).

If steps of a mathematical method are used to derive or predict the physical state of an existing real object from measurements of physical properties, as in the case of indirect measurements, those steps make a technical contribution regardless of what use is made of the results.

Technical implementations

A mathematical method can also contribute to an invention's technical character independently of any technical application when the claim is oriented towards a **specific technical implementation** of the mathematical method, and the mathematical method is particularly **tailored** for that implementation, in the sense that its design is driven by technical considerations of the **internal operation** of the computer system or network (T 1358/09, G 1/19). This could occur if the mathematical method is designed to utilize specific technical properties of the technical system on which it is implemented to create a technical effect such as efficient use of computer storage capacity or network bandwidth. For example, adapting a polynomial reduction algorithm to exploit wordsize shifts that align with the word size of the computer hardware is based on such technical considerations and can contribute to producing the technical effect of an efficient hardware implementation of said algorithm. Another example is the assignment of data-intensive training steps of a machine-learning algorithm to a graphical processing unit (GPU) and preparatory steps to a standard central processing unit (CPU) to leverage the parallel architecture of the computing platform. The claim should target the implementation of the steps on the GPU and CPU for this mathematical method to contribute to the technical character.

Computational Efficiency

If the mathematical method does not serve a technical purpose, and the claimed technical implementation does not exceed a generic technical implementation, the mathematical method does not contribute to the technical character of the invention. In such a case, it is not enough for the mathematical method to be algorithmically more efficient than prior-art mathematical methods to establish a technical effect (see Sec. III.6).

essential

However, if it is determined that the mathematical method produces a technical effect due to its application to a field of technology and/or adaptation to a specific technical implementation, the computational efficiency of the steps impacting that established technical effect should be considered when assessing the inventive step. See Sec. III.6.4 for instances where an improvement in computational efficiency qualifies as a technical effect.

III.2 Artificial intelligence and machine learning

Artificial intelligence (AI) and machine learning (ML) are predicated on computational models and algorithms for tasks like classification, clustering, regression, and dimensionality reduction. These include neural networks, genetic algorithms, support vector machines, k-means, kernel regression, and discriminant analysis. These models and algorithms are fundamentally abstract and mathematical, regardless of whether they can be "trained" using training data. Therefore, the guidance under Sec. III.2 is generally applicable to these computational models and algorithms as well.

Terms such as "support vector machine", "reasoning engine", or "neural network" might merely refer to abstract models or algorithms depending on the context, and thus don't necessarily imply the use of a technical means on their own. This should be considered when examining whether the claimed subject-matter possesses an overall technical character (Art. 52 (1), (2), and (3)).

AI and ML are utilized in various technological fields. For instance, employing a neural network in a heart monitoring device for the purpose of detecting irregular heartbeats is technically contributive. Classifying digital images, videos, audio, or speech signals based on low-level features (such as edges or pixel attributes for images) are other typical technical applications of classification algorithms. Additional examples of technical applications for AI and ML can be found in the list under Sec. III.2.

However, text document classification solely in terms of their textual content is not considered a technical purpose in itself but rather a linguistic one (T 1358/09). Similarly, classifying abstract data records or "telecommunication network data records" without any indication of a technical use of the resulting classification is not a technical purpose per se, even if the classification algorithm may be considered to possess valuable mathematical properties like robustness (T 1784/06).

essential

When a classification method serves a technical purpose, the steps of creating the training set and training the classifier may also contribute to the technical character of the invention if they assist in achieving that technical purpose.

Pertinent AI case law

Since the EPO treats AI/ML inventions as a subcategory of mathematical methods (see Sec. III.1), the entire body of Appeal Board decisions on this subject is directly applicable to AI/ML as well. Relevant decisions on specific AI/ML technologies and applications are therefore few. However, the following decisions of the Boards of Appeal relate directly to AI/ML technologies and are therefore to be considered relevant:

In T 598/07 the invention concerned a heartbeat monitoring method, which was based on a **neural network** for the purpose of identifying irregular heartbeats. The board held that this made a technical contribution.

In T 1286/09 the invention related generally to the field of digital image processing and, in particular, to a method for improving image classification by training a **semantic classifier** with a set of exemplar colour images, which represented "recomposed versions" of an exemplar image, in order to increase the diversity of training exemplars. The board found that it involved an inventive step.

In T1510/10 the invention concerned ranking information, particularly live web applications, based on interest and/or importance. The board had to consider whether using **machine learning** algorithms could contribute to inventive step. The board highlighted that the claimed subject matter failed to define any particular method of machine learning – not even one was described in the application. Rather, machine learning was presented in the application as known. Thus, the Board decided that 'no inventive step can derive just from the use of machine learning. The Appeal was dismissed.

In T 1285/10 the invention related to a genetic analysis computing system with a method for diagnosing and recommending treatment for a physiological condition using artificial intelligence. The board held that it was common ground that use of **artificial intelligence** generally was already known. It was the use of hybridization information from an array of peptide nucleic acid probes, which was in question.

essential

The board did not come to a decision on inventive step, but observed that the claims were obvious in the light of the prior art.

In T 1784/06 the **automatic classifying** of abstract data records was held to be non-technical since the data records were classified for the non-technical purpose of billing. A valuable mathematical property of the algorithm could imply technical benefits but only when used for a technical purpose.

In T 755/18 the board held that if neither the output of a **machine-learning** computer program nor the output's accuracy contributed to a technical effect, an improvement of the machine achieved automatically through supervised learning to generate a more accurate output was not in itself a technical effect.

In J 8/20, J 9/20 the Legal Board confirmed that two applications in which an **artificial intelligence** system was designated as inventor in the application forms are to be refused. The Legal Board also refused the auxiliary request according to which no person had been identified as inventor but merely a natural person was indicated to have "the right to the European Patent by virtue of being the owner and creator of" the artificial intelligence system. The Legal Board held that under the EPC the inventor had to be a person with legal capacity.

III.3 Simulation, design or modelling

Claims aimed at methods of simulation, design, or modeling typically include features that fall under categories of mathematical methods or methods for mental acts. Therefore, the claimed subject-matter as a whole might fall under exclusions from patentability mentioned under Art. 52 (2) (a), (c) and (3) (see Sec. III.1 to III.3).

However, the methods considered in this section are at least partially computer-implemented, so the claimed subject-matter as a whole is not excluded from patentability.

Computer-implemented methods of simulation, design, or modeling are evaluated according to the same criteria as any other computer-implemented inventions (see Sec. IV.2 to IV.4 and G 1/19). For establishing a technical effect, it's not crucial whether the simulated system or process is technical or if the simulation reflects technical principles underlying the simulated system and how accurately it does so.

Simulations interacting with the external physical reality

Computer-implemented simulations that include features representing an interaction with an external physical reality at their input or output level might provide a technical effect related to this interaction. A computer-implemented simulation using measurements as input might be part of an indirect measurement method that calculates or predicts the physical state of an existing real object, thus making a technical contribution, regardless of the usage of the results.

Purely numerical simulations

A computer-implemented simulation without an input or output having a direct link with physical reality can still solve a technical problem. In such a "purely numerical" simulation, the underlying models and algorithms might contribute to the technical character of the invention by their adaptation to a **specific technical implementation** or by an intended technical use of the **data resulting from the simulation**.

Models and algorithms that do not contribute to the technical character of the invention form constraints that may be included in the formulation of the objective technical problem when following the COMVIK approach outlined in Sec. IV.2 to IV.4.

Specific technical implementation of a numerical simulation

The technical contribution that might be made by a model or algorithm due to their adaptation to the internal functioning of the computer system or network on which they are implemented is assessed in the same manner as adaptations of mathematical methods to specific technical implementations, see Sec. III.1 to III.3.

Intended technical use of the calculated numerical output data of a numerical simulation

Numerical computations that mimic the physical state or actions of a system or process that only exists as a model in a computer generally cannot enhance the technical aspect of an invention, even if they accurately portray the actual system or process.

Numerical computations might have a "**potential technical impact**", which refers to the technical outcome that will be realized when the data is utilized as per its intended technical use. This prospective technical impact can only be included in the evaluation of the inventive step if the intended technical use is either explicitly or implicitly stated in the claim.

If the data from a numerical simulation is **particularly adapted** for a planned technical use, for example, it is control data for a technical device, a potential technical impact of the data can be considered as "**inferred**" from the claim. The particular adaptation suggests that the claim does not include other non-technical uses because the planned technical use is then inherent in the claimed subject matter across significantly the entire range of the claim (Sec. III.6.3). Conversely, if the claim also includes non-technical uses of the simulation outcomes (like acquiring scientific knowledge about a technical or natural system), the potential technical impact is not realized across significantly the entire range of the claim, and therefore cannot be taken into account in the evaluation of the inventive step.

Accuracy

The extent to which a simulation adds to the technical character of the subject in question isn't contingent upon the fidelity of the underlying model or how closely the simulation mirrors the real world. However, the precision of a simulation could be a factor that influences an existing technical effect beyond simply executing the simulation on a computing device. A purported enhancement may not be realized if the simulation doesn't possess the necessary accuracy for its intended technical application. This could be factored in when defining the targeted technical issue (Art. 56) or when evaluating the adequacy of disclosure (Art. 83), see Sec. V.3. On the other hand, a method may still achieve a technical impact even if some simulation parameters lack precision but are adequate for the intended technical application.

Design processes

These principles hold true even when a computer-aided simulation is part of a claimed design procedure. If a computerized method simply leads to an abstract model of a product, system, or process (like a series of formulas), it is not perceived as producing a technical effect, regardless of the technicity of the product, system, or process being modeled (T 49/99, T 42/09). Take, for instance, a logical data model for a series of product configurations; it lacks inherent technical properties, and a method that

merely outlines the steps to create such a logical data model doesn't provide any technical benefits beyond its implementation on a computer. Similarly, a method that merely details how to depict a multiprocessor system in a graphical modeling environment doesn't contribute technically beyond its computer implementation. Sec. III.6.2 concerning information modeling as a cognitive endeavor is referred to for further clarification.

III.4 Aesthetic creations

Artistic creations often exhibit both technical and aesthetic aspects. For instance, a canvas or fabric represents a technical "substrate", while the depiction or pattern upon it, judged largely on a subjective level, represents the aesthetic aspect. As long as there are technical elements within such an artistic creation, it can't be purely classified as an aesthetic creation "as such", and therefore it isn't barred from patentability.

A component that may not, in isolation, demonstrate a technical facet could nonetheless possess a technical quality if it initiates a technical impact. An illustrative example can be seen in a tyre tread's pattern, which could actually serve as an additional technical characteristic of the tyre if it improves water dispersal. However, the opposite is true when the sidewall color of the tyre only fulfills an aesthetic function. The aesthetic influence, per se, isn't patentable, irrespective of whether it is part of a product or process claim.

For instance, aspects that solely pertain to the artistic or aesthetic effect of a book's content, its layout, or typeface, wouldn't be deemed as technical elements. Nor would the aesthetic influence of a painting's subject, color arrangement, or its artistic style, like Impressionism, be technical. That said, if an aesthetic impact is achieved by a technical structure or other technical methods, even if the aesthetic effect isn't technically oriented, the methods of achieving it could be. For example, an attractive appearance of a fabric achieved through a novel layered structure might make the fabric patentable.

Likewise, a book characterized by a technical aspect of binding or the pasting of the spine isn't barred from patentability under Art. 52(2) and (3), even if it has an aesthetic influence as well. Similarly, a painting defined by the type of canvas or the dyes or binders used isn't exempt either.

A technical procedure, despite its use in creating an aesthetic creation like a cut diamond, remains a technical procedure and isn't barred from patentability. The same applies to a printing technique for a book that results in a specific layout with an aesthetic effect, and the book as the product of that process isn't exempt either. Moreover, a substance or composition distinguished by technical elements used to create a unique effect concerning scent or taste, for instance, to retain a scent or taste for an extended duration or to enhance it, is also not exempt.

III.5 The exclusions under Art. 52 (2) (c) EPC

Art. 52 (2) (c) and (3) exclude *schemes, rules and methods for performing mental acts, playing games or doing business as such* from patentability. By definition, such subject-matter does not involve any technical aspects that my contribute to inventive step.

III.5.1 Schemes, rules and methods for performing mental acts

The non-patentability of schemes, rules, and methods for conducting mental tasks under Art. 52 (2) (c) pertains to guidance given to the human brain on how to carry out cognitive, intellectual or conceptual processes, such as language learning. This exclusion only comes into play when these schemes, rules, and methods are claimed as such (Art. 52 (3)).

A method claim that includes the purely mental realization of all method steps falls within the scope of methods for conducting mental acts as such (Art. 52 (2) (c) and (3)). This holds true even if the claim also includes technical embodiments or if the method originates from technical considerations (T 914/02, T 471/05, G 3/08).

A case in point is a claim that describes a method for designing an arrangement for inserting nuclear reactor fuel bundles into a reactor core to maximize the energy generated before needing to refuel the reactor. Even though this method is grounded in technical considerations related to the technical field of nuclear reactors, the subject-matter claimed is excluded from patentability as long as the claim doesn't rule out the possibility of all method steps being carried out mentally. This objection also applies when the simulation uses real-world values obtained by technical measurements, unless the claim

includes a step of conducting the technical measurement or a step of receiving the measured real-world values using technical means.

Generally, the complexity of a method doesn't remove its classification as a method for conducting mental tasks as such. If technical means, such as a computer, are essential for performing the method, they are included in the claim as an essential feature (Art. 84). See also Sec. III.1 to III.3 for matters related to algorithmic efficiency.

A method claim is not a method for conducting mental acts as such if it requires technical means (like a computer or a measuring device) to execute at least one of its steps, or if it yields a physical entity as the end product.

Once it is confirmed that the claimed method as a whole isn't excluded from patentability under Art. 52 (2) and (3), it is evaluated in terms of other patentability requirements, mainly novelty and inventive step (see Sec. II and IV).

When a claim that defines a method for conducting mental acts as such is restricted by specifying that the method is executed by a computer, not just the computer's use but also the steps the computer carries out may offer a technical contribution if they subsequently contribute to a technical effect. The existence of technical considerations alone, such as those related to the technical field of nuclear reactors in the given example, is not adequate in itself to recognize the presence of a technical effect (G 1/19).

A method that includes steps that involve the use of technical means can also specify steps meant to be mentally performed by the method's user. These mental steps contribute to the method's technical character only if they contribute to producing a technical effect serving a technical purpose within the context of the invention.

For instance, a method might outline steps leading to the selection of a product from a product family based on certain criteria, along with a step of manufacturing the selected product. If the selection steps are mentally performed, they only contribute to the method's technical character if a technical effect can be deduced from the features characterizing the selected sub-family of products over the broad family of suitable products (T 619/02). If the selection steps are based on purely aesthetic criteria, they result in a non-technical selection and hence don't contribute to the method's technical character. As

another example, in a method of attaching a driver to a Coriolis mass flowmeter, steps that detail how to select the driver's position to enhance the flowmeter's performance make a technical contribution to the extent that they stipulate that specific position (T 1063/05).

For additional context on simulation, design and modelling methods, see Sec. III.3. For methods pertaining to information modelling and computer programming activities, refer to Sec. III.6.2.

III.5.2 Schemes, rules and methods for playing games

Art. 52 (2) (c) and (3) exclude patentability of schemes, rules and methods for playing games if claimed as such. This applies to both traditional games, like board games or card games, and modern gaming forms, such as video games or gambling machines.

Game rules establish a conceptual framework which dictates how players act and how the game progresses based on player's decisions. These rules could involve game setup, player options during the game, and goals to mark progress. They are abstract and cognitive, only meaningful in the context of the game (T 336/07). For instance, a game rule might dictate that two randomly drawn numbers must match to win.

Modern games, especially video games, often include complex interactive and narrative elements within a virtual game world. These elements dictate how the game progresses interactively with the players. As these elements are conceptual, they broadly fall under the game rules category as per Art. 52 (2) (c) (T 12/08).

If technical means to implement the game rules are specified, the claim has a technical character. This could include a computer calculating a pseudo-random sequence or mechanical tools like dice to ensure random numbers match. This would be enough to avoid objection under Art. 52 (2) (c) and (3).

The problem-solution approach for mixed-type inventions is used to examine inventive step in a claim that comprises game rules and technical features (see Sec. IV.2 to IV.4). Inventive steps cannot be solely established by game rules or their automation. Instead, they need to be based on further technical effects of the game's technical implementation. For example, a game of chance implemented on a

network scrambles results prior to transmission to players, which makes a technical contribution as it secures data transmission (analogous to encryption). This, however, has no impact on the actual playing of the game. On the other hand, limiting the complexity of a game to reduce the memory, network, or computational resources does not address a technical constraint with a technical solution (see Sec. IV.3).

An implementation's inventive step is evaluated from the perspective of the skilled person - usually an engineer or game programmer - tasked with implementing the game rules. Merely paraphrasing non-technical game elements or abstracting them using superficially technical terms doesn't affect the inventive step. Game rules often aim to entertain and engage players through psychological effects like amusement, suspense, or surprise. These effects aren't considered technical. Similarly, rules and computations that determine game scores or player skill ratings, even if complex, are usually deemed non-technical.

Video games often involve technical means for sensing user input, updating the game state, and presenting visual, audio, or haptic information. Non-technical information, such as game score, the arrangement of playing cards, or game character attributes, is deemed non-technical. An example of a technical context in which the manner of presenting information can make a technical contribution is the interactive control of real-time manoeuvres in a game world, the display of which is subject to conflicting technical requirements (T 928/03).

A game world state may also progress based on numerical data and equations that model physical or pseudo-physical behavior. The calculation of game state updates constitutes a computer-implemented simulation based on these models (G 1/19). For the purpose of assessing inventive step in this context, the models are to be understood as defining a given constraint for a corresponding implementation on a computer (see Sec. IV.2 to IV.4). A specific simulation implementation, if adapted to the computer system's internal functioning, produces a technical effect. For instance, merely predicting the virtual trajectory of a billiard ball shot by the player fails to solve a technical problem. In contrast, adjusting the step sizes used in the distributed simulation of bullets fired in a multi-player online game based on current network latencies produces a technical effect.

User input features generally make a technical contribution (see Sec. III.7). However, a parameter mapping from known input mechanisms to a computer game is considered a game rule if it reflects the game designer's choice for defining the game or making it more interesting or challenging.

III.5.3 Schemes, rules and methods for doing business

Subject-matter or activities of financial, commercial, administrative, or organisational essence are encompassed under business methods as per Art. 52 (2) (c) and (3), hence, they're generally not patentable. As we delve further into this section, these activities and subject matters will be collectively referred to as "business method".

Banking, billing or accounting are typically financial activities. Aspects of a commercial or administrative nature include marketing, advertising, licensing, rights management, contractual agreements, and activities involving legal considerations. Organisational rules can be seen in personnel management, the creation of workflows for business processes, or location-based target user communication. Other business-related activities involve operational research, planning, business environment forecasting and optimization, including logistics and task scheduling. These activities revolve around information collection, goal-setting, and applying mathematical and statistical methods for data analysis, aiding in managerial decision-making.

If the claim incorporates technical means such as computers, computer networks or other programmable devices to execute some business method steps, it surpasses the exclusions mentioned under Art. 52 (2) (c) and (3).

However, the mere potential for technical means isn't enough to avoid exclusion, even when a technical embodiment is disclosed (T 388/04, T 306/04, T 619/02). Words like "system" or "means" require detailed scrutiny, as "system" might refer to a financial organization and "means" to organizational units if the context doesn't clearly point towards technical entities (T 154/04).

Once it's confirmed that the claim as a whole isn't excluded from patentability under Art. 52(2) and (3), it undergoes novelty and inventive step examination (see Sec. II). The inventive step examination involves assessing features that contribute to the technical character of the invention (see Sec. IV.2 to IV.4).

When a claim specifies a technical implementation of a business method, the features that contribute to the claim's technical character are generally limited to those that specify the exact technical implementation.

Features resulting from technical implementation choices, rather than being part of the business method, add to the technical character and must be duly considered. For instance, a claim could outline a computerized networked system enabling customers to access audio-visual content about selected products through computers at every company sales outlet, all linked to a central server with a database storing the electronic files of the audio-visual content. The distribution of the electronic files could be technically executed either by directly downloading individual files from the central database upon customer request, or by transferring several selected electronic files to each sales outlet, storing these files in a local database, and retrieving the requested file when a customer asks for the audio-visual content at the sales outlet. Choosing one of these two implementations would typically be the job of a technically skilled individual, such as a software engineer, while deciding that the set of audio-visual content offered is different for each sales outlet would typically be a business klun
's responsibility. Features of the claim specifying either of these technical implementations add to the technical character of the invention, but features specifying the business method do not.

In claims directed to a technical implementation of a business method, alterations to the underlying business method intended to dodge a technical problem, rather than solve it using inherently technical means, aren't regarded as making a technical contribution over the prior art. In the context of business method automation, effects inherently tied to the business method aren't considered technical effects (see Sec. IV.1.2).

For instance, an automated accounting method that avoids duplicate bookkeeping might be seen to require less computer resources regarding computer workload and storage requirements. But if these advantages stem from a reduction in the operations to be performed and data to be examined due to the business specifications of the accounting method, they are inherent to the business method and thus aren't recognized as technical effects.

A further example is an electronic auction performed by successively lowering the price until it's secured by a remote participant who first sends a message. Owing to potential transmission delays causing messages to arrive out of sequence, each message includes timestamp information. Modifying auction rules to eliminate the need for timestamps equates to avoiding the technical problem of transmission delays rather than technically solving it (T 258/03). Similarly, in an electronic financial transaction method with credit cards at a point of sale, the decision to omit the buyer's name or address for transaction authorization may result in time savings and decreased data traffic. However, this is not a technical solution to

the technical issue of communication lines' bandwidth bottleneck and server computers' limited capacity. Instead, it's an administrative measure that doesn't enhance the technical character of the claimed subject-matter.

The simple fact that a business method's input is real-world data doesn't ensure the business method adds to the technical character of the claimed subject-matter, even if the data is related to physical parameters like geographic distances between sales outlets (T 154/04, T 1147/05, T 1029/06); see Sec. III.1 to III.3.

In a computer-implemented method that assists managerial decision-making, automatically choosing the most cost-effective business plan from a set, which also meets specific technical constraints (e.g., to achieve a targeted reduction in environmental impact), doesn't offer a technical contribution beyond the computer-implementation.

The mere potential to serve a technical purpose doesn't suffice for a method to contribute to the invention's technical character. For example, a claim to a "method of resource allocation in an industrial process" may include pure business processes and financial, administrative, or management services, without limiting the method to any specific technical process due to the term "industry's" broad interpretation.

Although the outcome of a business method might be beneficial, practical, or marketable, that doesn't equate to a technical effect.

Business method features, such as administrative features, can appear in various contexts. For instance, a medical support system may be designed to provide information to a clinician based on data gathered from patient sensors, and only resort to data provided by the patient if sensor data isn't available. The prioritization of sensor data over patient-provided data is an administrative rule. The establishment of this rule falls within an administrator's realm, such as a clinic head, rather than an engineer's. As an administrative rule without a technical effect, it doesn't add to the technical character of the claimed subject-matter. It can be used as a constraint in formulating the objective technical problem when assessing the inventive step (see Sec. IV.2 to IV.4). For further examples of applying the problem-solution approach in assessing the inventive step for subject-matter containing business-method features, refer to Sec. IV.4.1 to IV.4.3.

III.6 Programs for computers

According to Art. 52 (2) (c) and (3), computer programs are exempt from patentability when claimed as such. However, computer programs that possess a **technical character**, adhering to the criteria specified under Art. 52 (2) and (3) (see Sec. II.2), are not excluded.

A computer program must induce a "**further technical effect**" when executed on a computer to qualify as having a technical character, thus rendering it not excluded from patentability. This "further technical effect" is a technical effect that exceeds the "typical" physical interplay between the program (software) and the computer (hardware) it operates on. The standard physical effects arising from a program's execution, such as electrical current flow within the computer, do not endow a computer program with a technical character in themselves (T 1173/97 and G 3/08).

Further technical effects that lend a computer program a technical character may include the regulation of a technical process or the internal functionality of the computer itself or its interfaces (see Sec. III.6.1).

The identification of a further technical effect is carried out independently of any prior art. Thus, the simple fact that a computer program serving a non-technical purpose demands less computing time than a previous program serving the same non-technical purpose doesn't alone confirm the presence of a further technical effect (T 1370/11). Equally, it's not appropriate to compare a computer program to a human executing the same task to determine if the computer program possesses a technical character (T 1358/09).

Once a computer program's further technical effect has been confirmed, the algorithm's computational efficiency influencing the confirmed technical effect contributes to the invention's technical character and thus to the inventive step (for instance, where the algorithm's design is inspired by technical considerations of the computer's internal functioning; see Sec. III.1 to III.3).

A computer program cannot attain a technical character merely because it's designed to be automatically executed by a computer. "Further technical considerations", generally connected to the internal functioning of the computer, that surpass simply identifying a computer algorithm to perform a task, are required. These must be reflected in claimed features that generate a further technical effect (G 3/08).

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essential

If a claim pertains to a computer program devoid of a technical character, it's contested under Art. 52 (2) (c) and (3). If it passes the technical character test, the examiner advances to questions of novelty and inventive step (see Sec. IV, especially Sec. IV.2 to IV.4).

Computer-implemented inventions

The term "computer-implemented invention" is intended to include claims that involve computers, computer networks, or other programmable devices wherein a feature is realized through a computer program. Claims related to computer-implemented inventions can take the forms outlined in Sec. V.2.

A computer program and a corresponding computer-implemented method are distinct entities. The former refers to a series of computer-executable instructions detailing a method, while the latter pertains to a method actually executed on a computer.

Claims focused on a computer-implemented method, a computer-readable storage medium, or a device cannot be challenged under Art. 52(2) and (3). Any method involving technical means (such as a computer) and any technical means itself (like a computer or a computer-readable storage medium) possess a technical character, thus constituting inventions under Art. 52(1) (T 258/03, T 424/03, G 3/08).

III.6.1 Examples of further technical effects

Should a method demonstrate technical character beyond simple computer implementation, the computer program outlining this method brings about an additional technical effect when run on a computer. Examples include a computer program dictating the control of an automobile's anti-lock braking system, calculating emissions via an X-ray device, compressing video data, restoring a distorted digital image, or encrypting digital communications, all of which lead to further technical effects when executed on a computer (see Sec. III.1 to III.3).

Moreover, if a computer program is crafted considering specific technical aspects related to the internal workings of the computer it will be running on—like being designed for the computer's particular architecture—it may be deemed to generate an additional technical effect. Computer programs establishing

security protocols to safeguard boot integrity or counteract power analysis attacks are technically significant because they rely on a technical comprehension of the computer's internal functionality.

Likewise, computer programs that manage a computer's internal operations such as processor load balancing or memory allocation typically generate an additional technical effect (see Sec. IV.4.3 for an example where control is based on a non-technical scheme). Programs that process code at a low level, such as builders or compilers, can be technically significant. For instance, when creating runtime objects from development objects, only regenerating those runtime objects that resulted from modified development objects assists in producing the further technical effect of reducing the resources required for a specific build.

III.6.2 Information modelling, activity of programming and programming languages

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Information modelling is a conceptual activity lacking technical properties, usually conducted by a systems analyst during the initial stages of software development to formalize a description of a real-world system or process. Consequently, details about a modelling language, the structure of an information modelling process (e.g. employing a template) or model maintenance likewise lack technical properties (T 354/07). Analogously, inherent properties of information models, like reusability, platform independence, or documentation convenience, are not considered as technical effects (T 1171/06).

However, if an information model is deliberately used within the invention's context to solve a distinct technical problem by providing a technical effect, it can add to the invention's technical properties (see also Sec. III.3 and III.5.1). Features defining how the model is stored (for instance, employing relational database technology) can also contribute technically.

Conceptual methods outlining the process of software development (meta-methods) usually lack technical properties. For example, a computer-implemented method for creating program code task, a feature that specifies the conversion of a platform-independent model to a platform-dependent model, from which the program code suitable for the target platform is derived, doesn't provide a technical contribution, as long as the execution of the control task itself remains unaffected.

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Writing code, which is essentially the **act of programming**, is deemed an intellectual, non-technical activity, unless it's used within a concrete application or environment to causally contribute to the production of a technical effect (G 3/08, T 1539/09).

For instance, reading a data type parameter from a file as an input to a computer program, rather than defining the data type in the program itself, is simply a programming choice when writing code, and it has no technical character per se. This extends to naming conventions for object names that are meant to ease understanding and management of program code.

Defining and providing a **programming language** or a programming paradigm like object-oriented programming doesn't inherently solve a technical problem, even if its unique syntax and semantics enable the programmer to create a program more efficiently. Reducing the intellectual effort of the programmer isn't regarded as a technical effect.

While evaluating an invention related to a **programming environment**, the elements linked to the programming language usually do not contribute to its technical character. For example, in a visual programming environment, the provision of specific graphical building blocks is part of the programming language and makes no technical contribution if the sole effect is reducing the intellectual effort of the programmer. The provision of specific programming constructs may allow a programmer to write shorter programs, but that doesn't qualify as a technical effect since any resultant reduction in program length ultimately depends on how the programming constructs are used by a human programmer. In contrast, automatically processing machine code by separating it into an instruction chain and an operand chain, and replacing repeating instruction sets with macro-instructions to generate optimized code with reduced memory size, is a technical contribution. In this instance, the effect doesn't depend on how a human programmer utilizes the macro-instructions.

Characteristics of a programming environment that are tied to its graphical user interface, such as visualizations and data input mechanisms, are to be evaluated as indicated under Sec. III.7.

III.6.3 Data retrieval, formats and structures

A computer-implemented data structure or data format, whether embodied on a medium or as an electromagnetic carrier wave, inherently possesses technical character and thus is an invention within the scope of Art. 52 (1).

A data structure or format contributes to the technical character of the invention if it has a designated technical use and induces a technical effect when employed in line with this intended technical use. Such a potential technical effect, tied to an inferred technical use, must be considered in evaluating the inventive step (G 1/19). This might occur if the data structure or format is functional data, meaning it has a technical function within a technical system, such as controlling the operation of the device that processes the data. Functional data intrinsically consist of, or map to, the corresponding technical features of the device (T 1194/97). Cognitive data, in contrast, are data whose content and meaning are only relevant to human users and do not contribute to a technical effect (see however, Sec. III.7 for presentation of information to a user in an ongoing and/or guided human-machine interaction process).

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For example, a record carrier used in a picture retrieval system stores encoded pictures alongside a data structure defined in terms of line numbers and addresses, which instructs the system on how to decode and access the picture from the record carrier. This data structure is defined in terms that inherently consist of the technical features of the picture retrieval system, namely the record carrier and a reading device for retrieving pictures from it. Hence, it contributes to the technical character of the record carrier, while the cognitive content of the stored pictures (such as a portrait of an individual or

Likewise, an index structure utilized for searching a record in a database creates a technical effect since it governs how the computer performs the search operation (T 1351/04).

An additional instance is an electronic message with a header and content section. Information in the header consists of instructions that are automatically recognized and processed by the receiving message system. This processing subsequently determines how the content elements are to be assembled and presented to the ultimate recipient. The inclusion of such instructions in the header contributes to the technical character of the electronic message, while the information in the content section, representing cognitive data, does not (T 858/02).

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A data structure or a data format may possess features that may not be characterized as cognitive data (i.e., not for conveying information to a user) but that nevertheless do not make a technical contribution. For instance, the structure of a computer program may merely aim to facilitate the task of the programmer, which is not a technical effect serving a technical purpose. Furthermore, data models and other information models at an abstract logical level have no technical character per se (see Sec. III.6.3).

Digital data is used to control devices in additive manufacturing (AM), which is a general term for technologies that manufacture physical objects by successive addition of material based on a digital depiction of the object's geometry. If the data defines the instructions for operating the AM device, it makes a technical contribution as demonstrated in the following example:

Case Study: Computer-readable medium storing control information to fabricate a product

A computer-readable medium storing data which defines both a digital representation of the product of claim 1 and operating instructions adapted to control an AM device to fabricate the product using the digital representation of the product when said data is conveyed to the AM device.

A computer-readable medium is a technical object, thus no objection arises under Art. 52 (2) and (3). Given that the data comprises both a digital description of the product and operating instructions to control an AM device, it is intended to be used to control an AM device to fabricate the product. This technical use of the data is implied across the entire scope of the claim. Interpreting the present claim to encompass a non-technical use of merely visualizing the data would be unreasonable. The technical effect of fabricating the product defined in claim 1, for which the data is used as intended, is thus a potential technical effect to be considered when assessing inventive step. The digital representation of the product makes a technical contribution in that it defines technical features of the fabricated product.

Nonetheless, if such a technical use of the data was not implied by the claim, the potential technical effect of the data in fabricating the physical product could not be considered when assessing inventive step, as it would not be implied across nearly the entire scope of the claim. This would be the case if the data defined only a digital description or 3D model of the product that is not adapted to additive manufacturing of the product and could be used to merely visualize the product in a CAD software tool. Abstract descriptions or models are not considered technical, even if the described entities are technical (see Sec. III.3). In such a case, the stored non-technical data would not make a technical contribution.

III.6.4 Database management systems and information retrieval

Database management systems (DBMS) are engineered solutions housed within computers, tasked with the technical responsibilities of storage and retrieval of data. They utilize an array of data structures for the effective governance of data. Any method that is enacted within a DBMS, hence, engages technical means and, as a result, isn't deemed ineligible for patentability in line with Art. 52 (2) and Art. 52 (3).

The inherent workings of a DBMS are typically delineated by technical attributes. These attributes are integral to the invention's technical character and are consequently factored into the evaluation of its inventive step. To illustrate, the enhancement of system throughput and the hastening of query response times through the automatic management of data across a variety of data stores, each bearing distinct technical characteristics such as varying levels of consistency or performance, are outcomes of technical deliberation (T 1924/17, T 697/17).

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DBMS operate structured queries which present an exact and formal description of the data that is to be fetched. The refinement of the execution process of these structured queries, with respect to the computational resources required (CPU, primary memory, or hard disk, for example), augments the technical character of the invention. This is because it embodies technical considerations towards the efficient utilization of the computer system.

However, it is critical to note that not every feature incorporated into a DBMS automatically contributes technically. For instance, a DBMS feature that calculates costs related to system usage by different users might not necessarily render a technical contribution.

Data structures such as an index, hash table, or query tree, employed in DBMS to ease data accessibility or execute structured queries, play a role in enhancing the technical character of the invention. These data structures functionally govern the operation of the DBMS to undertake aforementioned technical tasks. On the other hand, data structures that are defined solely by their capacity to store cognitive information are deemed to offer no contribution to the technical character of the invention beyond the simple storage of data (see Sec. III.6.3).

There is a demarcation between the execution of structured queries by a DBMS and the process of information retrieval. The latter encompasses the search for information within a document, the search for

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the documents themselves, and the search for metadata that describes data, for example, texts, images, or sounds. The query may be expressed by the user seeking information, typically informally in natural language without any specific format: the user might input search terms as a query in web search engines to locate pertinent documents or provide a sample document to find similar documents. If the method to estimate relevance or similarity relies exclusively on non-technical factors, such as the cognitive content of the items to be fetched, purely linguistic rules or other subjective criteria (e.g. items deemed relevant by friends in social networks), it does not make a technical contribution.

The process of converting linguistic considerations into a mathematical model with the goal of enabling automatic linguistic analysis by a computer can be perceived as involving, at least implicitly, technical considerations. However, this alone does not guarantee the technical character of the mathematical model. Additional technical considerations concerning the internal functioning of the computer system are required.

For instance, a mathematical model that calculates the probability of semantic similarity between given terms by analyzing the frequency of their co-occurrence in a set of documents does not inherently contribute technically. This is because it's grounded in considerations of a purely linguistic nature (i.e. based on the presumption that related terms are more likely to occur together in the same documents than unrelated terms). The search results obtained through this similarity calculation method would differ from prior art that uses a different mathematical model only in terms of the different cognitive content retrieved. This is a non-technical distinction and does not qualify as a technical effect. In this context of retrieval based on similarity of meaning of terms, the concept of "better search" is subjective (T 598/14). In contrast, optimising the execution time of structured queries in a database management system as discussed above is a technical effect. See also Sec. III.2 for artificial intelligence and machine learning algorithms.

III.7 Presentation of information

Under Art. 52 (2) (d), the transmission of data or information to a recipient refers to both the cognitive substance of the shared information and the approach of its presentation (T 1143/06, T 1741/08). This concept doesn't merely pertain to visual data, it also pertains to other methods of communication, such

as auditory or tactile. However, it does not encompass the technical apparatus utilized to produce such informational presentations.

Moreover, the task of imparting information to a user should be separated from technical data illustrations intended for a technological system, which will process, store, or disseminate that data. Characteristics of data encryption systems, data structures, and digital communication protocols that display functional data, as opposed to cognitive data, aren't considered presentations of information within the context of Art. 52 (2) (d) (T 1194/97).

While evaluating exclusion from patent eligibility under Art. 52(2) and (3), the subject matter claimed must be scrutinized as a collective entity (see Sec. II.2). For instance, a claim that stipulates or implies the use of any technical apparatus for information presentation (such as a computer screen) has an inherent technical aspect and thus is not excluded from patent eligibility. Similarly, a claim outlining a kit featuring a product (such as a bleaching composition) and supplemental characteristics like instructions for use or reference data for evaluating the results acquired, even if these additional features don't technically affect the product, isn't excluded, as the claim contains a technical element: a product with a composition of matter.

When it is confirmed that the claimed subject matter, taken as a whole, is not excluded from patent eligibility under Art. 52 (2) and (3), it undergoes examination with respect to other patent eligibility requirements, particularly novelty and inventive step (see Sec. II.1).

During the inventive step examination, features associated with the presentation of information are evaluated to ascertain whether they contribute to achieving a technical effect that serves a technical purpose in the context of the invention. If they do not, they make no technical contribution and cannot substantiate the existence of an inventive step (see Sec. IV.2 to IV.4). The determination of whether a technical effect is achieved involves examining the context of the invention, the task performed by the user, and the actual purpose served by the specific presentation of information.

A feature that defines an information presentation produces a technical effect if it demonstrably aids the user in executing a technical task through sustained and/or directed human-machine interaction (T 336/14 and T 1802/13). Such a technical effect is deemed credibly realized if the assistance provided to the user in executing the technical task is objectively, reliably, and causally connected to the feature.

This would not be the case if the supposed effect is reliant on the user's personal interests or preferences. For instance, some users may find it easier to comprehend data presented as numerical values, while others may prefer a color-coded display. The choice between these two presentation methods is thus not considered to have a technical effect (T 1567/05). Similarly, whether it is easier to comprehend audio information presented as a musical scale rather than spoken words is a matter that only pertains to the cognitive abilities of the user. As another example, allowing the user to set parameters that determine the information to be displayed or to select the method of its presentation does not provide a technical contribution if it merely caters to subjective user preferences.

Evaluating if a specific presentation of information credibly assists the user in executing a technical task can be complex. The process might be streamlined during the inventive step assessment by contrasting the invention with existing knowledge, thereby focusing the analysis on distinguishing features (see Sections IV.2 to IV.4). The comparison might suggest that the potential support for executing the technical task is already present in existing knowledge, implying that the differentiating features do not provide a technical contribution (for instance, they only relate to non-technical subjective user preferences).

A feature related to the presentation of information might generally specify:

(1) The cognitive content of the presented information, i.e., identifying "what" is presented; or
(2) The method in which the information is presented, i.e., identifying "how" the information is presented.

This categorization has been adopted to permit a more granular discussion on technical effects in the rest of this section. It's worth noting that these categories are not meant to be comprehensive. Also, a feature might fall into both categories. As an example, a step of "displaying a customer's surname in uppercase letters" in a claimed process defines both the intellectual content of the presented information (the customer's surname) and the method of its presentation (in uppercase letters). This feature might be considered to include two features: the displayed text is the customer's surname (falling into the first category) and the displayed text is presented in uppercase letters (falling into the second category). The method of presentation might additionally communicate intellectual information. For instance, the capitalized part of a name might, conventionally, indicate which part is the surname.

(1) What (which information) is presented?

If the intellectual content of the information shown to the user pertains to a prevailing internal state in a technical system and allows the user to correctly operate this technical system, it has a technical effect. An internal state prevailing in a technical system is an operating mode, a technical condition, or an event related to the system's internal functioning that can dynamically change and be automatically detected. Its display typically prompts the user to interact with the system, possibly to prevent technical malfunctions (T 528/07).

Information that is static or predetermined about technical properties or potential states of a machine, specifications of a device or operating instructions, does not constitute an internal state prevailing in the device. If the display of static or predetermined information merely assists the user with non-technical tasks preceding the technical task, it does not provide a technical contribution. For example, the effect that the user is not required to know or memorise a sequence of buttons to be operated prior to configuring a device is not a technical effect.

Non-technical information such as the status of a casino game, a business process or an abstract simulation model is intended exclusively for the user's subjective evaluation or non-technical decision-making. It is not directly connected to a technical task. Hence, such information does not qualify as an internal state prevailing in a technical system.

(2) How is the information presented?

A feature in this category typically specifies the format or arrangement in which, or the timing at which, information is communicated to the user (e.g., on a screen). An example might be a diagram designed solely to communicate information. Specific technical features related to, for example, the method in which audio signals or images are created are not regarded as a way in which information is presented.

Features defining a visualisation of information in a particular diagram or layout are generally not considered to provide a technical contribution, even if the diagram or layout arguably communicates information in a way which a viewer might intuitively regard as especially appealing, clear or logical.

For instance, managing limited available screen space is part of designing information presentations for human viewing and therefore not an indication of technicality per se. The broad concept of providing an overview of multiple images in a limited display area by displaying a single image and sequentially replacing it with other images is not based on technical considerations, but is a matter of layout design. Similarly, arranging objects within available screen space by eliminating "white space" between window panes follows the same layout principles as would apply to the layout of a magazine cover and does not involve technical considerations.

On the contrary, if the method of presentation credibly assists the user in executing a technical task through a continuous and/or guided human-machine interaction process, it creates a technical effect (T 1143/06, T 1741/08, T 1802/13). For example, displaying multiple images side by side in low resolution and allowing selection and display of an image at higher resolution communicates information to the user in the form of a technical tool that enables the user to perform the technical task of interactively searching and retrieving stored images more efficiently. Storing digital images at different resolutions results in the technical effect of allowing the simultaneous overview display of multiple images (T 643/00). As another example, in a video soccer game, the specific method of communicating to the user the location of the nearest teammate by dynamically displaying a guide mark on the edge of the screen when the teammate is off-screen creates the technical effect of facilitating a continuous human-machine interaction by resolving conflicting technical requirements: displaying an enlarged portion of an image and maintaining an overview of a zone of interest which is larger than the display area (T 928/03). As a further example, in the context of a visual aid for a surgeon, if, during surgery, the current orientation of a medical ball joint implant is displayed in a manner which credibly assists the surgeon to correct the position of the implant in a more precise manner, this is considered to provide a technical effect.

Effects based on human physiology

When a method of presenting information creates in the user's mind an effect which does not depend on psychological or other subjective factors but on physical parameters which are based on human physiology and can be precisely defined, that effect may qualify as a technical effect. The method of presenting information then provides a technical contribution to the extent that it contributes to this technical effect. For example, displaying a notification on one of multiple computer screens near the user's current visual focus of attention has the technical effect that it is more or less guaranteed to be seen immediately (compared e.g. with an arbitrary placement on one of the screens). Conversely, the decision

to show only urgent notifications (compared e.g. to all notifications) is based only on psychological factors and thus does not provide a technical contribution. Minimising information overload and distraction is not considered to qualify per se as a technical effect (T 862/10). As another example, displaying a stream of images in which the parameters for delay and change in the content between successive images are computed based on physical properties of human visual perception to achieve a smooth transition is considered to make a technical contribution (T 509/07).

If information (e.g., a visual or audio stimulus) is shown to a person with the aim of producing in that person a physiological reaction (e.g., involuntary eye gaze) which can be measured in the context of evaluating a medical condition (e.g., eyesight, hearing impairment or brain damage), that presentation of information may be considered to produce a technical effect.

Effects based on mental activities of the user

When the claimed subject matter includes a feature of presenting information to a user, whether it falls into category (1) or (2), user evaluation is involved. Although such an evaluation per se is a mental act (Art. 52 (2) (c)), the mere involvement of mental activities does not necessarily classify subject matter as non-technical. For instance, in T 643/00 discussed earlier, the user makes an evaluation based on an overview of low-resolution images in order to locate and objectively identify a desired image. This mental evaluation may be considered as an intermediate step directing the image search and retrieval process and thus forms an integral part of a solution to a technical problem. Such a solution does not rely on making human tasks such as understanding, learning, reading or memorising easier, nor on influencing the user's decision as to which image to search for. It provides a mechanism for inputting a selection which would not be possible if the images were not displayed in that specific arrangement.

Conversely, if the choice or layout of information shown is solely aimed at the human mind, particularly to aid the user in making a non-technical decision (e.g., which product to buy based on a diagram showing properties of products), no technical contribution is made.

III.8 User interfaces

User interfaces, especially graphical user interfaces (GUIs), contain features that display information and collect user responses during human-computer interaction. Generally, elements that define user input are more likely to be technical, as opposed to those that only relate to data output and display, because input needs to adhere to a machine's specific protocol, while output is often driven by a user's personal preferences. Graphic design aspects of a menu (like its aesthetic appeal) that are influenced by aesthetic judgments, user biases, or administrative guidelines, don't add to the technical character of a menu-based user interface. This section primarily evaluates features concerning user input, with aspects related to data output being discussed in Section III.6.3.

Features that establish a mechanism for user input, such as typing text or selecting an option are generally regarded as contributing technically. For instance, a GUI that offers a graphical way to quickly adjust processing conditions, like initiating a print job and determining the number of copies to print by dragging a document icon onto a printer icon, is considered a technical contribution. However, if the feature merely helps users decide what to input, it's not considered to contribute technically (T 1741/08).

Assisting a user in typing into a computer system by introducing a predictive text function is seen as a technical operation. Nevertheless, producing word options for this predictive text function is inherently non-technical. The linguistic model used to solve this non-technical problem doesn't inherently contribute technically. However, if technical considerations are needed to implement the linguistic model on a computer, like those related to the computer's inner functioning, a technical effect might be produced.

When effects like simplifying user actions or offering more convenient user input rely solely on subjective user capabilities or preferences, these effects may not be considered a valid technical problem. For instance, reducing the number of interactions needed for the same input is not credibly achieved if it only applies to certain usage patterns based on the user's expertise level or personal preferences.

Input methods such as gestures or keystrokes that merely mirror subjective user preferences, conventions, or game rules and don't objectively provide a physical ergonomic advantage are not considered to contribute technically. However, improvements to input detection that enhance performance, such as enabling quicker or more precise gesture recognition or reducing the device's processing burden during recognition, are seen as making a technical contribution.

IV. Assessment of inventive step

The **problem-solution approach** is a systematic method employed by the EPO for assessing whether a novel invention involves an inventive step. This approach plays a fundamental role in EPO's patent examination process as it forms the core basis for determining if an invention establishes inventiveness. While the general problem-solution approach is briefly described in Sec. IV.1, Sec. IV.II and IV.3 address the **COMVIC approach** as an extension of the problem-solution approach for so called mixed-type claims, i.e. claims comprising technical and non-technical features. Finally, Sec. IV.4 gives five practical examples of applying the COMVIC approach to mixed-type software inventions.

The COMVIC decision T 641/00 of September 26, 2002 by Technical Appeal Board 3.5.01 is one of the most frequently cited landmark decisions in European patent case law. European patent jurisprudence. **KLUNKER IP** was involved in the two-sided proceedings as opponent against the European patent EP 0 579 655 of the Swedish proprietor COMVIK GSM AB and helped to shape the new examination practice for software inventions that has been in force since then.

IV.1 Problem-solution approach

In order to assess inventive step in an objective and predictable manner, the so-called "**problem-solution approach**" is applied.

In the problem-solution approach, there are three main steps:

(A) determining the "closest prior art",

(B) establishing the "objective technical problem" to be solved, and

(C) considering whether or not the claimed invention, starting from the closest prior art and the objective technical problem, would have been obvious to the skilled person.

IV.1.1 Determination of the closest prior art

The closest prior art is defined as a singular reference that embodies a combination of features offering the most promising foundation progressing toward the invention. The initial factor in determining this prior art reference is its alignment with the invention's purpose or effect, or its affiliation with the same or closely associated technical field as the claimed invention. Customarily, the closest prior art aligns with a similar function and mandates the least structural and functional alterations to reach the claimed invention (T 606/89).

In certain circumstances, multiple viable starting points for evaluating inventive step may exist. For instance, when the skilled person has several plausible solutions at their disposal, each of which could potentially lead to the invention. If a patent is to be granted, it may be required to apply the problem-solution approach on each of these starting points sequentially, in regard to all these plausible solutions.

Nonetheless, using the problem-solution approach from varying starting points, for example, different prior-art documents, is only mandated if there is persuasive evidence that these documents serve as equally valid launching pads. Notably in opposition proceedings, the problem-solution approach's structure is not a stage where the opponent can indiscriminately establish numerous inventive step objections with the hope that at least one may have a chance of success (T 320/15, Reasons 1.1.2).

In case of denial or revocation, it is adequate to establish based on a single pertinent piece of prior art that the claimed subject-matter lacks inventive step: there is no necessity to debate which document is "closest" to the invention; the only significant question is whether the document used is a viable starting point for evaluating inventive step (T 967/97, T 558/00, T 21/08, T 308/09 and T 1289/09). This holds true even if the problem pinpointed in a problem-solution reasoning diverges from the one identified by the applicant or patent holder.

As a result, the applicant or proprietor cannot disprove the argument that the claimed subject-matter lacks inventive step by asserting that a more promising launching pad exists: a piece of prior art, which renders the claimed invention as non-obvious, cannot be "closer" than a document, which makes the claimed invention seem obvious. It is apparent in this situation that the former does not signify the most promising launching pad to reach the invention (T 1742/12, Reasons 6.5; T 824/05, Reasons 6.2).

The closest prior art should be evaluated from the skilled person's perspective on the day preceding the filing or priority date valid for the claimed invention. The examiner must not create a contrived interpretation of the closest prior art based on previous knowledge of the application.

When identifying the closest prior art, consideration is given to what the applicant concedes in the description and claims to be known. Any such acknowledgment of known art is deemed accurate by the examiner unless the applicant specifies that an error was made.

IV.1.2 Formulation of the objective technical problem

In the second stage, the **technical problem** to be solved is determined objectively. This is accomplished by examining the application (or patent), the closest prior art, and the differences (also known as "the **distinguishing feature(s)**" of the claimed invention) in terms of features (either structural or functional) between the claimed invention and the closest prior art. From this, the technical effect resulting from the distinguishing features is derived, and the technical problem is subsequently formulated.

Features that do not contribute to the technical character of an invention, whether independently or in combination with other features, cannot substantiate the existence of an inventive step (T 641/00). Such a circumstance can arise, for example, if a feature solely contributes to solving a non-technical problem, such as a problem in a domain excluded from patent eligibility. For the handling of claims comprising both technical and non-technical features, see Sec. IV.2 to IV.4. The criteria for deciding whether a feature, albeit non-technical on its own, contributes to a technical effect within the context of the invention are elucidated in Sec. II, for different categories of subject matter listed under Art. 52 (2).

In relation to the problem-solution methodology, the technical problem signifies the goal and task of modifying or adapting the closest prior art to deliver the technical effects that the invention provides over the most relevant prior art. The technical problem, thus defined, is frequently termed as the "**objective technical problem**".

The objective technical problem determined in this manner may not align with what the applicant defined as "the problem" in the application. It might necessitate redefinition, as the objective technical problem relies on objectively established facts, notably those revealed in the prior art during the

proceedings, which might differ from the prior art that the applicant was aware of when filing the application. Specifically, the prior art mentioned in the search report might cast the invention in an entirely new light compared to a mere examination of the application. Redefinition might result in the objective technical problem being less ambitious than initially contemplated by the application. An instance of such a scenario would be when the originally stated problem involves introducing a product, process, or method exhibiting some improvement, but where no evidence suggests that the claimed subject-matter improves upon the closest prior art discovered in the search; rather, evidence is only available with respect to more distantly related prior art (or perhaps none at all). In this instance, the problem must be redefined as offering an alternative product, process, or method. The obviousness of the claimed solution to this redefined problem must then be evaluated in light of the cited prior art (T 87/08).

The degree to which such redefinition of the technical problem is possible must be evaluated based on the merits of each specific case. As a general rule, any effect produced by the invention may be utilized as a foundation for redefining the technical problem, provided that said effect can be inferred from the application as filed (T 386/89). It is also feasible to rely on new effects proposed subsequently during the proceedings by the applicant, as long as the skilled person would identify these effects as implied by or associated with the initially suggested technical problem (T 184/82).

It is important to note that the objective technical problem must be formulated in a way that does not hint at the technical solution, since including a portion of a technical solution proposed by an invention in the problem statement must, when evaluating the state of the art in terms of that problem, necessarily result in a hindsight view of inventive activity (T 229/85). However, if the claim refers to a goal to be achieved in a non-technical field, this goal may legitimately appear in the problem formulation as part of the framework of the technical problem to be solved, specifically as a constraint that must be satisfied (see Sec. IV.2 to IV.4, particularly Sec. IV.3).

The term "technical problem" is interpreted expansively; it does not necessarily suggest that the technical solution enhances the prior art. Hence, the problem could merely be seeking an alternative to a known device or process that offers the same or similar effects or is more economical. A technical problem is only considered solved if it is plausible that substantially all claimed embodiments exhibit the technical effects upon which the invention is premised.

Occasionally, the objective technical problem must be viewed as a combination of several "**partial problems**". This is the case when there isn't a technical effect achieved by all the distinguishing features taken together, but rather several partial problems are solved independently by different sets of distinguishing features (T 389/86).

IV.1.3 Could-would approach

In the third stage, the inquiry focuses on whether there exists any instruction in the entirety of the prior art that **would** (not merely could, but would) have led the skilled person, confronted with the objective technical problem, to alter or adjust the closest prior art in light of that instruction. This adjustment should result in something within the scope of the claims, thereby achieving the results that the invention achieves.

In simpler terms, the crux of the matter isn't whether the skilled person could have reached the invention by modifying or adjusting the closest prior art, but rather if the skilled person **would have done** so given that the prior art offered a motive to do so in anticipation of some enhancement or benefit (T 2/83). Even a subtle suggestion or a discernible incentive is enough to prove that the skilled person would have merged the elements from the prior art (T 257/98, T 35/04). This should have been the perspective of the skilled person prior to the filing or priority date applicable for the claim being examined.

When an invention involves multiple steps to reach the comprehensive solution to the technical problem, it is still considered obvious if the technical problem being solved guides the skilled person to the solution in a progressive manner, and each individual step is clear given the progress made and the remaining problem yet to be solved (T 623/97, T 558/00).

IV.2 Claims comprising technical and non-technical features (mixed-type claims)

It is entirely valid for a claim to include a mix of technical and non-technical features, as frequently seen in computer-implemented innovations. Non-technical elements can make up a significant portion of the subject-matter being claimed. However, according to Art. 52(1), (2) and (3), establishing an inventive step under Art. 56 requires a non-trivial technical solution to a technical problem (T 641/00, T 1784/06).

most essential

When evaluating the inventive step of such a **mixed-type claim**, all components that contribute to the invention's technical character are taken into account. This includes features that, although non-technical when viewed separately, do contribute to a technical effect serving a technical purpose within the context of the invention, thereby adding to the invention's technical character. Nevertheless, components that do not enhance the invention's technical character cannot bolster the existence of an inventive step (COMVIK approach, T 641/00, G 1/19). Such a scenario might arise, for example, when a feature only contributes to solving a non-technical problem, such as a problem in a field excluded from patentability (see Sec. II).

The problem-solution approach is employed for mixed-type inventions in a manner that ensures an inventive step is not recognized based on components that do not enhance the invention's technical character, while accurately identifying and considering all features that do contribute. Accordingly, when a claim refers to a goal to be achieved in a non-technical field, this goal can legitimately feature in the formulation of the objective technical problem as part of the framework of the technical problem to be solved, specifically as a constraint that must be satisfied (T 641/00; see step (3.c) below and Sec. IV.3).

The COMVIC approach

The following steps delineate the utilization of the problem-solution method for mixed-type inventions, adhering to the **COMVIK approach**:

(1) Determine the features which contribute to the technical character of the invention on the basis of the technical effects achieved in the context of the invention (see Sec. II).

(2) Select a suitable starting point in the prior art as the closest prior art with a focus on the features contributing to the technical character of the invention identified in step (1).

(3) Identify the differences over the closest prior art. The technical effect(s) of these differences, in the context of the claim as a whole, is/are determined in order to identify from these differences the features which make a technical contribution and those which do not. This step corresponds to step A of the conventional problem-solution approach (see Sec. IV.1 and IV.1.1).

most essential

(3.a) If there are no differences (not even a non-technical difference), a lack of novelty objection under Art. 54 is raised.

(3.b) If the differences do not make any technical contribution, i.e. if the claim comprises only novel non-technical features, an objection of lack of inventiveness under Art. 56 is raised. The reasoning for the objection is that the subject-matter of a claim cannot be inventive if there is no technical contribution to the prior art.

(3.c) If the differences include features making a technical contribution, i.e. if the claim comprises novel technical features, the following applies:

(4) The objective **technical problem** is framed around the technical effect(s) produced by the novel technical features, i.e. the **technical solution**. If the differences incorporate features making no technical contribution, such novel non-technical features, or any non-technical effect realized by the invention, can be incorporated in the formulation of the objective technical problem as part of what is "provided" to the skilled person, particularly as a condition that must be satisfied (see Sec. IV.3). This step corresponds to step B of the conventional problem-solution approach (see Sec. IV.1 and IV.1.2).

Remark: The **invention can be illustrated as the "gap" between the objective technical problem and the technical solution** (= the novel technical features). The wider the gap between problem and solution, the more likely does the invention establish an inventive step. According to the COMVIC approach, the non-technical features – and in fact the whole non-technical disclosure of the respective patent application – is deemed to be known and can therefore be utilized as a basis for construing the objective technical problem. Therefore, any disclosure of non-technical features or observations, whether they are novel or not, may narrow said "gap" between the objective problem and the novel technical features.

(5) Finally, depending on the width of the "gap" between the technical problem and the technical solution inventive step is assessed. If the "gap" is too narrow, the technical solution is obvious and a lack of inventiveness objection under Art. 56 is raised. Otherwise, if the skilled person cannot reach the technical solution starting from the technical problem, a patent is granted. This step corresponds to step C of the conventional problem-solution approach (see Sec. IV.1 and IV.1.3).

most essential

The identification of features contributing to the technical character of the invention should be conducted for all claim features in step (1) (T 172/03, T 154/04). Nevertheless, in reality, due to the complexity of this task, the examiner usually executes this identification in step (1) on a preliminary basis only, and performs a more in-depth analysis at the onset of step (3). In step (3), the technical impacts resulting from the differences over the selected closest prior art are established. The degree to which these differences add to the technical character of the invention is scrutinized in relation to these technical effects. This analysis, confined to the differences, can be conducted in a more detailed way and on a more specific basis than the one conducted at step (1). As a result, it may uncover that some features initially deemed as not contributing to the technical character of the invention in step (1) do make such a contribution upon a more thorough examination. The opposite scenario is also plausible. In these instances, the selection of the closest prior art in step (2) may need reevaluation.

While conducting the analysis in steps (1) and (3) above, caution must be exercised to avoid overlooking any features that could contribute to the technical character of the claimed subject-matter, especially if the examiners paraphrase their understanding of the claim's subject-matter during the analysis (T 756/06).

The three case studies under Section IV.4.1 to IV.4.3 exemplify the application of the COMVIK approach to mixed-type claims.

IV.3 Formulation of the objective technical problem for mixed-type claims

The objective technical problem should be a technical issue that a skilled person in the relevant technical field might have been tasked to resolve at the pertinent date. It shouldn't be formulated in such a way that it refers to elements that the skilled person would only know by understanding the claimed solution. Hence, the objective technical problem should not contain hints to the technical solution. Nonetheless, this principle is only applicable to those features of the claimed subject-matter that contribute to the technical character of the invention and thus are part of the technical solution. Just because a feature is included in the claim doesn't automatically exclude it from the formulation of the problem. Particularly, if the claim points to a goal to be achieved in a non-technical domain, this goal might legitimately be included in the problem formulation as part of the framework of the technical problem to be solved, especially as a constraint to be fulfilled (T 641/00).

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To put it differently, the formulation of the objective technical problem may reference features that do not contribute technically, or to any non-technical effect accomplished by the invention, as a given framework within which the technical problem is posed, like a requirements specification given to the technically skilled person. The purpose of formulating the technical problem according to these principles is to acknowledge inventive step solely based on features contributing to the technical character of the invention. The technical effects used for formulating the objective technical problem must be inferable from the application as filed when viewed in light of the closest prior art. These effects must be achievable across the entire scope of the claim. Therefore, a claim should be restricted in such a manner that nearly all embodiments covered by the claim exhibit these effects (G 1/19).

For "potential technical effects", which are not directly achieved by the claimed invention, see Sec. III.3.

For technical effects stemming from specific technical implementations where the design of algorithms is driven by technical considerations of the computer's internal operation, see Sec. III.1 to III.3.

In instances where claims are directed to a technical implementation of a non-technical method or scheme, particularly a business method or game rules, a modification to the underlying non-technical method or scheme intended to evade a technical problem, instead of addressing this problem in an inherently technical way, isn't deemed to make a technical contribution over the prior art (T 258/03, T 414/12). Such a solution constitutes a modification to the constraints given to the technically skilled person charged with the implementation of the provided non-technical method or scheme.

In these situations, further technical advantages or effects associated with the specific features of the technical implementation beyond the inherent effects and advantages of the underlying non-technical method or scheme should be considered. The latter are, at most, deemed incidental to that implementation (T 1543/06). They do not qualify as technical effects for the purpose of defining the objective technical problem.

For example, in a game played online over a distributed computer system, the effect of reducing network traffic achieved by limiting the maximum number of players cannot form the basis for formulating the objective technical problem. This effect is a direct result of altering the game rules, which is inherent in the non-technical scheme. The problem of network traffic reduction isn't solved by a technical

solution but is sidestepped by the non-technical gaming solution offered. Therefore, the feature defining the maximum number of players is considered a given constraint that forms part of the non-technical scheme that the skilled person, e.g., a software engineer, would be assigned to implement. An assessment would still have to be made to determine whether the claimed specific technical implementation would have been obvious to the skilled person.

IV.4 Applying the COMVIC approach

The following three case studies aim at illustrating the application of the COMVIK approach using the steps listed in Sec. IV.2 in various scenarios.

By far the most rejections of software applications by the EPO Examining Divisions and Appeal Boards are related to the exclusion of business models according to Art. 52 (2) (c), see Sec. III.5.3. In such typical applications of the COMVIK approach the claim is cleaned from all non-technical features, such as a claimed business concept, and the remaining technical substance is then so common or mundane that an inventive step cannot be established. Particularly since the COMVIC approach allows that all non-technical information given in the application is deemed know and thus narrows the gap between problem and solution.

For example, a "method of facilitating shopping on a mobile device" where the only feature providing a technical contribution is that a server accesses a vendor database to identify if a selected product is offered is not inventive. Likewise, a "computer-implemented method for brokering offers and demands in the field of transporting freight" with technical features of being carried out by a computer and using GPS location data cannot establish an inventive step either.

As a brief reminder, the steps of the COMVIC approach according to Sec. IV.2 are basically the following:

(1) Determine the features which contribute to the technical character of the invention.
(2) Select the closest prior art.
(3) Identify the features that are novel over the closest prior art.
    (3.a) If there are no novel features at all, the invention is not novel (Art. 54).
    (3.b) If there are only novel non-technical features, the invention is obvious (Art. 56).

(3.c) If there are novel technical features, they form the technical solution of the invention.

(4) Derive the objective technical problem from the technical effect(s) of the technical solution.

Note, all (novel) non-technical features can be used for deriving the objective technical problem. Therefore, any non-technical disclosure narrows the "gap" between the technical problem and the technical solution and thus diminishes the likelihood of and inventive step.

(5) If the "gap" is too narrow, the technical solution is obvious (Art. 56).

IV.4.1 Case Study: Transmission of a broadcast media channel

This example illustrates the two-level technicality analysis set forth in Sec. IV.2 and IV.3.

Claim 1: *A system for the transmission of a broadcast media channel to a remote client over a data connection, said system including:*

(a) means for storing an identifier of the remote client and an indication of an available data rate of the data connection to the remote client, said available data rate being lower than the maximum data rate for the data connection to the remote client;

(b) means for determining a rate at which data is to be transmitted based on the indication of the available data rate of the data connection; and

(c) means for transmitting data at the determined rate to said remote client.

The steps according to the COMVIC approach are applied to the claimed teaching sketched above.

Step (1): At first glance, all features appear to contribute to the technical character of the invention.

Step (2): Prior art reference D1, which discloses a system for broadcasting video over an xDSL connection to the set-top boxes of subscribers, is selected as the closest prior art. The system comprises a database storing identifiers of subscribers' computers and, in association with them, an indication of the maximum data rate for the data connection to each subscriber's computer. The system further comprises means for transmitting the video to a subscriber's computer at the maximum data rate stored for said computer.

Step (3): The differences between the subject-matter of claim 1 and D1 are:

(a) Storing an indication of an available data rate of the data connection to the remote client, said available data rate being lower than the maximum data rate for the data connection to the remote client.

(b) Using said available data rate to determine the rate at which the data is transmitted to the remote client (instead of transmitting the data at the maximum data rate stored for said remote client as in D1).

Step (3.c): The reason for employing an "available data rate" that falls below the maximum data rate for the data connection to the remote client is not clear from the claim. To address this, we must consider the relevant disclosure in the description. The description elucidates that a pricing model is on offer, which presents the customer with the option to select from a range of service levels. Each of these levels corresponds to an available data rate at a distinct price. To economize, customers have the option to opt for a lower available data rate than the maximum supported data rate. Consequently, using a less then maximum data rate for the connection to the remote client fulfills the objective of enabling customers to select a data-rate service level that aligns with the pricing model. This objective is not technical in nature, but rather it is a financial, administrative, or commercial goal. As such, it falls under the exclusion of Art. 52 (2) (c) and can therefore be incorporated into the formulation of the objective technical problem as a constraint that needs to be satisfied.
The features of *storing* the available data rate and of *using it to determine the rate at which the data is transmitted* have the technical effect of implementing this non-technical aim.

Step (4): The objective technical problem is therefore formulated as how to implement in the system of D1 a pricing model which allows the customer to choose a data-rate service level.

Step (5): Given the task of implementing this choice of data-rate service level in accordance with the pricing model, it would be obvious to the skilled person that the data rate purchased by a subscriber (i.e. the "available data rate" of claim 1), which can only be lower or equal to the maximum data rate (i.e. the "remote client" of claim 1), would have to be stored for each subscriber and used by the system to determine the rate at which data is to be transmitted to a subscriber. Therefore, no inventive step is involved within the meaning of Art. 52 (1) and Art. 56.

Remark: This particular instance showcases a claim that encompasses a sophisticated mix of technical and non-technical elements. At the outset, in step 1, all features seemed to contribute to the technical character of the invention. After comparison with D1, a detailed analysis of the technical character of the contribution made by the invention over D1 was possible at step 3. This brought to light that the distinguishing features were addressing a non-technical objective. As a result, this non-technical objective could be integrated into the formulation of the objective technical problem (T 641/00).

IV.4.2 Case Study: Determining risk of condensation on a surface

Claim 1: *A computer-implemented method of determining areas in which there is an increased risk of condensation for a surface in a building comprising the steps of:*

(a) controlling an infrared (IR) camera to capture an image of the temperature distribution of the surface;

(b) receiving mean values for the air temperature and the relative air humidity measured inside the building over the last 24 hours;

(c) calculating, based on said mean air temperature and mean relative air humidity, a condensation temperature at which there is a risk of condensation on the surface;

(d) comparing the temperature at each point on the image to said calculated condensation temperature;

(e) identifying the image points having a temperature lower than the calculated condensation temperature as areas at increased risk of condensation on the surface; and

(f) modifying the image by colouring the image points identified in step (e) in a particular colour to indicate the areas at increased risk of condensation to a user.

Step (1): The control of an IR camera as detailed in step (a) unequivocally contributes to the technical character of the claimed subject matter. The discussion remains as to whether steps (b) through (f) also add to the technical character of the claim.

Viewed separately, steps (b) through (e) are related to algorithmic/mathematical steps, and step (f) defines a presentation of information. Nevertheless, the claim is not directed towards a mental act, a mathematical method, or presentation of information as such (which would be excluded from

patentability under Art. 52 (2) (a), (c), (d), and (3) since the claimed subject-matter involves technical means such as a computer.

Consequently, the question becomes whether the algorithmic and mathematical steps, as well as the step related to the presentation of information, in the context of the invention, contribute to producing a technical effect and thus to the technical character of the invention.

Since the algorithmic and mathematical steps (b) through (e) mentioned above are employed to predict the physical state (in this case, condensation) of an existing real object (surface) from measurements of physical properties (an IR image, measured air temperature, and relative air humidity over time), they contribute to a technical effect serving a technical purpose. This is valid regardless of how the output information about the risk of condensation on the surface is utilized (see Sec. III.1 , subsection "Technical applications"). Therefore, steps (b) through (e) also contribute to the technical character of the invention.

The determination of whether step (f) makes a technical contribution is postponed until step 3 below. The control of an IR camera in step (a) clearly makes a technical contribution.

The question is whether steps (b) to (f) also contribute to the technical character of the claimed subject-matter.

Step (2): Prior art reference D1 presents a method for monitoring a surface to ascertain the risk of condensation formation on it. The risk of condensation is assessed based on the difference between the temperature reading obtained via an IR pyrometer for a single point on the surface and the condensation temperature, which is calculated based on the current ambient air temperature and the relative air humidity. The numerical value of this difference is subsequently displayed to a user as an indicator of the potential of condensation at the mentioned point. This document is selected as the closest prior art.

Step (3): The differences between the subject-matter of claim 1 and D1 are:

(a) an IR camera is used (instead of the IR pyrometer of D1, which only captures the temperature at a single point of the surface);

(b) mean values for air temperature and relative air humidity measured inside the building over the last 24 hours are received;

(c) the condensation temperature is calculated on the basis of the mean air temperature and mean relative air humidity and compared to the temperature at each point on the IR image of the surface;

(d) image points having a temperature lower than the calculated condensation temperature are identified as areas at increased risk of condensation on the surface;

(e) colours are used to indicate areas at increased risk of condensation.

Step (3.c): As previously stated, distinguishing features (a) through (d) contribute to the technical character of the claimed subject-matter and must be considered when formulating the technical problem. These features produce the technical effect of a more accurate and dependable prediction of the risk of condensation by considering all surface areas (as opposed to a single point) and considering temperature variations throughout the day.

Distinguishing feature (e), which defines a specific method of presenting information to a user (Art. 52 (2) (d)), does not produce a technical effect. This is because any effect resulting from the decision to display data using colors rather than numerical values is contingent on the subjective preferences of the user: some users may favor the former, others the latter. Consequently, this feature does not make a technical contribution. It cannot support the presence of an inventive step and is not discussed further in the analysis as it has no impact on the other distinguishing features.

Step (4): The objective technical problem is therefore formulated as how to determine the risk of condensation on a surface in a more precise and reliable manner.

Step (5): The employment of an IR camera to acquire temperature readings on a surface can be seen as a standard technical progression in the thermography field that doesn't necessitate any inventive activity: IR cameras were well established at the application's effective date. Using an IR camera is a clear alternative for a skilled person aiming to measure the temperature at several points on the monitored surface, as opposed to using an IR pyrometer to establish the surface's temperature distribution.

However, D1 doesn't suggest considering a temperature distribution on a surface (as opposed to a single point) and calculating mean air temperature values while considering the relative air humidity measured inside the building over the last 24 hours. Furthermore, it doesn't suggest considering varying conditions that might realistically occur within the building over time for predicting condensation risk.

Assuming that no other prior art suggests the technical solution of the objective technical problem as defined by distinguishing features (a) to (d), the subject matter of claim 1 involves an inventive step.

Remarks: This example illustrates the situation addressed in Sec. IV.2, second paragraph, according to which non-technical features contribute to producing a technical effect serving a technical purpose in the context of the claimed invention (features (b) to (e), which are algorithmic/mathematical steps). As these features contribute to the technical character of the invention, they may support the presence of an inventive step.

important

IV.4.3 Case Study: Coating a workpiece by means of a neural network and neuro-fuzzy rules

Claim 1: *A method for coating a workpiece using a thermal spray coating process, the method comprising:*

(a) applying, using a spray jet, a material to the workpiece by thermal spray coating;

(b) monitoring the thermal spray coating process in real time by detecting properties of particles in the spray jet and supplying the properties as actual values;

(c) comparing the actual values with target values;

and, in the event that the actual values deviate from the target values,

(d) adjusting process parameters for the thermal spray coating process automatically by a controller on the basis of a neural network, said controller being a neuro-fuzzy controller which combines a neural-network and fuzzy logic rules and thereby maps statistical relationships between input variables and output variables of the neuro-fuzzy controller.

The claimed invention pertains to the regulation of an industrial procedure, specifically, the thermal spray coating of a workpiece. The material utilized for the coating is inserted into the high-temperature

jet with the assistance of a carrier gas, where it is accelerated or melted. The outcomes of the resulting coatings are subject to significant fluctuations, even under seemingly constant coating operation parameters. The spray jet is visually monitored with a CCD camera. The image captured by the camera is sent to an image processing system, from which properties of particles in the spray jet (e.g., velocity, temperature, size, etc.) can be deduced. A neuro-fuzzy controller is a mathematical algorithm that combines a neural network with fuzzy-logic rules.

Step (1): The method is oriented toward thermal spray coating, which is a specific technical process, comprising various specific technical features, such as particles, a workpiece, and a spray coating device (implied).

Step (2): Prior art reference D1 discloses a method for the control of a thermal spray coating process by applying material to a workpiece using a spray jet, detecting deviations in the properties of the particles in said spray jet, and adjusting process parameters automatically based on the outcome of a neural network analysis. This document is considered the closest prior art.

Step (3): The difference between the method of claim 1 and D1 is the use of a neuro-fuzzy controller that combines a neural network and fuzzy logic rules as specified in the second part of step (d).

Step (3.c): Computational models and algorithms related to artificial intelligence are, by themselves, of an abstract mathematical nature (see Sec. III.1). The feature of combining results of a neural network analysis and fuzzy logic defines a mathematical method when taken on its own. However, in conjunction with the feature of adjusting the process parameters, it contributes to the control of the coating process. Hence, the output of the mathematical method is directly used in the control of a specific technical process.

Control of a specific technical process is a technical application, see Sec. III.1, subsection "Technical applications". In conclusion, the differentiating feature contributes to producing a technical effect serving a technical purpose and thereby contributes to the technical character of the invention. Therefore, it is considered in the assessment of inventive step.

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Step (4): The objective technical problem must be derived from technical effects that are based on objectively established facts and that are directly and causally related to the technical features of the claim.

Step (5): Starting from the teaching of D1 and tasked with the above objective technical problem, the person skilled in the field of control engineering would look for an alternative solution to determine the control parameters of the process.

Remarks: This example illustrates the case where a mathematical feature which, when taken in isolation, is non-technical but contributes to producing a technical effect serving a technical purpose in the context of the claim.

The neuro-fuzzy controller's availability in the general teaching in the field of control engineering resulted in the objection that the controller of claim 1 was an obvious alternative. This particular objection could have been circumvented if the claim had mentioned additional features of the fuzzy control method linked to some technical properties of the spray coating process. If the desirable coating properties were a result of specific input and output variables of the neuro-fuzzy controller, how the controller is trained, or how the output is used in the regulation of the process parameters, these features would have had to be mentioned in the claim. As presently claimed, the neuro-fuzzy controller is not adapted for the specific application of thermal spray coating. There is no evidence of any particular technical effect which is credibly achieved over the whole claimed scope other than that of providing different process parameters as input to the controller.

V. Searching, claiming, and disclosing computer-implemented inventions

V.1 Search of subject-matter excluded from patentability under Art. 52 (2) and (3)

The subject matter or activities listed in Art. 52 (2), when claimed as such (Art. 52 (3)), are deemed non-technical (see Sec. II.2). In instances where a claim contains a mix of technical and non-technical features, the search division identifies the features that contribute to the technical character of the claimed

subject matter (see Sec. IV.2 to IV.4). The search covers all features deemed to contribute to the technical character.

Features that may appear non-technical when examined in isolation might still contribute to the technical character of a claimed invention if, within the context of that invention, they contribute to producing a technical effect serving a technical purpose. The mere implementation of effects that are inherent in the excluded matter (T 1543/06) or arise from circumvention of the technical problem rather than contributing to a technical solution would not qualify as technical effects (T 258/03). Sec. III provides examples of how to assess contribution to technical character for each of the items listed in Art. 52(2).

Claimed features are examined in light of the description and drawings to ascertain if they produce a technical effect and form part of a technical solution to a technical problem. Specifically, the application's specific embodiments disclosed in its description and drawings are taken into consideration, as the claims could reasonably be expected to be limited to these, and they could confer technical character on the claimed features.

If the search division deems that some claim features do not contribute to the technical character of the claimed invention, this is indicated in the search opinion. If a lack of inventive step objection is raised, and at least some of the distinguishing features are found not to have a technical effect contributing to the solution of a technical problem as outlined in Sec. IV.2 to IV.4, this finding is substantiated.

Search of computer-implemented business methods

In the case of claims that are focused on computer-implemented business methods, if the features that contribute to the technical character of the claimed subject matter are so well-known that their existence at the relevant date can't reasonably be disputed (as outlined in (T 1411/08, Reasons 4.1 and 4.2, and T 690/06, Reasons 13), there is no need for documentary evidence concerning the relevant state of the art in the search report. Such "notorious" knowledge, which doesn't necessitate citation of documentary evidence, must not be confused with the common general knowledge of a person skilled in the art, which is something that can generally be reasonably questioned. In these exceptional cases, a search report may be issued under Rule 61 with no documents cited. It's important to differentiate this type of Rule 61 search report from a declaration of no search or a partial search report issued under Rule 63 (2).

V.2 Clarity of claims directed to computer-implemented inventions

The term "computer-implemented inventions" (CII) encompasses claims that involve computers, computer networks, or other programmable apparatus, with at least one feature being realized by means of a program. Claims directed to CII should outline all the features essential for the technical effect of the process the computer program is intended to carry out when run. An objection under Art. 84 might arise if the claims contain program listings. Short excerpts from programs may be acceptable in the description (see Sec. V.3.2).

In the following three sections, a distinction is made between three situations. The practice defined in Sec. V.2.1 is confined to inventions in which all the method steps can be performed by generic data processing means. Sec. V.2.2, on the other hand, pertains to inventions in which at least one method step defines the use of specific data processing means or other technical devices. Inventions that are realized in a distributed computing environment are discussed in Sec. V.2.3.

V.2.1 Cases where all method steps can be fully implemented by generic data processing means

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A typical category of "computer-implemented inventions" (CII) involves subject matter where all the method steps can be executed completely by computer program instructions operating on apparatus that provide generic data processing functions in the context of the invention. These apparatuses could be embedded in devices like a personal computer, smartphone, printer, etc.

In such inventions, even though various claim structures are possible, the set of claims usually begins with a method claim. Additional claims in other categories, which have subject matter equivalent to that of the method, might be included to ensure complete protection of the invention.

If the invention pertains to software that can be loaded into memory, transmitted over a network, or distributed on a data carrier, a claim to a computer program [product] may also be included, in addition to a computer-implemented method. It's important to note that the category of a computer program [product] claim is distinct from that of a corresponding computer-implemented method (T 424/03 and G 3/08).

essential

Sample claim formulations

The following non-exhaustive list comprises proposals of acceptable claim wordings in such a set of claims (T 410/96, T 1173/97 and T 2140/08):

1. Method claim
   - A computer-implemented method comprising steps A, B, ...
   - A method carried out by a computer comprising steps A, B, ...

2. Apparatus/device/system claim
   - A data processing apparatus/device/system comprising means for carrying out [the steps of] the method of claim 1.
   - A data processing apparatus/device/system comprising means for carrying out step A, means for carrying out step B, ...
   - A data processing apparatus/device/system comprising a processor adapted to/configured to perform [the steps of] the method of claim 1.

3. Computer program [product] claim
   - A computer program [product] comprising instructions which, when the program is executed by a computer, cause the computer to carry out [the steps of] the method of claim 1.
   - A computer program [product] comprising instructions which, when the program is executed by a computer, cause the computer to carry out steps A, B, ...

4. Computer-readable [storage] medium/data carrier claim
   - A computer-readable [storage] medium comprising instructions which, when executed by a computer, cause the computer to carry out [the steps of] the method of claim 1.
   - A computer-readable [storage] medium comprising instructions which, when executed by a computer, cause the computer to carry out steps A, B, ...
   - A computer-readable data carrier having stored thereon the computer program [product] of claim 3.
   - A data carrier signal carrying the computer program [product] of claim 3.

In claim wording 2 above, the apparatus features specified in a means-plus-function format ("means for...") are understood to be apparatus adapted to carry out the respective steps/functions, rather than simply apparatus suitable for conducting those tasks (T 410/96). Phrases like "comprising means for", "adapted to", "configured to", and equivalents are all considered equivalent, and there's no specific preference among them. Hence, novelty is attributed over an unprogrammed data processing apparatus, or a data processing apparatus programmed to perform a different function.

As per Rule 43 (2), an objection is not raised if the claim set includes one claim from each of the claim wordings 1 to 4 mentioned above. Hence, an invitation under Rule 62a (1) is not issued at the search stage, as the requirements of Rule 43 (2) are met.

However, an objection under Rule 43 (2) may be raised if more than one independent claim is present according to claim wordings 1 to 4. For instance, if there are two or more independent computer program [product] claims which cannot be considered as falling under one of the exceptions of Rule 43 (2).

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When examining the novelty and inventive step of a set of claims as described above (claim wordings 1 to 4), the examining division usually starts with the method claim. If the subject-matter of the method claim is considered novel and inventive, the subject-matter of the other claims in a set that is formulated according to the headings above will generally also be novel and inventive, provided they include the features corresponding to all those that ensure the patentability of the method.

Claims related to CII which are formulated differently than those according to claim wordings 1 to 4 defined above are assessed on a case-by-case basis, considering the requirements of clarity, novelty, and inventive step (see Sec. V.2.2).

If the invention is realized in a distributed computing environment or involves interrelated products, it may be necessary to reference the specific features of the different entities and define how they interact to ensure the presence of all essential features. In such cases, additional independent claims to interrelated products and their corresponding methods may be allowed under Rule 43 (2) (a) (see Sec. V.2.3).

If user interaction is needed, an objection under Art. 84 may arise if the claim does not clearly specify which steps are performed by the user.

Additionally, a claim to a computer-implemented data structure, in addition to claim wording 1 to 4, may be allowable under Rule 43 (2) if it is defined by its own technical features. However, a computer-implemented data structure does not necessarily include features of the process by which it is generated, and it isn't necessarily restricted by a method in which it is used. Hence, a claim to a computer-implemented data structure usually cannot be defined simply by reference to a method or as an outcome of a process (for more information on data structures, see Sec. V.2.3).

For assessing inventive step for claims including features related to exclusions under Art. 52 (2), which is often the case with CII, see Sec. IV.2 to IV.4.

V.2.2 Cases where method steps define additional and/or specific data processing means

essential

Where a method claim includes steps defined as being carried out by devices other than generic data processing means, a corresponding device and/or computer program claim may need more than a mere reference to the method claim according to claim wordings 1 to 4 in Sec. V.2.1 to fulfil the requirements of Art. 84. Furthermore, if not all the features of the method claim are reflected in claims in other categories referring to the method, said claims in other categories have to be construed and examined separately with respect to novelty and inventive step.

In particular in applied fields such as medical devices, measuring, optics, electro-mechanics or industrial production processes, method claims frequently involve steps of manipulating or interacting with technical physical entities by using computer control. These method steps may not always be fully performed by the computer and the method claim may recite specific technical means for carrying out some of the steps. In such a case, defining a computer program claim as proposed in Sec. V.2.1 (claim wording 3) will normally lead to an objection under Art. 84 if the step carried out by the specific technical means cannot be carried out by a generic data processing means (see Example 1 below). An objection under Art. 84 may also arise if the claims do not define which steps are carried out by the data processor or by the additional devices involved, as well as their interactions. The same applies if specific data processing means (e.g. a particular parallel computer architecture) are required as opposed to the generic data processing means described in Sec. V.2.1.

essential

On the other hand, if the method claim defines the further processing, by generic computational means, of data received from specific technical means, such as sensors, it is not necessary that the computer or computer program claims referring to the method comprise those specific technical means. In this case the specific technical means recited in the method are not required for carrying out the method steps and formulations as in Sec. V.2.1 may be appropriate (see Example 2 below).

Example 1: Determining oxygen saturation in blood in a pulse oxymeter

Claim 1: *A method of determining oxygen saturation in blood in a pulse oximeter, comprising:*

– *receiving in an electromagnetic detector first and second electromagnetic radiation signals from a blood-perfused tissue portion corresponding to two different wavelengths of light;*

– *normalising said electromagnetic signals according to steps (a), (b) and (c) to provide normalised electromagnetic signals;*

– *determining oxygen saturation based on said normalised electromagnetic signals according to steps (d) and (e).*

Claim 2: *A pulse oximeter having an electromagnetic detector and means adapted to execute the steps of the method of claim 1.*

Claim 3: *A computer program [product] comprising instructions to cause the device of claim 2 to execute the steps of the method of claim 1.*

Claim 4: *A computer-readable medium having stored thereon the computer program of claim 3.*

Remarks: In this example, the method claim comprises a step which is defined as being executed by specific technical means (the electromagnetic detector in a pulse oximeter). A computer program claim making reference only to the method would lack clarity because such a program could not be executed e.g. on a general-purpose computer which does not have a pulse oximeter with an electromagnetic detector. Therefore, the computer program claim should be defined as being executed on the pulse oximeter with an electromagnetic detector (by referring to the device of claim 2) rather than only referring to the method claim 1.

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Example 2: Determining oxygen saturation in blood on a general-purpose computer

Claim 1: *A computer-implemented method of determining oxygen saturation in blood, comprising:*

– *receiving data representing first and second electromagnetic radiation signals acquired by an electromagnetic detector from a blood-perfused tissue portion corresponding to two different wavelengths of light;*

– *normalising the data representing said electromagnetic signals according to steps (a),(b) and (c) to provide normalised data;*

– *determining oxygen saturation based on said normalised data according to steps (d) and (e).*

Claim 2: *A data processing apparatus comprising means for carrying out the method of claim 1.*

Claim 3: *A computer program [product] comprising instructions which, when the program is executed by a computer, cause the computer to carry out the method of claim 1.*

Claim 4: *A computer-readable medium having stored thereon the computer program [product] of claim 3.*

Remarks: In this example the invention lies in the further processing of acquired data for determining the oxygen saturation in blood. The data can be received for example from a data file storing data previously acquired by the electromagnetic detector. Such a method can therefore be carried out by generic data processing means, for example in the form of a desktop computer. It does not specify the electromagnetic detector as a required feature for receiving the input data. Hence, the device claim defined by reference to the method claim does not need to include the pulse oximeter or an electromagnetic detector either. Furthermore, the computer program claim can be executed on a general-purpose computer and not on a specific device in contrast to the case in Example 1. As a result, the formulations as in Sec. V.2.1 are appropriate for claims 2 to 4 of Example 2.

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V.2.3 Cases where the invention is realized in a distributed computing environment

Distributed Computer-Implemented Inventions (CIIs) are another prevalent type. They are realized in a distributed computing environment, which may involve systems like a networked client-server system (with the client being, for instance, a smartphone), computer cloud storage or processing access, peer-to-peer network file sharing, an augmented reality environment with head-mounted displays, autonomous vehicles communicating over an ad-hoc network, or maintaining a distributed ledger using blockchain technology.

For such distributed CIIs, the claim set may consist of claims targeting each entity within the distributed system, or it may pertain to the overall system and its corresponding methods. Such a claim set may be deemed allowable under Rule 43 (2) (a). Regardless, each independent claim must still fulfill the patentability requirements, particularly those of Art. 54, Art. 56, and Art. 84. For instance, if the invention is about implementing a computer cloud with virtual machines that can adapt to workload changes by autonomously allocating resources, a client device accessing the cloud resources may already be known in the art. The claim set must also satisfy the unity requirements.

To ensure the presence of all essential features, it might be necessary to refer to the specific features of the different entities and define how they interact. Special care is needed when referring to the interaction between different entities to ensure the clarity of the claim. In some cases, it may be necessary to limit the claim to the combination of the entities. If the distribution of the method steps across the involved entities is critical to the invention, it will be necessary to define which method step is performed by which entity to meet the requirements of Art. 84. However, in generic CII claims, this can remain undefined (see Sec. V.2.1).

Some thoughts related to these requirements are exemplified below. While other formulations (see Sec. V.2.1) apart from the ones given in the examples can also be part of the claim set, they have been left out here for brevity's sake.

Some considerations relating to these requirements are illustrated with the help of the following example. Other formulations (see Sec. V.2.1) than the ones given in the examples can also be part of the claim set but have been omitted for reasons of brevity.

essential

Example 3: Transmitter device comprising encoding means and transmission means

Claim 1: *A transmitter device comprising means for encoding data by performing steps (a) and (b) and means to transmit the encoded data to a receiver device.*

Claim 2: *A receiver device comprising means for receiving encoded data from a transmitter device and means for decoding the data by performing steps (c) and (d).*

Claim 3: *A system comprising a transmitter device according to claim 1 and a receiver device according to claim 2.*

Claim 4: *A computer program [product] comprising instructions which, when the program is executed by a first computer, cause the first computer to encode data by performing steps (a) and (b) and to transmit the encoded data to a second computer.*

Claim 5: *A computer program [product] comprising instructions which, when the program is executed by a second computer, cause the second computer to receive encoded data from a first computer and decode the received data by performing steps (c) and (d).*

Remarks: The problem that this invention addresses involves data transmission over a network. In this system, a transmitter device encodes the data using an algorithm composed of steps A and B, while a receiver device decodes the data using a different algorithm, which includes steps C and D. The requirements of Rule 43 (2) are satisfied because the devices described in claims 1 and 2 are interrelated, as they interact to perform the invention and solve the stated problem.

However, novelty and inventive step must be evaluated individually for each independent claim. For instance, if the encoding according to steps (a) and (b) provides a more efficient method for encoding to a known coding format, while decoding according to steps (c) and (d) is conventional, it's possible that only claims 1 and 3 are novel and inventive.

V.3 Disclosure of a computer-implemented invention

V.3.1 Sufficiency of disclosure

In patent applications, a detailed description of at least one way of executing the invention is mandatory. The application targets those skilled in the field, so including exhaustive details of well-known auxiliary features is neither required nor desirable. However, the description must elucidate any critical feature for executing the invention in such detail that the skilled person can perceive how to implement the invention. While a single example might be sufficient, when claims cover a broad domain, the application generally needs to fulfill the requirements of Art. 83, providing multiple examples or describing alternative embodiments or variations across the area protected by the claims. There can be exceptions where a very broad field is sufficiently exemplified by a limited number of examples or even one example. In these cases, the application, in addition to the examples, must contain enough information to enable a skilled person to perform the invention across the entire claimed area without undue burden or inventive skill (T 727/95). In this context, the "whole area claimed" encompasses virtually any embodiment within a claim's ambit, even though a certain amount of trial and error might be permissible, particularly in an unexplored field or when numerous technical difficulties exist (T 226/85 and T 409/91).

When assessing the sufficiency of disclosure, inherent limitations that a sensible interpretation imposes on the independent claims' subject matter should be considered. This implies that a skilled person would exclude any embodiments that are nonsensical or inconsistent with the application's teaching (T 521/12).

In relation to Art. 83, an objection to lack of sufficient disclosure implies serious doubts, supported by verifiable facts (T 409/91, T 694/92). If the examining division, under specific circumstances, can establish a reasoned case that the application lacks sufficient disclosure, the applicant bears the burden of proving that the invention can be performed and repeated across substantially the entire claimed range.

To fully satisfy the requirements of Art. 83 and Rule 42 (1) (c) and Rule 42 (1) (e), the invention must be described not only structurally but also functionally, unless the functions of the various components are immediately obvious. This is particularly applicable in fields like computers, where a clear description of function may be far more appropriate than an overly detailed description of structure.

If an application is found to be sufficiently disclosed according to Art. 83 only in respect of a part of the claimed subject matter, this may have led to the issuance of a partial European or supplementary European search report according to Rule 63. In such cases, without appropriate amendments, an objection under Rule 63(3) may also arise.

V.3.2 Remark on requirements for the description of a computer program

When it comes to inventions in the field of computer technology, relying solely on program listings in programming languages for disclosing the invention is not sufficient. The description, like in any other technical domain, should be written primarily in standard language. It may be supplemented with flow diagrams or other explanatory aids to make it understandable to a person skilled in the art, who is presumed to have general programming skills but may not be a specialist in any particular programming language. If they help illustrate an embodiment of the invention, short excerpts from programs written in commonly used programming languages may be acceptable. This approach ensures that the invention is accessible to a broad audience of professionals in the field, rather than being limited to specialists in a particular programming language.

VI Conclusion

We find ourselves at the forefront of a digital revolution that is rapidly reshaping our world. The heart of this transformation lies in the sphere of software and AI innovations, driving developments in key areas such as AI/ML, blockchain, IoT, robotics, and 4IR technologies. Protecting software-driven processes and devices through robust IP is essential for securing businesses, competitive advantage, and investments.

With the COMVIC approach the EPO has developed a sound and concise scheme to extract and assess the technical essence of software inventions. Within this scheme, AI/ML inventions are considered mathematical methods that require a technical problem solved for patent eligibility. Mastering the multiple levels of this approach is key to successful prosecution and requires specialized knowledge and a keen understanding of both the law and the technology.

In this context, **KLUNKER IP** is your trusted guide. We are a **leading European IP law firm** with ample expertise and deep experience in software, AI, 4IR and beyond. Our mission is in helping clients successfully navigate through the complex and landscape of the EPO's software examination process. With in-depth knowledge, comprehensive understanding, and dedicated client services we aim to support you in optimally preparing your software and AI patent applications for successful prosecution at the EPO.

Partner with **KLUNKER IP**, to safeguard tomorrow's technology in Europe and fortify your software and AI patent portfolios. Rest assured, your innovations are in safe and expert hands.

Munich, May 2023