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A Logic Model of the European Patent System

Abstract. In patent law most of the crucial legal questions such as patentability and infringement are linked to the patent claims. The European Patent Office regards patent claims as a set of independent features which are examined separately in a more or less formal way. The author has found that this approach allows for developing a simple logic model which treats patent claim features as logical statements and patent claims as compound statements wherein the individual logical statements are connected by logical connectives. The proposed logic model provides a uniform system for examining various legal questions that are dealt with separately under current case-law, moreover, it allows for examining the logical coherence between the different case-law decisions as well as detecting any hidden logical inconsistencies. The present paper offers an overview of the different legal questions linked to the patent claim and demonstrates the practical application of the proposed model.

Keywords: European patent, EPC, patent law, patent claim, Artificial Intelligence and Law, logic model

Introduction

Patents can be obtained for Hungary in either a national grant procedure governed by Act XXXIII of 1995 on the protection of inventions by patents, or in a European grant procedure taking place before the European Patent Office (hereinafter: EPO) under the legal regime established by the European Patent Convention¹ (hereinafter: EPC). The present paper focuses on the case law of the EPO which is directly only applicable in the European grant procedure, however legal harmonisation of the Hungarian patent law resulted in a very similar national system, which takes into account the legal practice of the EPO.

The scope of legal protection conferred by a patent is defined by the so-called patent claims. In the patent system established by the EPC (hereinafter: EPC system) patent claims are assessed for establishing (i) whether the invention defined by the patent claim is novel and involves an inventive step; (ii) whether an amendment of a patent claim extends the subject matter beyond the contents of the original patent application; and (iii) whether a patent claim can benefit from the priority of an earlier patent application.

In the present paper I propose a novel way of treating the aforementioned patent claim related questions based on my observation that the EPC system allows for a formal logical examination of the patent claims.

Currently decision making in the EPC system relies partly on positive law (mainly the EPC) and partly on case-law (mainly the decisions of the Boards of Appeal and of the Enlarged Board of Appeal² as well as customary law laid down in the Guidelines of the

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¹ Convention on the Grant of European Patents (European Patent Convention) of 5 October 1973 as revised by the Act revising Article 63 EPC of 17 December 1991 and the Act revising the EPC of 29 November 2000.

² For case law decisions of the European Patent Office see: <http://www.epo.org/patents/appeals/search-decisions.html>

European Patent Office³). There are currently no means for examining the logical consistency between the case law decisions relating to the above-mentioned three different fields of patent claim analysis. Inconsistencies are mostly remedied on a case-by-case basis thus causing case law to remain a divergent set of rules.

The proposed logic model allows for examining the logical coherence of case-law as a whole by connecting the separate fields of patent claim assessment and by making it possible to examine the logical consistency between separate decisions. It further allows for the detection of any hidden logical inconsistency within a single decision and for predicting the situation in which it will surface. The logic model could also assist codification as it is suitable for clearly setting the logical constraints that the legal system must take into consideration.

1. Related work

Various attempts have been made to computerise legal reasoning and legal decision making by applying artificial intelligence to the field of law. Some of the most promising research projects are directed to providing case-based reasoning, expert systems and logic models such as neural networks or fuzzy logic.

Case-based reasoning uses existing case law to provide or predict future decisions, for example Ashley's HYPO system⁴ comprises a knowledge base of over thirty judicial opinions in the field of trade secret law and allows for establishing similarities between a new case and the precedent cases forming the knowledge base with respect to given factors (e.g. whether plaintiff adopted security measures, whether plaintiff and defendant make competing products, etc.). HYPO compares the factors and determines the most helpful cases to the defendant's or plaintiff's position. This approach is particularly suitable for alleviating the work of legal practitioners operating in a common law system.

Expert systems on the other hand aim to offer the skills of an expert by providing legally relevant questions for generating a legal opinion as Tyree's FINDER⁵ or by assisting the formulation of legal argumentation as McCarty's TAXMAN.⁶ Expert systems are often combined with knowledge based systems, for example deductive knowledge based systems are based on pre-defined IF–THEN rules for solving specific tasks in a limited legal field.

Neural networks simulate the functioning of a biological network of neurons, in particular that of the human brain. The neural networks comprise a number of interconnected neurons (nodes) some of them serving as inputs and outputs the others forming hidden layers. The structure of the neural network is adaptive, the behaviour of the neurons is defined by mathematical functions and the interconnections can be modified whereby the network can be trained to produce a desired output in response to a given input. Once the learning phase has ended the neural network can be used to find an input pattern similar to

³ Guidelines for Examination in the European Patent Office, Published by the European Patent Office, Directorate Patent Law 5.2.1, D-80298 Munich (hereinafter: GL).

⁴ Ashley, K. D.: *Modelling Legal Argument: Reasoning with Cases and Hypotheticals*. Cambridge (MA), 1990.

⁵ Tyree, A. L.: *FINDER: An Expert System* <<http://austlii.edu.au/~alan/aulsa85.html>> (Last modified: 6 Sept. 2004).

⁶ McCarty, L. T.: Reflections on TAXMAN: An Experiment in Artificial Intelligence and Legal Reasoning. *Harvard Law Review*, 90 (1997) 5. 837.

a completely new input and produce the learned output of the similar input. This is practically the scheme of reasoning by analogy.⁷

Fuzzy logic is another mathematical model that can be used to obtain an exact value in situations characterised by a certain level of indeterminacy—this being often the case in legal decision making.⁸ For example the exact amount of compensation needs to be decided by a judge based on indeterminate terms such as the degree of negligence.

Other Artificial Intelligence approaches seek only to assist the legal practitioner in argumentation. One of the applied tools is mathematical logic that has been reduced to practice in the form of argument assistants—software applications implementing the rules of logic for supporting argumentative tasks for lawyers. The classical logical argumentation model of Toulmin⁹ dates back to the 1950s and allows for drawing conclusions from given premises and warrants (inference licences) taking into account any counter argumentation in the form of a rebuttal. The possibility of rebuttals results in a defeasible argument, new information (counter-reasons, exceptions to a rule, etc.) can overturn a conclusion. Complex logical systems have been developed such as Verheij's Deflog¹⁰ to model further important phenomenon in legal argumentation such as reinstatement, which occurs when an overturned conclusion is held valid again on account of additional information. Argument support software traditionally involve graphical representation of arguments usually consisting of boxes corresponding to the propositional content of the arguments and of arrows expressing the relations between the arguments,¹¹ while other argumentation management systems such as ArguGuide¹² offer a content-oriented tool incorporating laws, precedents, facts and arguments for supporting legal argumentation tasks such as writing a plea.

Turning to patent law, Nitta et al. have developed an expert system focusing on the procedural aspects of patent law.¹³ The KRIP system (Knowledge Representation System for Laws relating to Industrial Property) provides a tool for checking the legality of each patent procedure. In order to achieve this, the procedures defined by patent law need to be identified as well as the relationships between the procedures and the conditions for starting/ending any such procedure. The KRIP system is designed for aiding formalities examination of a patent application, however, it is not adequate to tackle substantive examination of patentability which—for the most part—is linked to the patent claims defining the scope of legal protection.

⁷ For proposed application see, e.g. Hollatz, J.: Analogy making in legal reasoning with neural networks and fuzzy logic. *Artificial Intelligence and Law*, 7 (1999), 289–301.

⁸ See Philipps, L. et al.: Introduction: from legal theories to neural networks and fuzzy reasoning. *Artificial Intelligence and Law*, 7 (1999), 115–128.

⁹ Toulmin, S. E.: *The uses of argument*. Cambridge, 1958.

¹⁰ Verheij, B.: DefLog: on the logical interpretation of prima facie justified assumption. *Journal of Logic and Computation*, 13 (2003) 3, 319–346.

¹¹ See Schweers, M. et al.: Beyond boxes and arrows: argumentation support in terms of the knowledge structure of a legal topic, Proceeding of the 2007 conference on Legal Knowledge and Information Systems: JURIX 2007: The Twentieth Annual Conference, *Frontiers in Artificial Intelligence and Applications*, 165 (2007), 109–118.

¹² See Verheij, B.: Argumentation support software: boxes-and-arrows and beyond. *Law, Probability and Risk*, 6 (2007), 187–208.

¹³ See Nitta, K. et al.: KRIP: A knowledge representation system for laws relating to industrial property. *Logic Programming '85. Lecture Notes in Computer Science*, 221 (1986), 276–286, DOI: 10.1007/3-540-16479-0_27.

The complexity of patent claims has incited new approaches that are of a linguistic nature directed to simplifying patent claim sentences in order to paraphrase and summarise its contents. A single claim sentence is segmented into clausal discourse units, transformed into complete sentences, co-reference relations are established and a discourse structure is built between the discourse units.¹⁴ Paraphrasing and multilingual summarisation of patent claims are but a few aspects of semantics-based patent processing techniques. These and other applications are incorporated in PATExpert¹⁵ which, as an overall scientific objective, strives to change the current patent processing paradigm of textual processing to semantic processing.¹⁶

The present paper offers a new approach to assisting legal decision making and legal argumentation in the field of patent law. The proposed model differs from existing models both in substance and form. It relies on conventional, human argumentation and judgement in deciding basic factual questions related to the patent claims. The legal questions, on the other hand, are incorporated in the model itself whereby a complex legal finding can be obtained from the basic decisions.

2. The “patent claim feature” approach of the EPO

It is important to understand that over the years the EPO has established an approach that is best described as “patent claim feature” approach. The invention is seen essentially as a set of technical features. The “spirit” of the invention, the “underlying overall concept”, the “inventive recognition” bear but little significance in proceedings before the EPO. Instead the patent claims are examined on a feature-by-feature basis on a purely formal level. The applicant or patentee must succeed in formally limiting the claims from any prior art material, otherwise the EPO will reject the application or revoke the patent. Any such limitation is strongly restricted as the EPO also examines the allowability of amendments on a formal basis.

2.1. “Patent claim feature” approach in examining novelty and inventive step

The patent claim feature approach is best illustrated by the EPO’s methodology of performing the examination of patentability. The process can be divided into two clear stages: (1) examination of novelty and (2) examination of inventive step.¹⁷

A technical invention can only be patented if it is novel (does not form part of the state of the art) and if it involves an inventive step (meaning that it is not obvious to a person skilled in the art having regard to the state of the art). The invention for which protection is sought is defined in a single complex sentence, called patent claim. Such a patent claim

¹⁴ See Bouayad-Agha, N. et al.: Simplification of Patent Claim Sentences for their Paraphrasing and Summarization. *Proceedings of the Twenty-Second International Florida Artificial Intelligence Research Society Conference*, May 19–21, 2009, Sanibel Island, Florida, USA, 2009.

¹⁵ See website of the PATExpert project: <http://recerca.upf.edu/patexpert/>

¹⁶ Bouayad-Agha, N. et al.: Improving the comprehension of legal documentation: the case of patent claims. *The 12th International Conference on Artificial Intelligence and Law, Proceedings of the Conference*, June 8–12, 2007, Barcelona, Spain, 2009.

¹⁷ See Palágyi, T.: Assessment of patentability in the official practice of the European Patent Office. *Industrial Property and Copyright Review*, 107 (2002) 2, 43–48.

sentence is treated by the European Patent Office (hereinafter: EPO) as the set of technical features defining the invention.

To illustrate the denotation of patent claim features let us take a simple example: the inventor recognizes that certain materials, called magnets, interact with the Earth's magnetic field, whereby needles made of magnetic materials can be used as a navigation tool. The inventor files a patent application with the following patent claim:

Claim 1: Navigation tool comprising a needle made of magnetic material.

In the present example the EPO would consider the navigation tool, the needle and magnetic (as the material of the needle) to be features of the patent claim:

A = navigation tool

B = needle

C = magnetic (as the material of the needle)

When comparing the invention (Claim 1) with a prior art solution the EPO would consider whether the object of comparison is used for navigation, whether it comprises a needle, and whether this needle is made of a magnetic material. If all three questions are answered in the affirmative then the patent claim is said to "read onto" the given prior art solution. In this case the EPO will find that the patent claim is not novel. If however at least one of the features is not disclosed in the prior art, then the patent claim is said to be novel.

Hence, in the first stage of examination the EPO will compare the features of a given claim with every relevant state of the art disclosure revealed in the search (or presented by an opposed party) and determine whether or not any of the claim features are novel over the given prior solution. The examined claim need not differ from *all* the relevant prior art in the *same* feature; one feature may establish novelty over one prior art document, while another feature may serve to distinguish the invention from another piece of prior art.

If the claim passes the first stage of examination, i.e. the claim is found to be novel over all relevant prior art, the EPO's examiner will move onto assessing inventive step. According to the Guidelines of the EPO the examiner should normally apply the so-called problem-and-solution approach, which consists of three main stages:

(i) determining the "closest prior art",¹⁸

(ii) establishing the "objective technical problem" to be solved by determining the distinguishing feature(s) of the examined patent claim over the closest prior art, determining the technical effect of any such distinguishing feature, and formulating the objective technical problem as the aim and task of modifying or adapting the closest prior art to provide the established technical effect,

(iii) considering whether or not starting from the closest prior art it would have been obvious to a person skilled in the art solve the objective technical problem.

The last step is the least formal in the sense that there is no real objective measure for deciding obviousness. The Guidelines give exemplifying indicators of non-obviousness, such as an unexpected technical advantage, bonus effect; long felt need, commercial success; overcoming a technical prejudice; etc. The various considerations applied in the course of examining inventive step are not discussed here (although a decision support

¹⁸ "The closest prior art is that combination of features, disclosed in one single reference, which constitutes the most promising starting point for an obvious development leading to the invention." (GL C-IV, 11.7.1, T 606/89).

system could be envisaged), but the resulting binary decision as to inventive step (inventive/not inventive) can be fitted into the present model.¹⁹

2.2. “Patent claim feature” approach in examining infringement

Infringement is not regulated in the EPC system instead it is left to national law. However, the scope of protection is defined by the EPC, which is the most important requisite to dealing with infringement.²⁰ According to Art. 69 EPC the scope of protection is determined by the claims. This is a rather vague definition and the EPO has no proceedings in which it were required or entitled to interpret the scope of protection (not even when giving a technical opinion upon request of a competent national court under Art. 25 EPC), hence there is no uniform case law to be followed by the authorities of the Contracting States.

Article 69 EPC does not state clearly whether *all* the claim features need to be embodied in a solution to infringe the patent or if making use of the inventive concept expressed by the claim as a whole could also constitute infringement. A clear example of the interpretational freedom provided for by the EPC is the EPILADY²¹ case where the same product was found to be infringing an EPC patent in Germany but not in England.

Although the Protocol on the Interpretation of Art. 69 EPC aims to restrict the interpretational freedom of the Contracting States, still, national authorities are more or less free to apply their own national standards as to how the claims determine the scope of protection.

The present paper aims to show that the patent scope must be assessed on a feature-by-feature basis as well if the conferred protection is to be coherent with the EPO’s case law on the requirements of patentability.

2.3. “Patent claim feature” approach in examining amendments

The EPC system is based on the first-to-file principle, from which it follows, that once the patent application is filed the applicant may not improve his position by adding subject-matter that is not disclosed in the original application as filed. This is the underlying idea of Art. 123 EPC prohibiting any amendment to the patent claims, description or drawings that may in any way extend the subject-matter beyond the content of the application as filed. This paper only focuses on the assessment of patent claims; however, the same considerations apply to examining amendments of the specification or drawings.

The EPC does not define “subject-matter”, nor is there an interpretation of “extension”. The case law of the Boards of Appeal explains these terms and lays down the criteria for an allowable amendment. According to decision T194/84 the amendment extends the subject-matter if as a result of the amendment the person skilled in the art is presented with new information which is not directly and unambiguously derivable from the content of the patent application as filed, even when account is taken of the information implicit to the skilled person. This is the so-called *disclosure test*, according to which the “subject-matter”

¹⁹ See Kacsuk, Zs.: Role of the patent claims in patent law (Part I.)—Certain questions of patentability—state of the art, novelty and inventive step. *Industrial Property and Copyright Review*, 5 (115) (2010) 1, 55–83.

²⁰ Kacsuk, Zs.: Role of the patent claims in patent law (Part IV.)—Scope of protection, infringement and the doctrine of equivalents. *Industrial Property and Copyright Review*, 5 (115) (2010) 4, 5–20.

²¹ European patent EP 0 706 376 B1.

of a patent or patent application is none other than all information, which is either explicitly or implicitly contained in the patent application or patent as a whole, although implicit information content is very rarely accepted as the basis of an allowable amendment (see Visser, 2010). Where the amendment is in the form of replacement or removal of a feature from a patent claim the disclosure test is supplemented by decision T331/87, which reflects the same strict patent claim feature approach as discussed in connection with novelty.²²

2.4. “Patent claim feature” approach in examining a claim to priority

A prerequisite of assessing novelty and inventive step is to determine what forms the state of the art. The general rule is that everything made available to the public before the filing date of the examined patent (or patent application) constitutes state of the art (prior art). However, a patent application may benefit from the priority of an earlier patent application filed by the same applicant in any WTO member state not later than 12 months earlier. In such cases the state of the art is determined by the filing date of the earlier patent application, called the *priority date*. Hence anything made available to the public after the priority date cannot be held against the later patent application claiming priority of the earlier patent application.

A patent application may benefit from any number of priorities as long as all the earlier applications are filed within 12 months of the filing date of the patent application in question. However, only those inventions may enjoy the priority of one or more earlier patent applications which are fully disclosed in the earlier patent application.

The EPC system applies two kinds of priorities. One is defined by a complete, self-contained code of rules laid down in the EPC, while the other system is regulated by the Patent Cooperation Treaty (PCT).²³ The former priority system will be referred to as the EPC priority system. The EPC priority system is applicable in respect of Euro-direct application, i.e. patent applications filed directly with the EPO as opposed to the Euro-PCT applications, which designate or elect the EPO as a regional patent office within the meaning of the PCT.²⁴ The priority of the Euro-PCT applications is regulated by Art. 8 PCT which adopts the priority rules of Art. 4 of the Paris Convention.²⁵ The EPC priority system has also taken over the priority rules of the Paris Convention,²⁶ albeit not the exact wording, which could, theoretically, result in different interpretation of the priority rules for Euro-

²² For an overview of the criteria for an allowable amendment see Kacsuk, Zs.: Role of the patent claims in patent law (Part II.)—Judgement of amendments extending the scope of protection in the European and the Hungarian patent system. *Industrial Property and Copyright Review*, 5 (115) (2010) 2, 5–15.

²³ Patent Cooperation Treaty (PCT), Done at Washington on June 19, 1970, amended on September 28, 1979, modified on February 3, 1984, and on October 3, 2001.

²⁴ Article 2 (iv) PCT: “regional patent” means a patent granted by a national or an intergovernmental authority having the power to grant patents effective in more than one State.

²⁵ Paris Convention for the Protection of Industrial Property of March 20, 1883, as revised at Brussels on December 14, 1900, at Washington on June 2, 1911, at The Hague on November 6, 1925, at London on June 2, 1934, at Lisbon on October 31, 1958, and at Stockholm on July 14, 1967, and as amended on September 28, 1979.

²⁶ The main difference between the priority system of the EPC and the Paris Convention is that while the EPC allows for internal priority (claiming the priority of European patent application), the Paris Convention only provides for external priority (claiming the priority of a foreign patent application). See also Visser, D.: *The Annotated European Patent Convention*. 18th revised ed., Veldhoven, 2010.

direct and Euro-PCT applications. However, case law has established uniform interpretation for both regimes.²⁷

In the past decades the EPO has adopted the aforementioned strict patent claim feature approach in respect of the validity of a priority claim as well. The keyword to the application of this approach is the term “same invention” as introduced in Art. 87(1) EPC: priority may only be claimed in respect of the same invention. The case law has been somewhat ambiguous on the interpretation of “same invention” until first decision G3/93 then decision G2/98 clarified that in order for a patent claim to qualify as defining the same invention, the patent claim features—separately as well as in combination—must find direct support in the priority application as a whole.²⁸ G2/98 made it clear that if the patent claim introduces a new feature, removes or replaces a feature as compared to the disclosure of the priority application the claim may not benefit from the priority of the first application. G2/98 also points out that multiple priorities as provided for by Art. 88(2) EPC and Art. 4F(1) of the Paris Convention are only conceivable in respect of OR-claims (disclosing alternative embodiments), whereas AND-claims (requiring the presence of all the claim features simultaneously) may only be entitled to a single priority.

3. Logic model of the patent claims

3.1. Defining the features of a patent claim

As we have seen in the previous chapter the EPO’s patent claim feature approach involves identifying the features of the patent claim and assessing novelty, infringement, amendments and priority by reading the claim features onto the prior art, the allegedly infringing solution, the content of the patent application as filed or the priority application, respectively.

Starting from the exemplary patent claim of section 2, I will now introduce a logic approach to modelling patent claim features.

As we have seen the EPO treats “navigation tool”, “needle” and “ferromagnet” as patent claim features of the patent claim: “Navigation tool comprising a needle made of a magnetic material”. Such an approach is a good starting point; however, in my model I propose to define the features of a patent claim as logical statements.²⁹ Accordingly, the patent claim in the example can be broken down into the following logical statements, which will be regarded as the features of the claim:

A = The subject is a navigation tool.

²⁷ “The EPC—according to its Preamble—constitutes a special agreement within the meaning of Article 19 of the Paris Convention, the EPC is clearly intended not to contravene the basic principles concerning priority laid down in the Paris Convention” (cf. decision T 301/87, reasons point 7.5). Affirmed by G3/93 and G2/98. Thus the priority rules of the Paris Convention are to be interpreted the same way as the priority rules of the EPC. See also Kacsuk, Zs.: Role of the patent claims in patent law (Part III.)—Comparing the Hungarian, European, International and Paris Convention priority systems. *Industrial Property and Copyright Review*, 5 (115) (2010) 3, 5–27.

²⁸ See Svingor, A.: Claiming of priority according to EPC in the light of two decisions of the Enlarged Board of Appeal, *Industrial Property and Copyright Review*, 108 (2003) 1, 45–49.

²⁹ For solving an exemplary case with logical statements see Kacsuk, Zs.: The analysis of the European priority law in the practice of the European patent office—or how should we claim the priority of a cooking pan for a plastic glass? *Industrial Property and Copyright Review*, 3 (113) (2008) 6, 69–87.

B = The navigation tool has a needle.

C = The needle is made of a magnetic material.

Ideally, the logical statements should be atomic in the sense that they cannot be broken down into more basic statements. In reality the patent claim features as statements can never be “atomic” because the patent claims are formulated in a natural language and the words of any natural language have a *field* of meaning rather than a precise (singular) meaning. For example the meaning of “magnetic material” will embrace various different materials such as steel, iron, cobalt, rare-earth magnets, etc. Even the sub-categories of magnets will incorporate a range of further materials, e.g. “rare-earth magnet” covers gadolinium, dysprosium, etc.. Instead of the expression atomic I will refer to such statements as “basic”, knowing that depending on the circumstances the basic statements may be broken down to even more basic sub-statements just like “magnetic material” covers steel, iron, cobalt, etc.

In this approach reading a claim feature on the prior art, on an allegedly infringing solution, etc. is carried out by deciding whether the statement is true or false in respect of the object of comparison (prior art solution, allegedly infringing solution, etc.). From the point of view of adjudication the statement is either true or false, there is no third possibility—in grant proceedings, opposition proceedings, revocation proceedings, or infringement law suits the competent authority is compelled to take a decision on whether the claim defines a novel invention, whether any amendments were allowable, whether priority can be acknowledged, whether there is an infringement of the patent.

In logic when two or more criteria need to be satisfied simultaneously the statements describing such criteria are connected by an AND connective. Similarly, if the features of a patent claim are regarded as statements, and the claims are to cover solutions embodying *all* of the claim features, this should be expressed by connecting the statements with the AND connective. In the example of the navigation tool:

Claim 1 = (the subject is a navigation tool) AND (the navigation tool has a needle) AND (the needle is made of a magnetic material) = A & B & C.

3.2. Structure of the claims

In order to decide on the nature of the logical connectives that should be applied between the basic statements we need to examine the legal areas where we hope to introduce the formal patent claim model. As I have stated in the introduction, patent claim assessment plays a key role in the examination of (i) patentability, in particular novelty; (ii) infringement; (iii) amendments; and (iv) priority.

In each patent claim assessment category a distinction should be made between questions of law and questions of fact although the latter is often influenced by case law as well. Questions of fact are related principally to the truth evaluation of the basic statements expressing the claim features—the basic statements are either true or false in connection with a prior art solution, the allegedly infringing solution, the content of the application as filed, or that of the priority application. On the other hand questions of law are a matter of positive law (statute—principally the EPC) and case law (principally the case law of the Boards of Appeal and Enlarged Board of Appeal as well as the customary law expressed in the Guidelines).

The EPO’s patent claim feature approach illustrated in the previous chapter implies that the basic statements expressing the claim features must be taken into account in an AND-combination in the formal model:

(i) as regards novelty the patent claim is not novel over a prior art reference if the latter discloses all the claim features in combination (A & B & C);

(ii) as regards infringement, a solution infringes the patent if all the patent claim features (A & B & C) can be read onto it;

(iii) as regards amendments, an amendment of a patent claim is allowable if the subject-matter determined by all the features of the amended patent claim (A & B & C) is directly derivable from the contents of the original application as filed; and

(iv) as regards priority, the priority claim is valid only if the invention defined by the combination of all the patent claim features (A & B & C) is directly derivable from the content of the priority application.

Determining the structure of a patent claim also requires semantic interpretation of the claim as the EPC system allows OR-claims, i.e. claims in which closely related but distinct inventions are claimed at the same time. For example:

Claim 1: Navigation tool comprising a needle made of iron or steel.

(Iron and steel being two types of permanent magnetic materials.) In this case there are four basic statements expressing the claim features:

A = The subject is a navigation tool.

B = The navigation tool has a needle.

C = The needle is made of a iron.

D = The needle is made of a steel.

The OR-type conjunctive particles (“or”, “either”, etc.) of the claims have been interpreted by case law as indicators that the claim embraces more than one inventions the features of which are generally alternatives not to be combined. Thus in the present case the first invention claimed is A & B & C (navigation tool comprising a iron needle), while the second invention is A & B & D (navigation tool comprising steel needle). The whole claim should be expressed as the OR-combination of two distinct claim variants:

Claim = (A & B & C) or (A & B & D).

3.3. A logic model of patent claims

In view of the above legal and non-legal considerations and in particular the EPO’s patent claim feature approach I propose to introduce a logic model for describing patent claims, which treats patent claim features as basic statements and allows true/false interpretation of the basic statements as well as the possibility of connecting the basic statements by logical connectives.³⁰ As we have seen, the structure of the claims (i.e. the logical connectives connecting the basic statements) is determined by positive law and case law, while the truth assessment of the basic statements is primarily a matter of fact to be decided by the competent authority.

The basic statements corresponding to the patent claim features will be denoted with capital letters of the alphabet (A, B, C, etc.). Each basic statement has a truth evaluation—the basic statement is either true or false in respect of the object of comparison (prior art, infringing solution, original patent application, priority application).

The logic model uses three types of logical connectives: the AND connective (&), the OR connective (\vee) and the NOT connective (\neg) as negation.

³⁰ For a more strict mathematical formalism see Kacsuk Zs.: The mathematics of patent claim analysis. *Artificial Intelligence and Law*, DOI 10.1007/s10506-011-9107-2, 2011.

The logical connectives are used to connect the basic statements the same way the AND-connectives and OR-connectives were used in the previous chapter to express the relationship between the claim features and thereby define the structure of the patent claim. It should be noted that the OR-connective of the patent claim language is generally an exclusive disjunction, i.e. either one feature or the other, but not both. In the patent claim language the non-exclusive (potentially inclusive) disjunction is nearly always emphasized by writing “and/or” in order to ensure that no court or authority will interpret the claim more strictly by excluding the possibility of the features being present simultaneously.

The patent claim is modelled by a compound statement which is made up of the basic statements corresponding to the claim features (A, B, C) and the logical connectives (&, or, not) defining the relationship between the claim features.

The truth evaluation of the basic statements is used to model the decision of the competent authority who examines whether a claim feature reads onto the object of examination, which is a factual question. The overall legal finding (novel/not novel, infringing/not infringing, etc.) follows from the truth evaluation of the basic statements. For example a compound statement **P** formed of two basic statements connected by an AND connective is true if and only if both basic statements are true, i.e. $\mathbf{P} = \mathbf{A} \ \& \ \mathbf{B} = \text{true}$ if and only if $\mathbf{A} = \text{true}$ and $\mathbf{B} = \text{true}$ at the same time. A compound statement formed of two basic statements connected by an *exclusive* OR connective is true if one of the statements is true: $\mathbf{P} = \mathbf{A} \ \vee \ \mathbf{B} = \text{true}$ if either $\mathbf{A} = \text{true}$ and $\mathbf{B} = \text{false}$ or if $\mathbf{A} = \text{false}$ and $\mathbf{B} = \text{true}$.

4. Application of the logic model

In the following sections I will demonstrate the application of the introduced logic model by way of examples.

4.1. Novelty

A patent claim may exhibit four differences with respect to a prior art disclosure:

- (i) a new feature (i.e. a feature not disclosed in any form in the prior art solution);
- (ii) a generic feature (i.e. a general feature of which a specific example is disclosed in the prior art);
- (iii) a specific feature (i.e. a feature, which is a specific example of a more general feature disclosed in the prior art);
- (iv) a substituting feature (i.e. a feature replacing a prior art feature but not having a generic-specific relation thereto)
- (v) an omitted feature (i.e. the omission of a prior art feature).

I recall that a patent claim determines a novel invention if the claim does *not* read onto the prior art. Hence, in the present logic model a claim is held novel over a prior art disclosure if the evaluation of the claim as a whole is *false*.

4.1.1. New feature

In the present example the examined EPC patent claim is:

Claim **P**: Navigation tool comprising a needle made of a magnetic material.

The basic statements of the examined patent claim **P** are:

A = The subject is a navigation tool.

B = The navigation tool has a needle.

C = The needle is made of a magnet.

Hence the examined claim **P** can be modelled as: $P = A \& B \& C$.

The patent claim will be compared with prior art material (**PRA**) disclosing a prior solution which can be modelled by the basic statements:

A = The subject is a navigation tool.

B = The navigation tool has a needle.

Hence the prior art solution can be modelled as: $PRA = A \& B$.

The question to be decided for the purpose of examining novelty is whether prior art **PRA** teaches A, B and C features, i.e. whether all three basic statements are true in respect to **PRA**. As postulated **PRA** only teaches features A and B, thus these basic statements are true, while basic statement C is false in respect to **PRA**:

A = true

B = true

C = false

In logic a composite statement made up of basic statements connected by AND connectives is true if and only if all basic statements are true. Hence, in the present situation, since basic statement C is false the logical model renders as result that the patent claim as a whole is false:

$P = A \& B \& C = \text{false}$

In accordance with our expectations the evaluation of claim **P** comprising the novel feature C is false (it does not read onto the prior art) thus claim **P** is considered to be novel over the prior art disclosure **PRA**.

Conclusion: In decision T411/98 the Board interpreted the requirement of novelty such that an invention is lacking novelty if all its features are known from the prior art. This practice is consistent with the logical model, which renders the claim novel if at least one of the basic statements is evaluated as false (i.e. if at least one of the features does not read onto the prior art).

4.1.2. Generic feature

As a second example let us consider the same patent claim ($P = A \& B \& C$) as in the previous section, which is compared with a specific prior art solution (**PRA**) modelled by the basic statements:

A = The subject is a navigation tool.

B = The navigation tool has a needle.

C1 = The needle is made of steel.

In the present example patent claim feature C (The needle is made of a magnetic material) is a generalisation of the prior art feature C1. Accordingly, in the logic model C can be written as $C = C1 \vee (C \& \neg C1)$. This would translate back to English as

The needle is made of steel OR the needle is made of a magnetic material but NOT steel.

The above logic transformation is thus none other than the artificial division of “magnetic materials” into two groups:

1. the group containing steel
2. the group containing all magnetic materials but NOT steel.

The patent claim **P** is thus broken down to two mutually exclusive claim variants as illustrated in Fig 1. Claim variant **P1** comprises the features (basic statements) A, B and C1, while the second claim variant **P2** comprises the features A, B, C and $\neg C1$ (not C1).

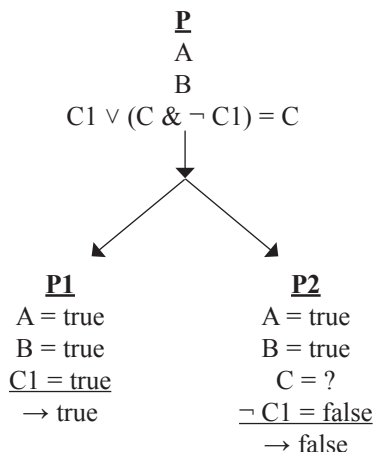


Fig. 1

The basic statements representing the claim features are written under the letters representing the claim and the two claim variants. The statements arranged vertically within the same column are understood to be connected by the AND connective, while the statements connected by any other connective are arranged horizontally with respect to each other and the connective is explicitly indicated. The logic evaluation of the statements reflecting the authority’s evaluation of the corresponding claim feature is indicated next to the statement. The evaluation of the first claim variant **P1** is very simple, the authority will establish that the basic statements A, B and C1 clearly read onto the prior art (all three features are disclosed in **PRA**), thus the logic evaluation of all three statements is “true”. As a consequence the evaluation of the first claim variant **P1** is also true, meaning that the first claim variant **P1** is not novel over the prior art **PRA**.

In the case of the second claim variant **P2** the evaluation of the compound statement **C** remains undecided, however since feature C1 is evaluated as “true”, the evaluation of the negation of C1 ($\neg C1$) is necessarily false (the negation of a true statement is false). Since one of the basic statements forming **P2** is false the evaluation of the second claim variant **P2** as a whole is also false regardless of the evaluation of C. Hence the second claim variant **P2** is novel over prior art material **PRA**.

It rests to decide whether or not patent claim **P** comprising as alternatives patent claim variant **P2** that is novel and a patent claim variant **P1** that is lacking novelty over prior art **PRA** is novel.

The patent claim **P** is composed of the two claim variants such that: $\mathbf{P} = \mathbf{P1} \text{ or } \mathbf{P2}$. As we have seen in the previous section the evaluation of a compound statement formed by an OR-connective is true if one and only one of the two statements is true. In the present case $\mathbf{P1} = \text{true}$ while $\mathbf{P2} = \text{false}$, which results in the patent claim as a whole being true ($\mathbf{P} =$

true). When translated back to the legal language this means that the patent claim **P** reads onto the prior art **PRA**. Thus it is not novel in view of **PRA**.

Conclusion: The EPO would make the same finding by applying the “specific vs. generic” rule (see Guidelines C-IV, 9.5): a specific disclosure takes away the novelty of a generic claim embracing that disclosure. Hence, it can be established the “specific vs. generic” rule is not an arbitrary interpretation adopted by the EPO but rather a logically consistent rule which can be fitted into the proposed logic model.

4.2. Infringement

As mentioned before the EPC system leaves the interpretation of the scope of protection of an EPC patent up to national law. However, legal certainty of third parties has to be guaranteed by making sure that the intellectual property right does not affect the public domain or third party’s existing intellectual property rights. Hence, if the scope of protection of a patent embraces an allegedly infringing solution (product, method or use) this solution should give rise to revocation (or limitation) of the patent whenever it can be proven that the solution belonged to the state of the art at the time of filing the patent application (having regard to its priority as well).

If we apply the EPO’s patent claim feature approach to decide upon infringement, this criteria is readily fulfilled, which can be easily demonstrated by the present logic model.

When deciding upon infringement, similarly to the assessment of novelty, the authority evaluates whether the basic statements representing the claim features read onto the allegedly infringing solution. The true or false evaluation of the basic statements allow for the logic evaluation of the compound statement representing the patent claim as demonstrated in the previous chapter. If the evaluation is true, the patent claim reads onto the examined solution, thus it infringes the patent protection. If the evaluation is false, the patent claim does not read onto the examined solution, meaning that it lies outside of the scope of protection.

4.2.1. Extra feature

When examining infringement the patent claim may exhibit five differences with respect to the allegedly infringing solution (product, method or use): (i) an extra feature; (ii) a more generic feature; (iii) a more specific feature; (iv) a substituting feature; and (v) a feature not embodied in the solution. These five cases correspond to the five cases of the novelty examination.

The first case (an extra patent claim feature) corresponds to the situation examined in section 4.1.1, whereby a similar finding can be made: if the patent claim ($P = A \& B \& C$) contains an extra feature (C) with respect to the allegedly infringing solution (A & B) the logic evaluation of this feature (C) will be false, whereby the evaluation of the patent claim as whole will be false as well:

A = true

B = true

C = false

Resulting in:

$P = A \& B \& C = \text{false}$

Conclusion: It can be established from the logic model that in the patent claim feature approach if a claim feature is not present in the allegedly infringing solution this suffices to come clear of the scope of protection. If this were not the case, the user of a prior art

solution would be found liable for infringement, while at the same time the above prior art solution (A & B) could not occasion revocation of the patent claim (A & B & C) based on lack of novelty.

4.2.2. *Generic feature*

The second case relates to the situation wherein a generic feature of a patent claim is embodied in the form of a specific feature in an allegedly infringing solution. Again the same example can be used as for the assessment of novelty in section 4.1.2. The evaluation of claim $P = A \& B \& C$ with respect to the allegedly infringing solution defined by A & B & C1 is performed in the same way and yields the same result as indicated in Fig n. 1 of section 4.1.2.

As established in section 4.1.2 the claim variant **P1** reads onto the allegedly infringing solution, while claim variant **P2** does not. Patent protection would have no value if the patent claims had to be as detailed as to encompass only one embodiment, instead it is allowed to claim an invention in more general terms, e.g. in the present example C stands for “magnetic material” encompassing “steel” as a possible embodiment of magnetic material. Hence, infringement should be established in the present situation.

Conclusion: If the scope of protection is interpreted in line with the EPO’s patent feature approach it embraces all the specific embodiments of a generic feature. This is counterbalanced by the fact that if any such specific embodiment belonged to the state of the art it could constitute a ground for revocation based on lack of novelty. For example in the present situation, if the allegedly infringing solution (A & B & C1) belonged to the state of the art, it would take away the novelty of the patent claim as we have seen in section 4.1.2.

4.3. *Amendments and priority*

In the European patent system amendments and the validity of a priority claim is treated very much the same way.³¹ Both questions require the same analysis: on the one hand it has to be asserted that all the patent features find a direct basis in the original application/priority application (i.e. the patent feature may not be novel over the original application/priority application), on the other hand it has to be made sure that all the features are present in the patent claim which have been disclosed in the original application/priority application as an essential feature.

When examining amendment of a patent claim or validity of a priority claim the patent claim features are compared to the content of the original application/priority application as a whole including information implicit to a person skilled in the art.

Again, five types of differences may be distinguished with respect to the original application/priority application (a new feature; a generic feature; a specific feature; a substituting feature; and an omitted feature) of which only the case of a generic feature will be discussed here to illustrate the application of the present logic model. The patent claim features are expressed by the same basic statements as in section 4.1.2.

³¹ See e.g. G1/03, G2/03, Reasons for the decision, 4. point: “*In order to avoid any inconsistencies, the disclosure as the basis for the right to priority under Article 87(1) EPC and as the basis for amendments in an application under Article 123(2) EPC has to be interpreted in the same way.*”

The logic model is applied in the same way as in the case of examining novelty. The invention disclosed in the original/priority application is indicated by **P**, while the amended patent claim and the patent claim claiming priority of invention **P**, as the case may be, are indicated by **P'**.

The results are recapitulated in Table 1. As can be seen patent claim **P'** embraces two claim variants **P1'** and **P2'** (relating to “a navigation tool comprising a needle made of steel” and “a navigation tool comprising a needle made of any magnetic material but not steel”). The same logic evaluation can be performed as in the previous sections, the result of which is that the first claim variant **P1'** reads onto the disclosed invention while the second claim variant **P2'** does not.

Table 1. Comparison of examination of amendments and priority

	Amendment	Priority
2. Generic feature	P' = A ∧ B ∧ C compared to P = A ∧ B ∧ C1	
Graphical representation:	<div style="text-align: center;"> <p><u>P'</u> A B C1 ∨ (C & ¬ C1) = C</p> </div>	
Evaluation:	first claim variant: P1' = A & B & C1 = true second claim variant: P2' = A & B & C & ¬ C1 = false	
Conclusion:	unallowable amendment	priority of P1' is valid priority of P2' is invalid
Legal background:	T194/84 (disclosure test)	G2/98

4.3.1. Amendment

The legal requirement of an allowable amendment is that it does not extend the subject-matter with respect to the original application. In the present example only the specific feature C1 (steel) is disclosed in the original application, hence the evaluation of patent claim variant **P2'** comprising the more generic feature C (magnetic material) is false, which is interpreted in the legal language such that the subject-matter covered by claim variant **P2'** consists an unallowable extension of the original patent application contravening Art. 123 EPC.

Turning to current case law, according to decision T194/84 an amendment extends the subject-matter if as a result of the amendment the person skilled in the art is presented with new information which is not directly and unambiguously derivable from the content of the patent application as filed (so-called disclosure test). In the present example the same result is reached by applying the disclosure test of decisions T194/84 as with the logic model: the general teaching implies additional information with respect to the original specific teaching.

Former case law applied the so-called novelty test of decision T201/83 for determining the allowability of an amendment. According to the novelty test the amendment is unallowable only if the amended patent claim is novel over the original patent application. The novelty test would be unable to detect extension of the subject-matter in the present example as the generic invention is not novel over a specific disclosure as we have seen in section 4.1.2.

Conclusion: This is a clear example of how the logic model would have been able to predict a situation in which the former case law decision T201/83 would have proved inadequate. It can also be established that current case law decision T194/84 is consistent with the logic model.

4.3.2. Priority

In the case of examining priority, the first thing to be noted is that Art. 88(2) EPC explicitly allows for claiming multiple priorities in respect of a single patent claim. Accordingly, the validity of the priority claim in respect of each patent claim variant should be examined independently.

The first claim variant **P1'** corresponds to the invention **P** disclosed in the priority application, it may thus benefit from the date of priority. However, the second claim variant **P2'** does not read onto the priority application, and the priority claim is invalid in respect of **P2'**. This is reflected by the evaluation of the two claim variants: **P1'** = true while **P2'** = false.

In former case law decision T828/93 the Board of Appeal found that the possibility of claiming multiple priorities for a single patent claim is only available in respect of OR-claims (claims containing explicit alternatives). Thus T828/93 is unable to handle the present situation where the patent claim feature C takes the form of a generalisation with respect to the specific feature C1 disclosed in the priority application.

In decision G2/98 the Board expanding the concept of OR-claims and drew the conclusion that a generic term or formula encompassing specific features may also benefit from different priorities in respect of the different specific embodiments falling within the scope of the generic patent claim.³²

Conclusions: The logic model makes it clear that a generic claim describes alternatives in the same way as OR-claims do. The present model could have helped recognise the inadequacy of the guidelines given in T828/93 and could have pointed to the more complete rule of G2/98.

³² "(...) where a first priority document discloses a feature A, and a second priority document discloses a feature B for use as an alternative to feature A, then a claim directed to A or B can enjoy the first priority for part A of the claim and the second priority for part B of the claim. It is further suggested that these two priorities may also be claimed for a claim directed to C, if the feature C, either in the form of a generic term or formula, or otherwise, encompasses feature A as well as feature B" (G2/98, Reasons of the decision, point 6.7).

5. The hidden logic behind the EPO's case law

The EPO established the patent claim feature approach as an objective method for assessing the patent claims in a self-consistent way. Former divergent interpretations, which would not fit into the present logic model, were found to be logically inconsistent (see all the non-uniform case law calling for the decisions of the Enlarged Board of Appeal) or to be unsatisfactory for regulating all aspects of a certain question (e.g. the novelty test was inadequate for screening out all types of amendments that would extend the subject-matter). Over the past decades the EPO's case law has gradually turned to the presently applied patent claim feature approach, the logical consistency of which is apparent from the fact that it can be modelled by a logic model. Albeit, minor inconsistencies may remain, but the trend indicates that the EPC system is self-regulating in the sense that it allows for over turning logically inconsistent decisions.

Although the EPO's patent claim feature approach can be regarded as a product of the grant procedure dealing with practical issues related to the patentability of an invention, I am going to demonstrate that this approach is equivalent to stipulating that the scope of protection should be interpreted on a feature-by-feature basis.

A patent is a right *in rem*, i.e. a right competent, or available, against all persons. Accordingly, when granting a patent, when examining the validity of a patent and its priority claim, as well as when enforcing a patent the central issue is always the legal position of the patentee with respect to third parties. The legal position is defined by the scope of protection, hence

(i) the purpose of examination as to novelty is to ensure that the scope of protection does not encompass the state of the art (which either belongs to the public domain or to somebody's private intellectual property);

(ii) the purpose of deciding on infringement is to enforce the patentee's intellectual property rights against unauthorized use of any embodiment of the invention (and possibly equivalent variations thereof) falling within the scope of protection;

(iii) the purpose of examining any amendment of a patent application is to ensure that the scope of protection is not broadened beyond the subject-matter disclosed in the original application as filed in order not to give unwarranted advantage to the applicant, while the purpose of examining any amendment of a granted patent is to ensure that the scope of protection is not broadened in an absolute sense for the legal certainty of third parties;

(iv) the purpose of examining priority is to draw a clear line between what constitutes the state of the art which may not be encompassed by the scope of protection, and any later disclosure or intellectual property right, which should not invalidate the applicant's/patentee's claim to patent protection.

It is interesting to note that all four aspects of patent claim assessment relate to the scope of protection, the interpretation of which, however, is not within the EPO's jurisdiction. I will now demonstrate that the EPO's patent claim feature approach applied for the examination of novelty, amendments and priority amounts to the postulation that the scope of protection is assessed on a feature-by-feature basis as well in accordance with the EPO's patent claim feature approach.

When assessing novelty the competent authority must ensure that any solution belonging to the state of the art will not fall within the scope of protection. In the feature-by-feature patent scope approach the prior solution is covered by the examined patent claim if each and every claim feature reads onto the solution. In the latter case the authority must declare the patent claim non-novel in order to bar the intellectual property right from

coming into force as that would lead to privatization of the public domain or to collision with a third party's prior rights. Hence assessment of novelty means assessing whether or not the prior solution falls within the scope of protection of the examined patent claim. If the scope of protection is determined by the EPO's patent claim feature approach, so must novelty be.

As regards amendments, an amendment must not result in the scope of protection modified so as to encompass embodiments potentially belonging to the public domain or to a third party's property rights. The EPC system does not bar the applicant from altering the desired scope of protection, consequently, up to grant all embodiments disclosed in the patent application (and not already belonging to the state of the art) may potentially form the basis for a claim to patent right—third parties are expected to respect this and refrain from exploiting any such embodiments before grant. When the patent is granted the limits of the associated intellectual property right are also set. Rights associated with embodiments falling within the scope of protection form part of the patentee's intellectual property rights, whereas all embodiments lying outside of the scope of protection become part of the public domain. Hence the requirement in respect of amendments is twofold. Before grant the scope of protection may not be altered so as to encompass anything lying outside of the subject-matter disclosed in the original application as filed, since any undisclosed embodiments may have become part of the public domain or of a third party's property rights since the filing date. The grant has for effect that the public domain is expanded by any subject-matter disclosed in the original application as filed but not encompassed by the scope of protection of the claims as granted, hence on the one hand an amendment of a granted patent may not extend the scope of protection to any such subject-matter originally disclosed but having been abandoned to the public domain and on the other hand to undisclosed subject-matter. In order to ascertain the allowability of an amendment the authority is required to examine whether as a result of the amendment the scope of protection extends to new subject-matter (originally not disclosed) or subject-matter abandoned to the public domain by virtue of the grant. If the scope of protection is determined based on the patent claim feature approach, consequently the examination of pre-grant or post-grant amendments should be carried out in the same spirit.

Validity of a priority claim is a preliminary question to defining the state of the art for the purpose of examining novelty of the patent claim. An invalid priority claim leads to the patent claim being refused or revoked only if there is relevant prior art or prior right falling within the intermediate period between the priority date and the filing date. If the scope of protection of a patent claim embraces embodiments that were not present in the priority application it may occur that such an embodiment became part of the public domain or a third party's intellectual property before the filing date of the examined patent application. The embodiment having become prior art or prior right may no longer be monopolized as a result of a subsequent filing. Thus priority can only be acknowledged in respect of patent claims the scope of which only embraces embodiments that were already disclosed in the priority document. Since we postulated that the scope of protection should be assessed based on the patent claim feature approach, the same approach must be applied for assessing the validity of the priority claim, too.

In view of the legal role of the patent claims, the true meaning of the EPO's patent claim feature approach is the assumption that the scope of protection should be interpreted on a feature-by-feature basis. The EPO has no direct influence on the interpretation of the scope of protection, however, by imposing the application of the patent claim feature approach in assessing the validity of a patent consistency of the EPC system requires that

the scope of protection be assessed on a feature-by-feature basis in patent infringement law suits as well. In other words, whatever standards are applied in the grant phase these should be taken into account when enforcing the resulting intellectual property right.

6. Conclusion

In the present paper I have introduced a logic model for the legal examination of European patent claims and shown its application in four different fields (assessment of novelty, infringement, allowability of amendments, and validity of a priority claim). I have shown that while findings based on case-law require the application of various decisions of the Boards of Appeal and Enlarged Board of Appeal, the proposed logic model provides for a common approach in all three fields of patent claim examination.

The logic model is based on mathematical logic and yields—in the illustrated situations—the same result as case-law would dictate. This indicates that current case-law has evolved into a logically highly coherent system. There are however, particular situations (not discussed here) wherein the logic model is in conflict with the current case-law. In such situations the results obtained from the logic model can help detect hidden inconsistencies of the case-law. I have shown a few specific examples where earlier case-law has been overturned by more recent decisions reflecting the logical requirements that could have been revealed by the logic model in advance.

This paper cannot endeavour to discuss every possible situation that may arise under each field of patent claim examination; however, I have applied the logic model to other situations as well obtaining various interesting results. In my view a logic approach to patent claim assessment would be desirable for reviewing current case-law as well as for assisting future decision making possibly in the form of a computerised expert system based on the logic model. The logic model is not designed to substitute the patent professionals nor will it eliminate subjective considerations, it is merely a supporting tool as is mathematics in all fields of technology and natural sciences.