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Will AI Change How We Innovate?

A Study of Inventive AI, Patentability, and Inventorship in Light of the DABUS case

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Summary

The U.S. painter Helen Frankenthaler, a behemoth of post-war American abstractionist painting, once described the act of inventing as an activity without rules. "This is how art is born, how breakthroughs happen. Go against the rules or ignore the rules. That is what invention is about", she is quoted saying in a 1994 interview with legendary publisher Ken Tyler.

In contrast with the precise and careful methodology of the law, the process of the artist or the inventor appears wildly different. Yet, within the construct of patent law, the two are forced to coexist, creating a fascinating matrix wherein attempts can be made to bring structure to the complex and precision to the unprecise.

This thesis aims to shine the light on an up until very recently rather undiscovered area of patent law, namely the patentability of AI inventions and AI's ability to attain inventorship status. This has not been a major issue in the past, seeing how even the most advanced AIs at most could be considered advanced machinery, appropriate for use as a tool or a means to a specific end by a training professional. Today, however, AI systems have grown far more advanced. So advanced, in fact, that they seemingly invent on their own as well as in a manner not unlike how humans invent.

Building on a foundation of existing Swedish and European patent legislation and a comparative study of relevant Australian, British, and American statutes and precedence, this thesis seeks to find whether now is the time to challenge the existing interpretation of AI's standing vis-a-vis patentability and inventorship.

In summary, this thesis sets out to answer the above by asking whether or not an AI may achieve inventive step, and whether or not an AI, in lieu of achieving legal status, may succeed rights related to any inventive works to a natural person in accordance with Swedish and European patent law.

In its findings, this thesis argues that the concept of inventor and inventorship is neither exhaustively defined in a legal sense nor applied correctly in a dictionary sense. By reviewing Swedish and European patent law, this thesis also discusses alternative interpretations of relevant patent law provisions in contrast to the rapid development in the field of inventive AI.

Sammanfattning

I en intervju med publicisten Ken Tyler så beskrev den amerikanska efterkrigskonstnären och abstraktionisten Helen Frankenthaler uppfinnarskapet som en regellös aktivitet: "Så föds konsten, på det sättet sker genombrott. Bryt mot reglerna eller ignorera dem. Det är vad uppfinnarskap handlar om."

Jämfört med juridikens precisa och noggranna metodik så framstår uppfinnandets skapande metod något annorlunda. Inom patenträtten så kan dessa två krafter dock samverka och skapa en fascinerande matris inom vilken försök att strukturera det komplexa och precis formulera det oprecisa kan ske naturligt.

Detta examensarbete riktar in sig på den relativt nyetablerade grenen av patenträtten som berör AI-uppfinningar och AI som uppfinnare. Tidigare så har utvecklingen av AI inte frambragt några komplexare utmaningar av juridisk natur då potentialen därtill hållits tillbaka av nivån på den tillgängliga tekniken. Idag så ser dock situationen annorlunda ut tack vare enorma framsteg på just teknikens område. AI kan idag vara så avancerad så tekniken i vissa situationer förefaller kunna uppfinna så väl på egen hand som på ett sätt mycket likt människans.

Genom att först utreda gällande svensk och europeisk rätt på patenträttens område och sedan, genom komparativ metod jämföra relevanta delar av lagstiftning och praxis från Australien, England och USA, så söker detta examensarbete utröna huruvida tiden är kommen att utmana de existerande tolkningarna kring AI, patentbarhet och uppfinnarskap.

Sammanfattningsvis så söker detta examensarbete finna dessa svar genom att ställa frågan huruvida AI potentiellt kan uppfinna i lagens mening genom att uppnå uppfinningshöjd, samt huruvida en AI som inte kan uppnå status som fysisk eller juridisk person kan överlåta rättigheterna till en fysisk person i enlighet med gällande svensk och europeisk patenträtt.

I slutdiskussionen argumenterar detta examensarbete för att den primära juridiska tolkningen av uppfinnare och uppfinnarskap saknar närmare definition samt att andrahandstolkningen enligt termens ordboksdefinition utgör en föråldrad bild av uppfinnare och uppfinnarskap. Genom analys av både svensk och europeisk patenträtt så diskuteras även alternativa tolkningar av relevanta juridiska frågeställningar mot bakgrund av den snabba tekniska utvecklingen av AI.

Preface

It has been brought to my attention that I could do well by adjusting my expectations on the staying power of this thesis. In my defence, I would argue that one piece of work completing a puzzle five years in the making might warrant some slight obsessive behavior. Although not all good, those years helped shape me into the person that in yearly 2020 left for the UK. Before I close out this particular chapter, however, I have several people that are deserving of recognition for putting up with me all these years.

I would like to extend the warmest of thanks to Lewis Johnston of the Chartered Institute of Arbitrators. Mr. Johnston's belief in me not only led to some of the most profound lessons of my early career, but it also created the foundation upon which I have been able to continuously challenge myself and grow as a professional. Being able to hit the ground running in the UK was – and will always be – formative beyond what words can describe. I will be forever grateful.

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It might go without saying, but I am very thankful for my supervisor, Martin Sunnqvist, who, time and again, has gone above and beyond in offering guidance and support. I simply hope that the quality of this thesis might be reflective of that.

För min familj som alltid stöttat mig i allt jag tagit mig för är jag mer än oerhört tacksam. Att ha ett tryggt hem att luta sig mot är ett privilegium som jag inte är helt säker på hur ni alltid lyckats upprätthålla. Tack.

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One last hooray.

Ludvig Hambraeus

Stockholm, Sweden, December 22nd, 2021

Abbreviations

ANN	Artificial Neural Networks
AI	Artificial Intelligence
BoA	Board of Appeal (EPO)
DL	Deep Learning
EBoA	Enlarged Board of Appeals (EPO)
EPC	European Patent Convention
EPO	European Patent Office
LJ	Lord Justice
ML	Machine Learning
NIR	Nordiskt Immateriellt Rättsskydd
PRV	Patent och registreringsverket
R&D	Research & Development
UKIPO	United Kingdom Intellectual Property Office
USPTO	United States Patent and Trademark Office
WIPO	World Intellectual Property Organization

1 Introduction

*“It’s partly true, too, but it isn’t all true.
People always think something’s all true”¹*

- J.D. Salinger

1.1 Background

The law as a concept is, fundamentally, built upon the managing of people through anticipation of their actions. Its norms have become understood as having to be linked to humans in order to fully function.² As a system, then, the law is intrinsically linked with human behavior. As a result, for most of our time here on Earth, little thought has been given to the legal ramifications of non-human actions that are laterally comparable to those of actual human beings. At this point in time, however, with the automation of knowledge-based labor appearing on the horizon, the law, much like the people whose behavior it manages, has found its interpretive precedence of work, inventing, and ownership challenged.

The economic and legal right of ownership is traditionally determined based on the outcome of a patent claim being filed with the relevant authorities. In Sweden, this authority is the *Patent and Registration Office* (Patent och registreringsverket) (PRV). Most AI-related patents globally are filed in the U.S. and China. Leaps in computational power are, however, continuously extending the AI revolution to other actors and markets beyond these behemoth nations and the World Intellectual Property Organization (WIPO) estimates that, eventually, close to every commercial sector will be benefiting from the use of AI.³

These leaps in computational power are not only sustaining development of AI technologies in emerging markets, but they are also complicating the determination of ownership by blurring the line between traditionally accepted definitions of the individual(s) involved in the research and development (R&D) cycle of a product, as well as their relationship to

¹ JD Salinger, *The Catcher in the Rye* (Little, Brown and Company, 1991) 5.

² Gregor Noll (ed), *AI, digitalisering och rätten* (1st ed, Studentlitteratur, 2021) 231.

³ WIPO, *WIPO Technology Trends 2019 Artificial Intelligence* (World International Property Organization 2019) WIPO 9
<https://www.wipo.int/tech_trends/en/artificial_intelligence/story.html> accessed September 8th 2021.

traditional conventions of patent law.⁴ As we find ourselves entering into what experts have dubbed the “Age of AI Implementation”, an increasingly poignant shift in AI development will take place – shifting its primary function from research to commercial use.⁵ This exponential shift from scientific discovery to a commercial first-to-market approach is what has driven autonomous development to a point where the speed of innovation is so high that the question of ownership no longer pertains exclusively to the information used in the development process, but also to matters at the very core of patent law, like patentability and inventorship.⁶

In 2016, the UK Parliament presented a report on accountability for liabilities derived from autonomously generated works. Despite not arriving at any firm conclusions vis-à-vis patentability or inventorship, it was suggested in the report that humans who created algorithms for AI would stand the legal risk for any infringements on already held ownership rights that occurred during the AI’s production cycle, suggesting a symbiotic relationship of legal implication between human creator and inventive AI.⁷

Following on this development, the EU introduced a resolution on robotics that took into consideration the matter of legal status for robots, and especially the question of whether they should be granted special legal status as *electronic persons*.⁸ The idea behind these legislative steps was to create a framework for assigning legal responsibility for AI-led unlawful acts pertaining to ownership and copyright violations. However, today, they lay the groundwork for a much more interesting debate, namely if presenting AIs and those who create them with obligations also provides these parties with corresponding rights.⁹

From a point of attempting to assess inventorship and patentability, three different types of autonomous inventions have been previously established: (1) human-made inventions where AI was used for verification of the outcome, (2) inventions in which a human identified a problem and

⁴ Noll (n 2) 14.

⁵ WIPO (n 3) 41.

⁶ Andres Guadamuz, ‘Artificial intelligence and copyright: The rise of the machines is here, but they do not come as conquerors, they come as creators’, WIPO Magazine, (2017) para 16.

⁷ House of Commons Science and Technology Committee, *Robotics and Artificial Intelligence* (HC 2016-2017, 145) paras 52-58.

⁸ European Parliament resolution 2015/2103 INL of February 16th 2017 with recommendations to the Commission on Civil Law Rules on Robotics, para 59

⁹ Yann Ménière, et. al., *Patents and the Fourth Industrial Revolution* (European Patent Office 2020) 14 <[patents and the fourth industrial revolution study 2020 en.pdf](https://www.epo.org/press-room/press-releases/2020/09/20200909_en.pdf) (epo.org)> accessed on September 9th 2021

utilized AI to find a solution, and (3) AI-developed inventions in which AI identifies a problem and proposes a solution without human intervention.¹⁰

In scenarios (1) and (2), AI is utilized as a tool for human inventors. Or put differently, as a de facto means for augmenting human capabilities to create and invent. The identification of category (3), though, would seem to suggest that the EPO understands and accepts that AI may take on a more independent role in the development cycle of an invention. Despite this, most expert agree – at least publicly – that AI inventorship wholly independent of human direction, instruction, and oversight still remains a figment of science fiction.¹¹ Yet, AI has in recent year shown to be able to undertake significant inventive actions. So significant, in fact, that the concept of evaluating the traditional understanding of patent law applicability vis-à-vis AIs has begun to pick up momentum.¹²

1.2 Purpose and Research Question

The purpose of this thesis is twofold. It seeks to evaluate current Swedish patent laws as they relate to safeguarding inventorship for the individual and market functionality for society as a whole in light of the legal challenge to the concept of patentability posed by inventive AI. It also seeks to put this evaluation into practice by suggesting pertinent revisions to the prevailing Swedish understanding of certain defining features of Swedish and European patent law. In regard to the latter aspect of the thesis, recent developments in Australian, U.S., and English law will be used as a comparative baseline in order to lend perspective on best practices that may be beneficial if considered forthwith. Furthermore, the DABUS case will be utilized as a continuous red thread throughout this thesis to provide guidance and conceptual coherency to the reader.

Thus, this thesis sets out to answer:

1. In the instance that an autonomous AI-process can be said to potentially render a patentable invention with none or very little human interaction, how should this fact be interpreted in the light of the requirements of inventive step as part of the conventional approach to determine patentability?

¹⁰ EPO, 'Artificial Intelligence' (2021) para 23 <<https://www.epo.org/news-events/in-focus/ict/artificial-intelligence.html>> accessed on September 9th 2021.

¹¹ EPO, (Artificial Intelligence) (n 10) paras 24-28.

¹² Ménière, et. al. (n 9) 14.

2. In a hypothetical scenario where inventive AI may be said to meet the requirements of patentability, can an AI be given any rights normally conferred on a human inventor, and if not, can such rights be succeeded to a natural person?

1.3 Method

1.3.1 Legal Dogmatic Method

As this thesis seeks to go beyond simply the descriptive qualities of the law, towards the fashions in which it is applied and how that application is critiqued by legal scholars and practitioners, the legal dogmatic method – also known as doctrinal method – is uniquely well-suited as a vehicle through which this thesis may research and in further detail discuss the interpretation and systematization of relevant legal doctrine in regard to the research questions posed above.¹³

The Swedish jurist Nils Jareborg described the use of the legal dogmatic method as “reconstructing the legal system”¹⁴ This notion of reconstruction was later revisited by Jan Kleineman, who described the method as a “reconstruction of the legal system through analysis of the various elements in the accepted sources of law¹⁵ aimed at reaching a conclusion with as much precision as possible in terms of coherence with the *lex lata*.”¹⁶

In this thesis, the accepted sources of law will subsequently to selection be discussed within the framework of the thesis’ research questions and limitations against a backdrop of comparative international case law and relevant statutes as well as for domestic application relevant case law and statutes from EU law and Swedish law as well as secondary sources of relevance to the doctrine. In keeping with one of the core principles of legal dogmatism, namely the interconnectivity between the generally applicable

¹³ Jan M Smith, ‘What is Legal Doctrine? On the Aims and Methods of Legal-Dogmatic Research’ in van Gestel, Rob, Micklitz Hans-W., and Rubin, Edward L., (eds) *Rethinking Legal Scholarship: A Transatlantic dialogue* (Cambridge University Press 2017) 207

¹⁴ Nils Jareborg, ‘Rättsdogmatik som vetenskap’ [2004] SvJT 1, 4

¹⁵ *Sources of law* is the author’s own translation of Kleineman’s original use of the term *rättskällelära* which may be defined as the doctrinally based common notion of what sources of law should, or may, be cited in the part of a court’s judgement that deals with matters of the law. C. f. *inter alia* Alexander Peczenik, ‘Rättsordningens struktur’ [1974] SvJT 369, 373

¹⁶ Jan Kleineman, ‘Rättsdogmatisk metod’, in Nääv, Maria & Zamboni, Mauro (ed), *Juridisk metodlära* (Studentlitteratur 2018) 27-28

and abstract legal rule, the above will finally also be juxtaposed to a concrete and unique situation which calls for the application of the former.

Presupposing that the influence of inventive AI may eventually cause not insignificant trouble for national and international institutions when it comes to applying the law *as is*, examining the purpose of current laws in order to discern if the technological developments challenging their application entails inherent risks for developers, investors, and prospective rightsholders in regard to inventive outcome from an automated AI may become relevant. Scholars are somewhat torn on the point of whether or not performing such a study could be done within the legal dogmatic method or not. Those that argue against suggests instead to limit the scope of the legal dogmatic method to only include defining relevant provisions of *lex lata*.¹⁷ Others, including the previously mentioned Kleinman, argues instead that lodging criticisms against the *lex lata* is as much a part of legal dogmatism as is defining it. Arguing for changes or amendments to the existing law as a means to change a perceived status quo is hence allowed within legal dogmatism, according to Kleinman.¹⁸

In summary, then, it may be concluded that for the purpose of this thesis, a proper application of the legal dogmatic method does not hinge on the eventual prevailing outcome of the above academic discussion. Instead, acknowledging that the method allows its user to proceed in ostensible comparative fashions either way, this thesis will keep with the central methodology of legal dogmatism – analyzing the consequences of applying *lex lata* on a given, albeit hypothetical, situation within the framework set forth by the law(s) in question.

Finally, it is worth, for academic purposes, to mention how a legal system or set of laws does not have to be inherently flawed or inefficiently designed just because the system or laws in question is being evaluated and analyzed under the guise of legal dogmatism. Indeed, a critical assessment, once completed, may well conclude that the subject assessed is well-suited for the purpose for which it was designed without affecting the functionality of the method applied.¹⁹

¹⁷ Rune Lavin, 'Är den förvaltningsrättsliga forskningen rättsdogmatisk?' (1989) 3 FT 1, 134.

¹⁸ Nils Jareborg, 'Rättsdogmatik som vetenskap' [2004] SvJT 1, 36.

¹⁹ Lavin (n 17) 125.

1.3.2 Comparative Legal Method

Alongside the legal dogmatic method, this thesis will include a not insignificant discussion based on the interpretations of foreign case law and statutes. Applying a comparative perspective on patent law in relation to the development of inventive AI enables this thesis to compare Swedish law and its interpretation in Swedish courts against similar legal provisions and case law in foreign jurisdictions. Attempting to find structure in ambiguous matters like inventive AI that for the purpose of a fair and balanced legal discussion and analysis, alternative interpretations of similar legal provisions can be beneficially considered so that well-designed critique of one interpretation of the law may be contrasted against the many.²⁰

In fact, the increasingly globalized nature of law and the legal sciences motivates bringing in a global perspective also in academic writings that are not primarily of a comparative character. Not acknowledging the international dimension of modern-day law could therefore well be to the detriment of any academic output, the existence of any primarily comparative themes notwithstanding.²¹

Despite the increased awareness of the value of retaining a comparative perspective even in primarily non-comparative works, the comparative legal method is not associated with one standardized methodology.²² Or put differently, there simply is no definite theory on methodology when it comes to the comparative legal method. Instead, scholars have outlined a methodological road map of sorts for those seeking to address any aspect of comparative law.²³

In lieu of a set strategy of application, the comparative method has to be continuously shaped – and thus dictated – by the applying party in the individual instance. While advancing through this thesis' comparative materials, continuous efforts will be made to outline the reasons as to how certain materials are being used and justifications will be presented for why a comparative dimension is needed at the point of its introduction.²⁴

²⁰ Ulf Bernitz, et. al., *Finna rätt – juristens källmaterial och arbetsmetoder* (15th ed, Norstedts Juridik 2020) 266.

²¹ Marie-Luce Paris, 'The Comparative Method in Legal Research: The Art of Justifying Choices', *Legal Research Methods: Principles and Practicalities*, (2016), No. 09/16 4.

²² Paris 5.

²³ Geoffrey Samuel, *An Introduction to Comparative Law Theory and Method* (1st ed, Bloomsbury Publishing 2014) 173.

²⁴ Paris 5.

Before outlining the means of application, a comment on the meaning and purpose of comparative law in the individual instance is warranted. The comparative method, in the context of this thesis, should not be interpreted as a vehicle through which a certain legal principle or rule may be deduced. Instead, it should be viewed as a way to observe, measure Swedish, European, as well as other branches of foreign law against one another in accordance with the methodological approach set forth below.²⁵

When it comes to application, the comparative method has the law as its object and comparison as its process.²⁶ Geoffrey Samuel illustrates this process in his book *An Introduction to Comparative Law Theory and Method* by stating that the comparative study of law is:

*“a process in which the comparatist takes several objects in order to study them within a scientific framework in which the object (...) being studied is viewed in terms of the other [and] it is the contrast between the domestic and the other that generates knowledge progression.”*²⁷

In using the comparative method, this thesis, in keeping with the prevailing definition of the method and its applicability, aims not to educate the reader in the functionality of foreign legal systems. Instead, this thesis, by using the comparative method, strives to critically look at the law of foreign jurisdictions as it is being applied to a particularly comparable set of cases having been presented before, and decided, by courts of law in those respective jurisdictions. In doing so, this thesis aspires to use the comparative legal method much in the spirit of how it has come to be contemporarily understood, namely as a vehicle for “the essential task of furthering the universal knowledge and understanding of the phenomenon of law.”²⁸

The reason for why this operation is necessary within the context of this thesis is because of the thesis’ central subject matter: inventive AI. Esin Öricü, cited in *Comparative Law – A Handbook*, argues that the purpose of applying the comparative legal method may range from aiding law reform and policy development to providing a tool of research, giving a critical perspective, facilitate harmonization of laws, and helping courts of law to fill out gaps in their applicable law.²⁹ Within the context of this thesis, focus falls

²⁵ Paris (n 21) 7 – 8.

²⁶ Paris (n 21) 8.

²⁷ Geoffrey Samuel, *An Introduction to Comparative Law Theory and Method* (1st ed, Bloomsbury Publishing 2014) 11.

²⁸ Samuel (n 23) 25. See also Esin Öricü, ‘Developing Comparative Law’ in Esin Öricü and David Nelken (eds), *Comparative Law: A Handbook* (1st ed, Hart 2007) 44.

²⁹ Öricü 53 – 56.

on the comparative method bringing to the table a critical perspective on Swedish law by contrasting its provisions and application to that of comparable foreign equivalents.

In doing this, the research questions posed will be comparatively tested and area-specific knowledge advanced through the examination of foreign jurisdictions, the comparison of foreign jurisdictions and the Swedish legal system, and finally a discussion regarding the comparative outcome of the above operation.³⁰

Finally, this thesis argues, again in line with concurrently prevailing scholarly thinking, that the use of the comparative legal method lends a unique lens through which the research questions posed above may be researched, valued, and addressed in a manner well suited to the academic nature of the work in question and to the furtherance of knowledge within the specific legal field(s) concerned in the thesis through comparatively examining foreign jurisdictions and the Swedish legal system.³¹

This definition of the comparative legal method and its application is in line with contemporary prevailing thinking on the application of comparative law in academic writing. Cited in *Legal Research Methods: Principles and Practicalities*, Marie-Luce Paris defines the aim of the method as one that adds to the quest for *better law*. Better law, in turn, was defined by Mathias Siems as something that:

[First] (...) may help improve law “technically”, which is typical of a functional-technical perspective of comparative law —that is when one looks at two or more legal systems presuming that the law would lead to a similar result, and chooses the best one (for example, the one which provides more legal certainty); secondly, comparative law may help improve a particular social problem or policy, which is typical of a ‘socio-legal functionalism’ approach to comparative law; thirdly, comparative law may act as a trigger for legal changes, such as ‘introducing a new social or economic policy or a re-balancing of group interests’, because the foreign law provides a better response to a particular evolution of society.’³²

In this thesis, the comparative legal method will be approached by looking at three materially similar cases from three different non-EU jurisdictions. In looking at these three different cases before each respective

³⁰ Paris 2016 (n 21) 11.

³¹ Paris 2016 (n 21) 11.

³² Mathias Siems, ‘Bringing in Foreign Ideas: The Quest for “Better Law” in Implicit Comparative Law’ (2014) 9 *Journal of Comparative Law* 119, 120-124.

court of law, conclusions will be drawn from each respective judgement regarding material and formal aspects of each individual case that, when compared to each other as well as to European and Swedish law, will accomplish the goal of illuminating matters of certain ambiguity within patent law and bring outside perspectives on how a court may view and define material as well as formal requirements in relation to the ever emerging field of inventive AI and patent law.

This juxtaposition of the law between a plurality of jurisdictions will be done in a set number of stages. As this thesis is not primarily concerned with comparative law but is merely utilizing the method as a means to a specific end, the stages will for the reader be conflated in the comparative analysis as a whole, in line with Ms. Paris refers to as *Kamba's First Method*. This method is defined in Ms. Paris' chapter in *Legal Research Methods: Principles and Practicalities* as containing a *descriptive phase* – wherein the central concepts of the compared legal systems are explained – an *identifying phase* – wherein similarities and differences between the compares legal systems are defined – and finally, an *explanatory phase* – wherein an attempt will be made at explaining the respective similarities and differences within the framework of the thesis' research questions.³³

This formulation of methodology is based on the prevailing understanding of good comparative legal practice of *Intellectual Freedom* (approach/meaning/accomplishing/purpose), expressed in Ms. Paris' chapter in *Legal Research Methods: Principles and Practicalities* and will – for the purpose of this thesis – mean that the jurisdictions actualized in this thesis' comparative chapter will be defined in relevant ways, have their reasoning explained, and the similarities and differences of their respective approach to inventive AI discussed.³⁴

1.4 Choice of Materials and Evaluation of Sources

The output of this thesis is built on a carefully garnered selection of primary and secondary sources. These include – *inter alia* – legislation, case law, academic literature, journal articles, curated legal blogs, commentaries from legal scholars and practitioners, as well as reputable online sources. The sources used all share the features of being highly qualitative, exceedingly insightful, and of great use to this thesis' goal of satisfyingly answer the

³³ Paris (n 21) 16.

³⁴ Paris (n 21) 15.

research questions in as an informative way as possible for the intended reader.

It should, however, be noted at the outset, that most legislatures are yet to consider introducing legislation pertinent especially to inventive AI and thereto adjoined matters of patentability and ownership. Thus, the topic itself invites a certain amount of speculation in terms of how current laws may be adopted for AI-specific issues in jurisdictions like Sweden, where no such case law exist.

Furthermore, as was previously mentioned in chapter 1.3, it is pertinent to make the reader aware of the fact that all materials utilized in this thesis towards explaining the functionality and applicability of AI have been selected for their useability towards the thesis' aims and not for their deep technical explanation in mind. The technology behind AI will therefore be briefly explained, in so far as it bears relevance to the legal issues discussed.

As to why the sources listed in the bibliography were chosen specifically, the answer is twofold. In some, albeit rare, instances, area-specific sources reaching the high threshold of quality assurance that this thesis required were few and far between, rendering the available roster quite slim. This means that the amount of particularly well-suited sources most likely are lower than in other, more developed, areas of legal research. In other instances, which accounted for the vast majority of choice of sources-cases, the materials were chosen due to their inherent quality, apt connection to the subject matter, and the sterling reputation of their author.

The materials used were also chose due to them being highly qualitative whilst remaining close to the subject matter in their origin. Thus, prioritization has been made for primary sources over secondary sources.³⁵ In some instances, however, secondary sources are more frequently utilized in order to explain inherent complexities in the source material that is not covered in any primary sources.

1.5 Limitations

Several aspects of the legal and technical dimensions engaged in this thesis are complex enough on their own, something that motivates reasonable limitations to its scope. The Swedish jurist Rune Lavin speaks to this fact in his 1989 publication *Är den förvaltningsrättsliga forskningen*

³⁵ Elsa T Önnfors, Henrik Wenander, *Att skriva rätt* (Norstedts juridik 2019) 47.

rättsdogmatisk?, wherein he argues that “research that encompasses too great a set of rules tends to become overbearingly descriptive.”³⁶ Heeding Levin’s warning, this thesis will be limited to consider AI challenges to patent law only as it pertains to the patentability requirement of inventive step and inventorship, limited further by the framework set out in the thesis’ research questions. Moreover, although analysis of international legal concepts and thinking will be used as a matrix within which understanding may be gained of the transnational nature of patent law in general, the thesis’ analysis, discussions on *lex ferenda*, and ensuing conclusions will be centered around these aforementioned concepts under primarily Swedish law, and secondarily EU law wherever it supplements or supersedes the national law of the member states.

This determination of scope has been made out of consideration for the time aspect connected to the thesis course’s duration, academic best practices illustrated by – inter alia – the above cited Lavin, as well as based on the author’s goal of explaining the issue at hand as poignantly and precisely as possible without branching out into unnecessarily broad narratives.

It may seem rather obvious to the knowledgeable reader that AI inventions presumably would affect more areas of IP law – and indeed commercial law in general – than simply patent law. This is, of course, a correct assessment of the impact that AI has – and most definitely will have – on the law. Still, based on the above mentioned determinates of scope, this thesis will focus on the specific features of patent law outlined in the research questions and detailed above.

The attentive reader will also come to notice that out of the multitude of available overseas jurisdictions, only a handful have been chosen for further study in the thesis’ comparative part. The choice to limit the comparative dimension to these particular jurisdictions stems from the same rationale as the one motivating the comparative dimension in the first place in combination with the general need for limitations, i.e., the act of providing perspective whilst keeping the scope of this thesis manageable. By presenting a comparative dimension, this thesis’ gives width and depth to the issue of inventive AI and its effect on both national and international patent law through the lens of multiple jurisdictions, courts, and opinions, rather than just a singular Swedish, or even European, one. This serves to highlight the complexity of the issue, but it also highlights the multitude of opinions held by practitioners and scholars around the world as to its solution. It is the

³⁶ Lavin (n 17) 123.

opinion of the author that not providing the reader with such a comparative dimension would be to rob the reader of a chance at gaining greater understanding of the issues discussed forthwith.

Furthermore, the choice of jurisdictions for the thesis' comparative sections – the United States, United Kingdom, and Australia – are especially relevant as the diversity in legal tradition and active precedence can be contrasted to one single case, the DABUS case, brought before a court in each of these aforementioned jurisdictions by the same applicant, one Dr. Thaler.

When it comes to determining an invention's patentability and the identity and thereto related rights of its inventor, less guidance may be found in EU law, which makes it more of an uncharted territory for patent seekers as more deliberative liberty is granted to domestic court in each jurisdiction where patent protection is sought.

As a final point, it should be noted that due to the complex nature of AI, this thesis will not be performing any deeper dives into the technological functionality of AI. For the reader, this will mean that no in-depth analysis of AI systems and their functionality will be done. A brief walkthrough of AI systems will nevertheless be undertaken seeing how the operational functionality of AI is what makes the technology uniquely challenging to interpret in light of inventorship and patentability as defined in the *lex lata*.

1.6 The Current State of Research

At present, AI in general – and establishing clear ownership over autonomously developed inventions in particular – constitute areas marred by regulatory ambiguity. The aforementioned complexity and relative novelty of AI technology together with its diverse functionality and applicability has – in lieu of area-specific legislation – led to speculation on the part of legal practitioners and laymen alike on how to approach issues of inventorship and patentability brought on by AI.³⁷ There is, however, literature available as well as a not insignificant number of both online and offline resources of substantial quality and value. The exact materials used can be found in the bibliography, which may be read together with the previous statement on choice of materials and evaluation of sources above for a holistic picture of what resources were chosen and the rationale behind it.

³⁷ WIPO (n 3) 5-6

Issues relating to inventorship for AI and patentability of AI-produced inventions have not been extensively discussed in Sweden. The exemption to this rule would be a recent 2021 discussion paper published by the PRV that discusses the challenges to patent law brought on by the emergence of inventive AI for – as far as this thesis has been able to ascertain – the first time.

Internationally, however, the subject has been discussed in more depth. Referencing to the above discussion vis-à-vis this thesis' comparative dimension, the more extensive international discourse on AI and patent law is useful for finding qualitative and diverse sources. Available materials, however, despite being more plentiful, still are mostly secondary sources. At the time of writing, the majority of sources available for this thesis' comparative dimension are secondary sources. In keeping with good academic practice, this thesis will nevertheless use as many primary sources as possible when their inclusion is motivated and convenient.

In terms of primary sources, the main materials used in the comparative part are three cases relating to the AI DABUS. The applicant in all of these cases was one Dr. Thaler, who, in his capacity as inventor of DABUS, lodged patent claims before the competent authorities in – *inter alia* – the U.S., UK, and Australia. The DABUS cases all went on to a higher court on appeal, which makes them suitable for providing a comparative dimension on the future of AI's relation to patent law as the appeals invites interesting discussions from both patent offices and courts of law. As far as this thesis has been able to establish, no Swedish academic paper or other scholarly output have yet compared these aforementioned cases.

In terms of secondary sources, the last 2-3 years have seen the development of a growing plethora of commentary and academic writing on the subject of AI and patent law. The vast majority of these, like for example articles and literature describing the functionality of inventive AI, discusses the topic on a general level. More recently produced materials, like Gregor Noll's *AI, digitalisering och rätten*, however, combines a general discussion about the functionality of AI with a discussion around the technology's place and status in a legal context. This thesis will concern itself with both of these subject-matter types, albeit more of the latter, as it will briefly explain the technical basis for AI functionality before continuing on to its core discussions around AI and the law.

Due to the relatively limited number of primary and secondary sources, much of the current output utilizes similar academic and professional resources. Since this thesis aims to pursue research into a somewhat narrow field of patent law, it is worth keeping in mind, as some resources used in this thesis may also be quoted in contemporary works to a perhaps more frequent degree than would be the case were the subject matter more traditional. Illustratively, in terms of general patent law, the Swedish Supreme Court has only tried matters pertinent to the interpretation of patent law statutes on two occasions since its first such landmark ruling in 1972³⁸. Such relative scarcity in primary source material may increase the relative influence of the interpretation of the law expressed in sources like the Supreme Administrative Court's Yearbook (RÅ), Nordiskt Immateriellt Rättskydd (NIR) and Patent Eye.³⁹ This, of course, might yield a more streamlined discussion across multiple independent works.

The above issue is furthered by the fact that several master theses authored within the last 2-3 years have been exploring questions similar to the ones posed by this particular thesis. Nevertheless, after not insignificant research into the subject matter discussed in these thematically similar works, it is reasonable to conclude that the specific scope and research questions of this thesis – as outlined above – sets it apart from previous works by a more than satisfactory margin.

To summarize, it may be concluded that the state of current research is good in terms of quality but somewhat lackluster in terms of quantity. For this thesis, this means that more focus than might normally be warranted will have to be put towards establishing that the secondary sources utilized are significantly diversified and qualitative whilst making sure to use every relevant piece of primary source information available.

As a final note on the state of current research, it is worth acknowledging that the subject matter of this thesis is somewhat cutting-edge, and as such currently subjected to a number of more or less significant court decisions and legislative actions. As a result, underlying judicial classifications and conceptualizations that aided in shaping this thesis and the author's understanding of the issues thereto related may have changed or come under further scrutiny under the writing process.

³⁸ NJA 1972 s. 462, and subsequently in NJA 2000 s. 497 and NJA 2002 s. 660

³⁹ Lindberg, Rättegångsbalk (1942:740) 28 kap. 1 §, Karnov (JUNO)

1.7 Outline

This thesis is divided into seven chapters with all but chapter seven having one or more subheading. Chapter one serves as an introduction to the reader, where the framework encapsulating this thesis is described. Chapter two defines the technology on which AI technology is based and introduces the reader to the DABUS case. Chapter three describes the defining features of inventions and inventorship. It also gives the reader insight into relevant case law and statues. In chapter four the reader is presented with a comparative review of how patentability and inventorship vis-à-vis AIs have been discussed in other jurisdictions. Chapter 5 and chapter 6 analyzes patentability of AI inventions and inventorship status for AIs in a fictitious Swedish case and discusses the potential effect of inventive AI on Swedish patent law. Chapter seven concludes the thesis with a final discussion.

2 Technical Point of Departure

Before diving into the real-world application of inventive AI, this thesis considers it beneficial to familiarize the reader with the technology whose existence warrants regulation in the first place. This chapter will briefly describe how an AI works and how the technology can be applied in an inventive process generally before touching upon the features that makes the AI DABUS unique in terms of functionality.

2.1 The Technology Behind AI

At its core, the technology behind AI is algorithm-based, meaning that it derives its functionality from complex computerized mathematics.⁴⁰ Drawing on this strength-through-agility, algorithmic AI systems available on the market today are capable of performing distinctly human tasks, composing music and artistic writing. In time, bolstered by emerging AI technologies like deep learning, researchers are confident that these humanlike abilities will go beyond merely crafting and bridge over into creating and even inventing.⁴¹

AI as a concept is somewhat hard to define. Since the term's inception, it has been the default label of several advances in smart technology, ranging from simple navigation software to exceedingly advanced programs.⁴² On the most basic level, AI as it has become familiar to most users can nevertheless be functionally broken down into two subcategories: Machine Learning (ML) and Deep Learning (DL).⁴³

ML can be described as a toolkit for implementing recommendations, predictions, and guide other application features. It is a collection of statistical methods used to find solutions to problems from data. The goal of machine learning is to get computers to accomplish a certain task by presenting them with examples similar to what they eventually should accomplish.⁴⁴ This is different from the usual software development process. In traditional software development, humans have to figure our solutions on their own. ML is

⁴⁰ Tobias Kempas, 'A Note on Artificial Intelligence and Intellectual Property in Sweden and the EU' (2020) 3 Stockholm Intellectual Property Law Review 1 54, 55-56 <[A-note-on-artificial-intelligence-and-intellectual-1-2020.pdf \(stockholmiplawreview.com\)](https://stockholmiplawreview.com)> accessed on November 4th, 2021.

⁴¹ Kempas 55.

⁴² Antti Ajanki, 'AI, machine learning and deep learning explained' (Futurice, January 9th, 2019) paras 1-4 <<https://bit.ly/3n9DpTn>> accessed on September 12th 2021.

⁴³ Ajanki 6-8.

⁴⁴ Ajanki 9-11.

extremely useful for figuring out problems that are either too complex or extensive for humans to solve effectively and directly. Despite this relative independence, ML only solve tasks that has been described in detailed mathematical terms. Humans are still needed in an R&D cycle to collect representative data and validate any results that an ML AI produce.

One particularly interesting branch of ML that further ups the ante in terms of autonomous processes is DL. Compared to traditional ML, DL is able to mostly overcome the aforementioned human component by automatically constructing suitable data representations by using sheer and extraordinary computational power.⁴⁵

DL utilizes a method of data-capturing called hierarchical learned representations.⁴⁶ This means that DL AI capture local as well as inter-relationships for whole datasets, distributing both learnt feature and hierarchically structures representations, making DL especially well-suited for resolving complicated real-world problems which themselves oftentimes have a clear hierarchical structure. DL is particularly well-suited for resolving problems through inventive actions as the greater degree of independence allows for increasingly human-like problem-solving. Ironically, AI has, in fact, already been suggested as a solution to the problems faced by the U.S. Patent and Trademark Office of finding cost-effective solutions to prior art search.⁴⁷

In summary, for DL AI in general, the human input is largely limited to the primary steps of the inventive process. Under the first step, a physical person instructs the AI by providing relevant dataset or guidance for the selection of these datasets. Under the second, human intervention is necessary in order to create the algorithm that the AI then utilizes.⁴⁸

The steps covered by human interaction, and any inventive outcome thereof, is traditionally considered protected.⁴⁹ What an AI under the final step of an inventive process may produce without human interaction and how such inventive outcomes should be classified in terms of patentability and inventorship, however, holds no designated protection.

⁴⁵ Ajanki (n 42) 9-11.

⁴⁶ Ajanki (n 42) 9-11.

⁴⁷ Arti K Rai, 'Machine Learning at the Patent Office: Lessons for Patents and Administrative Law' (2018) Iowa Law Review 104 2617, 2617.

⁴⁸ Christian Nilsson Zamel, et. al., 'Artificiell intelligens & immaterialrätt - ett tankepapper från Patent- och registreringsverket [2021] 10 <<https://www.prv.se/globalassets/in-swedish/om-oss/aktuellt/promemoria-kring-ai--immaterialratt-210527.pdf>> accessed September 12th, 2021.

⁴⁹ C. f. 1§ lagen (1960:729) om upphovsrätt till litterära och konstnärliga verk as well as article 10 TRIPS.

2.2 Applicability of AI in Inventive Processes

For the general public, the above description of AI may sound alien, but these machines are not only used by large companies like automakers or in high-tech professions like investment bankers. AIs are also used in various manufacturing processes which produces goods and services that comes much closer to home. AI's role in R&D is at this point in time so close to the wants and needs of humans that AI has come to operate in ways very akin to what inter-human discourse would label as creative processes.⁵⁰ The use of AI in these processes is so common and so close to the core of modern life that massive companies like IBM, Google, Amazon, and Facebook actively target AI development in order to get a leg up on the competition.⁵¹

2.3 What are the Defining Features of an Inventive AI?

As is the case with every other area of law, the impact of AI on patent law cannot be satisfyingly evaluated until all parties concerned have come to an agreement regarding how to properly define AI vis-à-vis inventorship and patentability.

John McCarthy, who is credited as the originator of the term *Artificial Intelligence*, coined it without providing a generally applicable definition of the term. This led AI scientists to instead created their own. Stuart Russel and Peter Norvig alone managed to create just about ten different ones, leading to the equally confusing inverse situation of the term becoming oversaturated.⁵²

Some explanation behind this diversity of opinion on how to properly define AI may be found in the broad range of tasks that such machines are able to perform. An AI may on the one hand be defined based on its features,

⁵⁰ Ravid Shlomit Yanisky, Liu (Jackie) Xiaoqiong, 'When Artificial Intelligence Systems Produce Inventions: The 3A Era and an Alternative Model for Patent Law' [2018] *Cardozo Law Review* 1, 6.

⁵¹ The Economist Briefing, 'Artificial Intelligence: Rise of the Machines' [2009] <http://www.economist.com/news/briefing/21650526-artificial-intelligence-scares-peopleexcessively-so-rise-machines> [https://perma.cc/B2LD-B4XS] accessed on October 20th 2021 .

⁵² Stuart J Russell & Peter Norvig, *Artificial Intelligence: A Modern Approach* (3rd ed. Pearson Education 2013) 2–14. See also John McCarthy, 'What is Artificial Intelligence?' (2007) <<http://www-formal.stanford.edu/jmc/whatisai.pdf>> accessed on October 21st, 2021

as a machine capable of performing tasks that normally require human intelligence, like recognition, decision-making etcetera.⁵³ AI may also, however, be defined as an instrument that makes existing solutions more efficient through utilization of deep learning and data within the system itself.⁵⁴

For the purpose of discussing patentability and inventorship – the focus of this thesis – the definition of AI as *machines that are capable of performing tasks that, if performed by a human, would be said to require intelligence*, proposed by Matthew Scherer comes closest to the mark of being adequately – for our purposes – all-encompassing.⁵⁵

Throughout this thesis, a secondary term, ‘inventive AI’, is used to describe AI units that invents (or acts in a manner, albeit it not in line with the letter of the law or its definition, that is akin to inventing as the activity historically has been defined in both blackletter law and case law). The terms AI and inventive AI are – generally speaking as well as for the purpose of this thesis – interchangeable, as, per the definition above, AI systems are *ex ante* presumed to be able to perform tasks which requires intelligence at a level usually connotated with humans – like the act of creating something new from something existing. The use of the word *inventive*, however, aims to address one of the main points of contest within this thesis – namely that of redefining the art of inventing, historically assumed to be reserved for humans only, as something that – given the intelligence of the machines humans are now capable of creating – can be completely automated and void of human interaction.

2.4 Can an Algorithm Technically Invent?

There is a prevailing opinion amongst academics and end users alike that AI is still purely a tool, capable of making creative choices and taking inventive action only through human guidance.⁵⁶ This opinion, however, is based on a common – and possibly somewhat outdated – view of AI behavior and capabilities.

⁵³ Marcus Hutter, *Universal Artificial Intelligence: Sequential Decisions Based on Algorithmic Probability* (Springer 2010) 125–126, 231.

⁵⁴ Hutter 231.

⁵⁵ Matthew U Scherer, ‘Regulating Artificial Intelligent Systems: Risks, Challenges, Competences, and Strategies’ (2016) 29 HARVARD J OF L & TECH 353, 354.

⁵⁶ Richard Johnson, ‘Inventive AI: Can Machines Innovate?’ (Mewburn Ellis 2019) para 7 <<https://www.mewburn.com/news-insights/inventive-ai-can-machines-innovate>> accessed on September 13th, 2021.

An inherent advantage of AI is the technology's ability to wield complex datasets that would otherwise be highly unsuited for human analysis.⁵⁷ Despite their unique functionality as a complement to human capabilities, AI's inventive process has been excluded from the legal definition of the term since the function and the task are both known in advance.⁵⁸

This sentiment has, however, become increasingly chastised as the rapid evolution of AI has brought continuous challenges to several traditional patent law convictions. Including, *inter alia*, the definition of inventor and the possibility of an AI-produced invention attaining patentability by achieving inventive step.⁵⁹ AI becoming fully capable of technical, human-like inventive action is more of a when and less of an if. This actualizes further the need for developing a roadmap vis-à-vis the legal challenges posed by AI.⁶⁰

2.5 The DABUS Case

In 2019, the Artificial Inventor Project submitted several multijurisdictional patent claims that disclosed inventions allegedly developed by an AI known as DABUS.⁶¹ The nature of the claims put the spotlight on the inability of AIs to be fully autonomous inventors without the guiding hand of humans. Although, and as this thesis will discuss in the following, no material evaluation of DABUS' inventions has been performed, the facts presented in the claims adds merit to the argument that AIs are indeed capable of inventing in a technical sense and that formal patent protection limitations barring such inventions from receiving proper designation as such is due for review.⁶²

The DABUS system is unique due to the type of DL it utilizes. Known as reinforcement learning, it works by having the AI operate two AI sub-systems, known as artificial neural networks (ANNs), and having them interact with each other.⁶³ The primary subsystem establishes a world view containing data from a set number of sources and becomes a trained sub-system. Through the use of this information, the primary sub-system then establishes links between different topics about which information may be drawn from the available sources. Finally, the primary subsystem is

⁵⁷ Johnson (n 56) para 9

⁵⁸ Johnson (n 56) para 10

⁵⁹ Kempas (n 40) 55

⁶⁰ Kempas (n 40) 55

⁶¹ Johnson (n 56) para 13

⁶² Johnson (n 56) para 28

⁶³ Johnson (n 56) para 8

configured to autonomously fluster – or put more colloquially, asserting continuous stress on – the links that were previously established.⁶⁴

Whilst this is happening in the primary subsystem, a secondary subsystem is set up to monitor the first subsystem. Its goal is to recognize the flustering as the primary subsystem conceives new ideas and assess them for utility through a comparative matrix, which is set up against the system’s pre-established world view. After this, the secondary subsystem applies a form of reinforcement learning through which new ideas that exhibit apparent utilitarian value are fed back into the system where they may be developed through further flustering. Ideas without evident benefits are not fed back. The secondary subsystem thus works as a sift designed to promote only new ideas with perceived beneficial value and to discard the remainder.⁶⁵

The DABUS system ended up developing a beverage container and a device for attracting attention. In the patent claims, the argument was made that the inventions in question – a design for a beverage container and a device for attracting attention in cases of emergency – were wholly a result of an inventive AI system, and not a result of humans either partially or wholly being responsible for the creative and intellectual dimension of the inventive process.⁶⁶

⁶⁴ Johnson (n 56) paras 16-17.

⁶⁵ Johnson (n 56) paras 17-18.

⁶⁶ Johnson (n 56) para 16. See also Kempas (n 40) 61

3 Specific Preconditions for Patents in Swedish Law

3.1 Background and Introduction to the Legal Problem

Having summarized how an AI works and how it can be applied in an inventive process generally, and in the case of DABUS especially, this chapter aims to complement the technical aspect of AIs with their legal status and classification.

The PRV argues that an “arms race for AI supremacy is in full swing”.⁶⁷ According to its Special Working Group on AI, the technological shifts currently underway are hinting at the most potent change in IP law since the introduction of the international conventions on copyright and ownership in the late 1800’s.⁶⁸ PRV’s lead attorney, Christian Nilsson Zamel, urges swift action. He alleges in the group’s findings that expediency on the part of the Swedish legislative assembly is key in crafting a potent response to what the PRV considers a rapidly changing situation on the ground for inventive processes involving AI.

Nilsson Zamel, however, is not alone in calling for updates to existing laws. In their groundbreaking paper *When Artificial Intelligence Systems Produce Inventions: The 3A Era and an Alternative Model for Patent Law*, leading researchers Ravid and Liu of Yale Law School and Fordham Law School, respectively, make a similar point. They argue that in order to meet the increased need for patentability vis-a-vis AI-developed inventions, current patent laws governing AI systems will have to be rethought and replaced with more bespoke legal tools, globally as well as nationally.⁶⁹ Although discussing primarily U.S. patent law, Ravid’s and Liu’s problematization of staunchly applying what is a very much analog patent law in an attempt to regulate a wholly new digital-first industry applies also in overseas jurisdictions.

⁶⁷ PRV, ‘Kapprustningen om AI är i full gång’ (PRV 2021) para 1
<<https://www.prv.se/sv/om-oss/aktuellt/nyheter/kapprustningen-om-ai-ar-i-full-gang/>>
accessed on September 12th 2021

⁶⁸ PRV para 2

⁶⁹ Ravid and Liu (n 50) 2

Nilsson Zamel argues that there are only three potential routes that Swedish lawmakers can travel down in relation to autonomous inventions once the development of AI reaches its regulatory boiling point. He argues that AI-produced inventions could (1) be deemed to not have the right of protection, (2) have their own legislation providing uniquely bespoke protections, or (3) file under current legislative regimes in order to allow for an AI to enter into the position as inventor or successor of title.⁷⁰

In a global context, this fits the general, split, narrative around inventive AI. The divided nature of the discourse around AI inventions was perhaps most flagrantly displayed in an earlier WIPO whitepaper that argued how “it should be clear that inventions can be autonomously generated by AI” but that, after open-source revision, later came to read how “it would not seem clear that the role of AI in the invention process is increasing”.⁷¹

The PRV’s views are expanded on further in their report *Artificial Intelligence & IP law*.⁷² In it, it is concluded that there currently is no AI advanced enough to create independently, i.e., without human interaction, but that such technology is most likely already in the pipeline.⁷³ This conclusion, although somewhat common amongst industry stakeholders, has not gone unchallenged.

As previously mentioned, the PRV holds – the existence of systems like DABUS notwithstanding – that AI systems as of today, in 2021, does not have the capacity to innovate without human interference.⁷⁴ They do, as mentioned before, note that such a system may very be on the verge of being successfully developed.⁷⁵

If, or rather when, such a system is introduced to the market, the PRV argues, it will lead to a series of applicability crises for Swedish and European patent law – the most important of which being that of establishing inventorship and patentability.⁷⁶

To illustrate, one might look at the rationale for European and Swedish patent law to assume a human inventor. Granted, the lack of autonomous inventors in at the time of the law entering into force and the decades of relevant case law that have since come to inform the general

⁷⁰ PRV (n 67) para 6

⁷¹ WIPO (n 3) 3 – 4

⁷² Nilsson Zamel, et. al. (n 48) 3

⁷³ Nilsson Zamel, et. al. (n 48) 3

⁷⁴ Nilsson Zamel, et. al. (n 48) 7

⁷⁵ Nilsson Zamel, et. al. (n 48) 6 – 7

⁷⁶ Nilsson Zamel, et. al. (n 48) 8

understanding of the law are more than relevant factors for courts to base their judgements on. However, regardless of how soundly patent law doctrine has developed, the fact remains that the basis on which the courts are being asked to ascertain several key facts relating to inventorship and patentability, including prior knowledge of a market, originality, and the inventor's intent, the fact remains that the world today has developed to a point where a potentially massive part of the inventive and manufacturing industry could find itself unable to assert their rights. Bridging the gap between currently available AI technology and existing patent to a satisfying degree does on its face seem like a Sisyphean task.

The problem facing the courts if, or when, they were to face a case similar to the aforementioned DABUS case is how they can reach a judgement that is conform with the letter of the law without going against the spirit and purpose of the law. This is something that has already been widely discussed in international patent law discourse and that will be addressed further on in this thesis as well.

3.2 Central Legal Concepts and Definitions

Establishing inventorship and determining patentability through inventive step in a patent claim requires knowledge of several key legal concepts bearing relevance in Swedish patent law. Summarized below are these key concepts, explained and illustrated through their definition in Swedish and European blackletter law and application through Swedish and European case law.

3.2.1 Inventive Step

Inventive step is one of the three key determination criteria for patentability, alongside novelty and industrial applicability. It is defined in 2 § patentlagen (Patentlag (1967:837)) as "*en uppfinning är patenterbar om den väsentligen skiljer sig från vad som är tidigare känt*" ("[an invention] essentially differentiating itself from what is known in the prior art") and is determined subjectively. This definition is harmonized from EU law but differs in its wording from the description of inventive step as defined in article 56 EPC. In the latter, inventive step is defined as "[a] claimed invention shall be considered to involve an inventive step if, having regard to the prior art, it is not, at the relevant date, obvious to a person skilled in the art." The

two definitions, however, have the same meaning in terms of their application.

The requirement of inventive step should be regarded as fulfilled if an invention is not obvious for a person skilled in the art with consideration to the current state of the prior art. This concept is known as non-obviousness. Non-obviousness in light of inventive step can be defined as something that is within the bounds of reasonable technical progress. Or put differently, something that logically could follow on existing prior art and that only involves the application of such skill and ability that can reasonably be expected to be applied by a person skilled in the art.⁷⁷

Everything that has been made publicly available before the day on which a patent application was filed is said to be included in the prior art. The day before is in Swedish patent law defined in 2, 6 §§ patentlagen as the priority date.

3.2.2 A Person Skilled in the Art

In order to determine non-obviousness, an invention should be viewed through the lens of a hypothetical *person skilled in the art* (fackmannen). Also interchangeably referred to as a *skilled person*, this individual is assumed to have knowledge of everything that has been made available up until the priority date within the particular technical field actualized by the invention being investigated.⁷⁸

The person skilled in the art is expected to experiment in order to assess any irregularities within a particular technical field but lacks the ability to invent in a creative fashion. The person has access to normal tools and aids through which that person may acquire the ability to do routine construction work and perform other mundane attempts at resolving a technical problem. If the problem addressed by the invention is determined to be solvable through application of another technical field, the person skilled in the art should have their skills concentrated in that other field. Furthermore, if the problem addressed by the invention under investigation could potentially arise within adjacent technical fields, the person skilled in the art is expected to independently seek to address the problem by applying knowledge and methods found in these adjacent fields. If, however, a solution cannot be sought in an adjacent technical field or in a technical field not in the person

⁷⁷ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.1.

⁷⁸ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.3.

skilled in the art' wheelhouse, the person skilled in the art is to be led to a solution through instruction or other means of guidance.⁷⁹

Given the inherent complexity of certain technical areas, it is sometimes pertinent for the court to visualize the person skilled in the art as a group of persons skilled in the arts. Additionally, it is also appropriate for the courts to characterize the(se) person(s) skilled in the arts as someone who does not question established notions in their technical field. Conclusively, then, the discernible feature that differentiates an inventor from a person skilled in the art is the former's ability to invent whereas the latter is merely capable of finding solutions to problems that follows causally on what is known in the prior art.⁸⁰

3.2.3 The State of the Art

The state of the art (*teknikens ståndpunkt*), also referred to as prior art, is a conceptualization of what is known to the world prior to the inception of a new invention.⁸¹ The state of prior art is used as a bottom line upon which comparisons can be made that aims to assert whether or not an invention has achieved inventive step.⁸²

In assessing the prior art, no difference should be made between geographical or language divides, nor about the manner in which a piece of prior art has been made available.⁸³ This means that the mere existence of a certain piece of prior art enables the assessment of a patent claim. Conclusively, then, in terms of introduction of a work into the prior art, it may be stated that a non-descript group of individuals theoretically could have accessed or analyzed a particular work, product, or invention for it to be legally considered a part of the prior art.⁸⁴

3.2.4 The Problem Solution Approach

As stated above, inventive step is dependent on the invention's relation to the nearest prior art as determined by a person skilled in the art. The fact is, however, that the investigation into the relevant knowledge that a person skilled in the art happens should realistically possess when

⁷⁹ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.3.

⁸⁰ European Patent Office, T 39/93.

⁸¹ C. f. 2, 6 §§ patentlagen.

⁸² See articles 54 and 56 EPC.

⁸³ European Patent Office's Guidelines for Examination, part C chapter IV subsection 1.

⁸⁴ Bengt Domeij, *Patent och företagshemligheter* (2nd ed, Iustus förlag 2019) 68.

determining an invention's relation to the prior art often start sometime after that point in time when the patent claim was first filed. This actualizes a risk for the applicant whereby their invention might end up being unfairly judged due to recent changes in the nearest prior art that has occurred in the period between the initial claim and the start of the investigation.

The problem solution approach (*problemlösningsmetoden*) was developed to prevent *ex post facto* determinations to the applicant's detriment. The approach involves is a three-step method, again, used to objectively – by which focus on the status of the prior art at the priority date is implied – assert whether or not a patent-pending invention has fulfilled the inventive step substantive requirement.⁸⁵

Firstly, the nearest technological prior art must be ascertained. The nearest technological prior art is derived from one individual document that is related to the same technical field as the invention under investigation. The relationship between documentation and technical field is determined based on the nature of the document. In making this determination, it is not allowed to combine parts of descriptions that are individually linked to a plurality of technical executions. This holds true even in instances where such descriptions are individually detailed but compiled in one coherent document. The only exception to this rule is if and when the compiling of combinations of descriptions into one document is specifically recommended as a practice.⁸⁶

Having determined the technological starting-point, the next step is to define the nearest prior art. The nearest prior art should be understood to mean the most logical place for a person skilled in the art to start their own research into solving the problem first addressed by the invention detailed in the patent claim. The details of the art-specific literature used by the person skilled in the art when navigating the nearest prior art must be similar to those referred to in the patent application under review.

It is important to note here, so that the reader understand how, in contrast to how novelty is determined, ascertaining documentation of the prior art in order to determine inventive step forces the determination to not be primarily centered around finding documentation detailing the largest number of similar features between the invention detailed in the patent claim and what else might exist in the prior art. Rather, when it comes to inventive step, the determination that should be made is one of subjective comparison

⁸⁵ European Patent Office's Guidelines for Examination, part G chapter VII subsection 5

⁸⁶ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.5.2

between the patent claim as such and comparable sources in the nearest prior art. By applying the problem-solving approach at this stage, any correlation between one source in the prior art and the application may be more easily confirmed, with one such confirmed correlation lending enough ground for a patent board to refuse to grant the patent claim or for a court of law to rule on the validity of an already granted patent.⁸⁷

Secondly, the objective problem that the invention detailed in the patent claim seeks to address, or that it, at any rate, argues it address has to be identified.

To do this, it is necessary to find the features that differentiates the patent application from what already exists in the nearest prior art. The patent claim should here be considered as a whole,⁸⁸ meaning that all features detailed – structural as well as functional – in the patent claim that sets the invention apart from what exists in the nearest prior art should be acknowledged and taken into consideration. Even if not all of the features detailed eventually aid in defining the problem that the invention, as detailed in the patent claim, aims to address, they should still be considered when determining the objective problem.⁸⁹

After completing this determinative step, the courts have to identify the technical effect that the feature(s) setting the invention detailed in the patent claim apart from the nearest prior art has. This identification has to start out from a reading of the patent claim, which may be done either directly or through applying the general knowledge of the technical field held by a person skilled in the art. If the invention's differentiating features as detailed in the patent claim and determined by the process thus far does not have any discernible technical effect besides what may be achieved through the nearest prior art it should be so acknowledged.

Then, the objective problem that the differentiation in features between the invention and the nearest prior art aims to address must be identified. In the first instance, this is done by taking the technical effect achieved through the technical effect that the feature(s) setting the invention detailed in the patent application apart from the nearest prior art and applying it on the nearest prior art. If the difference between the technical effect discernible in the patent claim and the nearest prior art does not have any noticeable mitigatory effect on the objective problem identified in the

⁸⁷ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.5.2.

⁸⁸ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.5.2.

⁸⁹ Svea hovrätt, T 9344-13.

hypothetical above, the problem may be redefined as seeking to explore and find an alternative method or application.⁹⁰

The observant reader has at this point of course noticed how the timeline of such an investigation means that an objective problem can be fully defined only after that the technical effect has been identified, This means that the objective problem may differ from the original problem stated by the applicant in the patent claim. To resolve this potential duality problem, the original problem as it may previously has been defined may be reformulated in the patent claim with regards to developments within the nearest prior art since the filing of said patent claim.⁹¹ The evaluating body may use every effect that the invention detailed in the patent claim can be said to reasonably have on the original problem it seeks to address when formulating their objective problem as long as every such effect may be derived from the original patent application depiction of that original problem.⁹² The problem may also be redefined after new effects having been considered and pointed out by the original applicant during the course of the investigation. It should be noted, however, that the effects that original applicant brings attention to must be describable as implied by, or at least related to, the original definition of the problem, as stated in the applicant's original filing.⁹³ Furthermore, the objective problem may not contain any parts of the solution detailed in the patent claim, since that would constitute a reasonable means for a person skilled in the art to address the problem.⁹⁴

At this point, it may decide that there are differences between a patent claim and the nearest prior art that, either separately or together, may lead to technical effects that are not related in terms of functionality – meaning that the effects all addresses individual technical problems. If this happens, the objective problem should be split into a collection of sub-problems in order to more accurately represent the nature of the invention detailed in the patent claim.⁹⁵ It is incumbent on the evaluating body to realize when addressing these types of patent claims that it in the absence of coherent technical effects is pertinent to assess every sub-problem individually. If, following on such an assessment, the resulting differences still give the courts reason to believe that the sub-problems, if considered together, would result in a technical solution, the courts are instead to revert back to viewing the problems addressed as one, coherent, problem.

⁹⁰ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.5.2.

⁹¹ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.5.2.

⁹² European Patent Office, T 386/89.

⁹³ European Patent Office, T 184/82.

⁹⁴ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.5.2.

⁹⁵ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.5.2..

Lastly, under step two, it should be noted that any problem referred to the problem solution approach should be of a technical character. This distinction characterizes the task faced by the person skilled in the art as one where the person skilled in the art would have to either modify or customize the nearest prior art in order to achieve the technical effect that the invention detailed in the patent claim would achieve on its own compared to what is available in the nearest prior art.⁹⁶ Unique characteristics that, by causing a technical effect, individually or together, add to the patent claim's technical character is not relevant at this point of the determination.⁹⁷

Thirdly, after a determination about the nearest prior art, asserted technical character, and defined the objective problem have been made – there is a need to determine whether or not the invention for which patent protection has been sought has achieved inventive step as a whole. To do this, the results of steps one and two are applied, as detailed in the following.

Whether or not the solution to the objective problem can be found in an accessible document or within the sphere of general knowledge feasible held by a person skilled in the art determines if the combination of knowledge in the prior art that may be said to have led to the invention being *reasonably attainable* (närliggande) for the person skilled in the art.

To address this question, the first step is to look at the objective problem and pose the question to itself whether there, somewhere in the prior art, is a solution to the objective problem. That solution, or any relevant notion relating to what such a solution might look like, does not have to be within the nearest prior art but may be acceptably found in unrelated documentation or in the general knowledge of the person skilled in the art.⁹⁸

Before continuing on to the last part of the third step of the problem-solution method, a quick description of *problem inventions* (problemuppfinnningar) is warranted. Whether or not the objective problem can be said to be known or obvious for a person skilled in the art or attainable to such a person through the prior art will determine whether or not the patent claim before the court is detailing a general invention or a so-called *problem-invention*. The latter are characterized as an invention that identifies a new problem that, once having been defined, has an obvious solution of a distinctly functional nature. In cases concerning the latter type of inventions, the differentiating factor between the invention and the nearest prior art is the defining *functional nature* of the invention, which may set it apart from the

⁹⁶ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.5.2.

⁹⁷ European Patent Office, T 641/00 and also Patent och marknadsdomstolen, 04-329.

⁹⁸ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.5.2.

prior art and lead it to achieve inventive step despite the non-obviousness of the invention detailed in the patent claim.⁹⁹

Lastly, then, in step three, a description of how a person skilled in the art would proceed in solving the objective problem while only having access to the nearest prior art has to be made. Or put differently, it must be determined whether the invention for which a patent claim has been filed is deserving of patentability through achieving inventive step in comparison to what is known in the nearest prior art. This determination is done by concluding whether the information available in the nearest prior art sufficiently would lead a person skilled in the art to the same solution as that defined in the patent claim.¹⁰⁰ In order to deny inventive step, it must be determined that a person skilled in the art with all available information at hand would attain similar results to what the invention specified in the patent claim would. The depiction of the actions undertaken by the person skilled in the art in doing this determination must be coherent and believable, which it is of great importance to note the distinction between information in the nearest prior art that *could* lead to similar results and information in the nearest prior art that *would* lead to similar results.¹⁰¹ To deny inventive step, and by extension patentability, it is not sufficient for a person skilled in the art to access information that simply could lead to similar results. This means that merely pointing out that an alternative solution might exist to a problem addressed by an invention for which a patent claim has been filed is not enough to deny inventive step. It must also be possible to explain *why* a person skilled in the art *would* arrive at a solution similar to the invention.¹⁰²

A quick final note regarding the subdivision of the objective problem. If the objective problem would be determined to consist of several sub-problems, as described above, such a determination would have to include that a solution of one of the sub-problems achieves inventive step for the patent claim to achieve inventive step in its entirety, further.¹⁰³

3.2.5 Technical and Non-technical Features

When filing a patent claim with the PRV, the applicant is allowed to mix technical and non-technical features as grounds for patentability. These

⁹⁹ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.5.2.

¹⁰⁰ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.5.2.

¹⁰¹ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.5.2.

¹⁰² Patent och registreringsverkets patenbarhetsvillkor B5, point 2.5.2.

¹⁰³ Svea hovrätt, T 9344-13 and also European Patent Office T 1054/05.

mixed patent claims are relatively common, but in the clear majority when it comes to claims filed for computer implemented inventions.¹⁰⁴

The concept of technical and non-technical features are important aspects of patent law in general, but they are especially crucial for patents claims over inventions of a highly technological or digital character. Having established that, and in the interest of limiting confusion over terminology, it appears pertinent to remind the reader that the word *technical*, used in this particular context of patent law jargon, refers to the intrinsic qualities of an invention and not to inventions specifically of a technical or highly technical character.¹⁰⁵

As a bottom-line requirement for patentability, technical features are necessary for an invention that seeks patent protection under the law. In order to comply with this requirement of patentability, the invention described in the patent claim must have such technical features so that the invention as a whole may be determined to have a technical character.¹⁰⁶ This is true for inventions that have clearly defined technical features and/or other non-technical features that, observed alongside the invention as a whole, creates a technical character. Non-technical features that adds to the overall technical character of an invention have determined to be – inter alia – methods of encryption¹⁰⁷ and graphics for presentation of on-screen information.¹⁰⁸ *E contrario*, if a patent claim, assessed as a whole, lacks technical character, it cannot be granted status as an invention under 1 § patentlagen, thus rendering moot any further assessment of inventive step.¹⁰⁹

In terms of formal evaluation, patent claims that exhibits these “split” characteristics of both technical and non-technical features forces the courts to adapt their application of the above mentioned problem solution approach’s steps two and three. Since this specified adaptation of the problem solution approach specifically impacts patent claims pertaining to inventions of an especially technological nature, that adaptation will be detailed below.

When formulating the objective problem, the courts seek to identify the differences between the patent claim as a whole and the nearest prior art. In addition to what has been described above in relation to formulating the objective problem, the courts base their evaluation on features that contribute to the invention’s technical character. In a scenario, like the ones discussed in

¹⁰⁴ C. f. European Patent Office, G 1/19.

¹⁰⁵ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.5.3.

¹⁰⁶ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.5.3.

¹⁰⁷ European Patent Office, T1326/06.

¹⁰⁸ European Patent Office, T0928/03.

¹⁰⁹ Patent och marknadsdomstolen, 04-326.

the above, where there are discernible differences between the patent claim and the prior art, but these are not of such character that they provide the invention with technical features, the patent claim should be dismissed over lack of inventive step. It is important to note here that a non-technical feature may yet contribute to an invention's technical character without actually having any discernible technical effect on the invention's functionality. This can be true even in situations where such aforementioned technical features have aided in differentiating the invention from the prior art.¹¹⁰

In formulating its mixed objective problem, the court is allowed to include and consider non-technical features as long as these are expressed as a series of conditions that the invention in question has to fulfill. This may sound somewhat strange but put differently it simply means that the court may include unique features of the solution provided by the invention. The inclusion of such unique features, however, hinges on that those features do not in any way contribute towards the invention's technical character. For inventions that are comprised of a series of computer-implemented non-technical features, this means that in order to avoid nonconformism with the non-technical features that are not considered contributive to the invention's technical character may be included. The outcome of a patent claim modelled in such a fashion is very likely to be dismissal on the grounds of non-technical computer implementation normally being reasonably attainable for a person skilled in the art.¹¹¹ In an instance such as this, then, compliance with the law's formal requirements provides the applicant with their day in court whilst simultaneously hamstringing the applying party's chances of achieving any success during the court's material evaluation.

3.2.6 Inventorship

Under the existing relevant provisions in Swedish and European law, as defined above, a work is tested in order to ascertain whom should be beholden of the title of inventor. Generally speaking, these tests aim to establish the person(s) responsible for solving the technical problem that the applicant(s) argues is at the heart of the invention for which the patent claim was originally filed. In the following, a summary attempt will be made at explaining the concept of inventorship and its applicability.

Defining this potential holder of title and rights, the inventor, however, has become increasingly difficult – the involvement of inventive AI notwithstanding – as modern-day inventions more often than not are the result

¹¹⁰ B5 Patent och registreringsverkets patenbarhetsvillkor, point 2.5.3.

¹¹¹ European Patent Office, T 641/00 and also European Patent Office, T 154/04.

of cooperative action and major R&D initiatives that lack any clear designatory.¹¹²

Regrettably, not much assistance may be found in Swedish blackletter law pertaining to this matter. Patentlagen offers no clear guidance and neither does the law's legislative history. In the latter, however, the legislature admits that the act of legally ascertaining inventorship is both complex and difficult – thus at least acknowledging the complexity of the task given the courts when interpreting the law.¹¹³

Nevertheless, as a point of entry to understanding the purpose and spirit of the law, patentlagen clearly states that it promotes *novel technical problem solution* (nyskapande teknisk problemlösning).¹¹⁴ In Swedish legal literature, novel technical problem solution is determined to require *independent intellectual contribution* (självständigt intellektuellt bidrag).¹¹⁵ That concept, however, is yet to be entered into the realm of common practice through application in actual case law.

Something that has been established in case law, however, is the contribution required in order for a person to achieve the status of inventor. The Gothenburg District Court (Göteborgs tingsrätt) expressed in T 2522-16 that such contributions should be defined as (1) självständigt utförande av hela eller delar av det tankearbete som lett fram till en uppfinning (*independent performative actions involving the whole, or parts of the whole, thought process that resulted in the invention*), by (2) personen som genom en teknisk lösning kommer fram med en lösning på ett tekniskt problem (*the person that through an applied technical solution produces a solution to a technical problem*).¹¹⁶ Put another way, the Gothenburg District Court can be said to have defined inventorship as an independent contribution containing a technically creative dimension.

The first part of this definition of inventorship – independent contribution – is relatively straight forward. It has been cited in both legal literature and case law and can be considered relative established in Swedish legal doctrine.¹¹⁷ Generally speaking, this first part of the definition seeks to identify only those contributing directly to the inventive process, but

¹¹² Graham Dutfield, 'Collective invention and patent law individualism: origins and functions of the inventor's right of attribution' (2013) 5 WIPO Journal 25.

¹¹³ See Prop. 1977/78:1 Del A s. 219.

¹¹⁴ Domeij (n 84) 101.

¹¹⁵ Domeij (n 84) 101.

¹¹⁶ Göteborgs tingsrätt 2018-09-28, T 2522-16.

¹¹⁷ Göteborgs tingsrätt 2018-09-28, T 2522-16 and also Bengt G Nilsson, and Catarina Holtz, *Patentlagen – en kommentar och en jämförelse med EPC och PCT*, (Jure 2012) 29.

exceptions may be made in an instance where the applying party has given instructions that in of themselves are to be considered a part of the technical solution.¹¹⁸ In these latter cases, the instructions given must conform with an additional requirement of having had a “styrande inverkan på arbetet som lett fram till uppfinningen” (“*guiding influence on labor directly contributing to the invention’s realization*”).¹¹⁹ Additionally, it should *e contrario* not be considered possible to achieve status as an inventor by simply applying instructions so clearly defined so that no discernible creative space is left for the creative party.¹²⁰ In such instances, argues Bengt Domeij – professor of civil law at Uppsala University and one of the leading Swedish academics in the areas of IP and contract law – the threshold for achieving inventorship status has not been reached.¹²¹

The second part of the definition of inventorship – *the demand for a technically creative dimension* – aims to promote the unique feats of technical creativity and problem solving that historically has motivated inventive action. The demand for technically creative dimensions on the part of the would-be inventor also serves as a guardrail against applicants being able to claim inventorship status from merely contributing extrinsic means to an inventive process, such as tools or a location to work out of.¹²² Whilst the above mentioned definition of inventorship does not constitute an exhaustive test of a person’s right to inventorship status, procedures very similar to the definition above has been applied by Swedish courts when asserting inventorship. Illustratively, the Court in T 14043-00 first identified the novel aspects of the invention – a container lock – before proceeding to asking the applicant about the nature of his involvement in the development of the invention in question.¹²³ In subsequent cases¹²⁴, courts have gone further down this line of inquiry by investigating if anyone else other than the applicant may have been involved in the development of the invention.

Domeij argues in his 2019 book, *Patent och Företagshemligheter*, that *individual intellectual labor* (eget tankearbete) should be the determining factor for whether or not the court should afford inventorship status upon an applicant, thus aligning himself with the opinion of the Court, previously

¹¹⁸ Lars Holmqvist, *Patenträtt*. (AWE/Geber 1976) 52.

¹¹⁹ Domeij (n 84) 26.

¹²⁰ ‘Applying’, in this context, should be understood as a reference to the act of applying instructions towards the realization of an invention and not as the act of applying for a patent or other ownership-related right.

¹²¹ Johannes Hygen Meyer, ‘Hvem skal anses som oppfinner eller medoppfinner?’ (2011) 1 NIR 2.

¹²² Domeij (n 84) 26.

¹²³ Stockholms tingsrätt 2003-06-12, T 14043-00.

¹²⁴ Stockholms tingsrätt 2009-04-24, T 14369-07.

expressed in T 2522-16.¹²⁵ This alignment, however, creates something of a problem. Narrowing the definition of inventorship to what the courts have defined in case law and what legal scholars like Domeij have conferred *ex post facto* through their additions to academic legal prose means that – while the narrower definition does address the much needed lack of clarification around what should count as a contribution to an invention’s innovative concept – it also overlooks the distinction between administrative and economic contributions and innovative contributions. Whilst potentially of equal importance for the process as a whole, administrative and economic contributions does not hold intrinsic value and should therefore potentially be excluded from consideration when assessing a person’s right to inventorship under the definition of individual intellectual labor.

Individual intellectual labor – as defined by Domeij – and independent performative actions involving the whole, or parts of the whole, thought process that results in the creation of an invention – as defined by the Court in T 2522-16 – does not differentiate *prima facie* between such labor or action put into the creative process and such labor or action put into the economic and administrative process. This is a not insignificant distinction to want to make as patent applications for a work bearing similar features as works in the prior art historically has managed to constitute a *formulation of a problem* different enough from the state of the art that the inventive step was considered significantly fulfilled.¹²⁶

The second part of the Court’s definition – the person that through an applied technical solution produces a solution to a technical problem – addresses this issue. However, the doctrinal terminology repeatedly utilizes Domeij’s *individual intellectual labor* definition or the closely related *independent intellectual contribution* (självständigt intellektuellt bidrag)¹²⁷ definition¹²⁸ Despite the ambiguity regarding this second part of the definition, one might with relative certainty conclude that the operative words that guides Swedish legal thinking in terms of the determination of inventorship are *independent* and *intellectual*. These operative words, applied to contribution to inventive works, should be connected to (1) *novel elements in the invention*, the (2) *causality between contribution and invention*, and the (3) *significance of the contribution*.¹²⁹

¹²⁵ Domeij (n 84) 26.

¹²⁶ Regeringsrätten, RÅ 1998 ref 4.

¹²⁷ It should be noted that the term *independent intellectual contribution* originates from Norwegian legal doctrine and therefore does not bear as close a connection to Swedish doctrine as the term *individual intellectual labor*.

¹²⁸ Meyer (n 121) 1.

¹²⁹ Meyer (n 121) 1.

In the 2020 report Trends and Developments in Artificial Intelligence – Challenges to the Intellectual Property Rights Framework – Final Report from the European Commission 2020,¹³⁰ the EPO’s interpretation of the EPC frames this matter in a less black-and-white way as compared to previous iterations. In the report, the authors argue that patent protection for autonomous inventions might in fact be theoretically possible, though not by leveraging material requirements, but by creating protections through formal requirements.¹³¹ To support their argument, the authors of the report refer continuously to the DABUS case, previously introduced in chapter 2.5.

In the European DABUS case – similarly to what happened in contemporaneous cases in other jurisdictions – the EPO instructed the applicant to fill out the field marked inventor on the patent request application, to which the applicant responded by resubmitting the application with the AI DABUS as the inventor, promptly forcing the EPO to refuse the application on the grounds that an inventor could be nothing but a natural person, and by extension, a human being.

In the aforementioned report from the Commission, this catch-all nature of the definition of inventor is discussed thusly:¹³²

“The EPO decisions can be read in two ways. A first, expansive reading is to infer that AI-assisted inventions with little if any discernible human contribution are not patentable. This assumes that, to claim inventor status, a person must have made a contribution to the invention. As noted elsewhere, the link between the substantive elements required, if any, of contributions to an invention, on the one hand, and inventorship, on the other hand, are best viewed as a matter for the national laws of member States. The second reading is simply that, because AI systems do not have the status of a person under the law (i.e. legal personality), they cannot be named inventors. The authors of this Report read the EPO decisions as suggesting the latter, not the former. Naming the inventor is, in other words, a formal requirement that a human person be named as inventor, nothing more.”

In this latter interpretation of the EPO decision, AI is viewed as merely a tool, utilizable only in much the same way a photographer would a camera or a chef a spatula. This view, albeit easier to square with the requirement of the inventor being a physical person, runs into problems if one presupposes that a human user might be inhibited by the system in such

¹³⁰ Patent Investigations EP 18 275 163 and EP 18 275 174 (EPO).

¹³¹ Nilsson Zamel, et. al. (n 48) 8.

¹³² Patent Investigations EP 18 275 163 and EP 18 275 174 (EPO).

a way so that his creative process is constrained enough to be non-compliant with the law's requirement of originality. The question then becomes one of what happens if the human actions does not reach the required levels for protection whilst AI-generated inventions remain unpatentable.

In a scenario like this, albeit a largely speculative one at this point, patent seekers might find themselves in a legal gray area wherein protection for works potentially falls outside of the scope of the law, locking out a swab of inventive works from ever achieving patent protection. This potential problem can be directly tied to the continued reliance on a traditional system for establishing patent protection being applied to a non-traditional process, like that of AI-developed inventions.¹³³

The more advanced AI becomes, applying existing patent law directly onto the determination of inventorship for patent claims resulting from inventive AI appears increasingly analogous to attempting to fit a round peg in a square hole.

For a patent claim to receive patent protection in Sweden currently requires a physical person as the filer.¹³⁴ When defining the term inventor or designating inventorship status, however, nation law is given a fair amount of autonomy to make independent determinations. Swedish law, of course, remains subject to the supreme authority of prejudicing EU law despite this, but – as mentioned above and as will be discussed in more detail below – it is a differentiation from the standard of harmonization of general patent law.¹³⁵ This is worth highlighting as computers often, but not always, are viewed as tools. As such, when wielded by a physical person in a human-led innovative process, it is relatively easy to point out how the involvement of AI cannot in itself lead to sustained innovation without the input of the natural person. The increased autonomy of national courts in determining the scope of the term inventor and inventorship may force a distinction between instances concerning work resulting from a physical person's labor efforts, and whether or not that process may achieve inventive step, and those where the final work is to be considered a result of emerging technological capabilities.¹³⁶

¹³³ Nilsson Zamel, et. al. (n 48) 11.

¹³⁴ Bengt Domeij, *Patentavtalsrätt – Licenser, överlåtelser och samägande av patent* (2nd ed, Norstedts Juridik 2010) 98–108

¹³⁵ See Prop. 2013/14:89, 28 and also Chapter 3 Article 7 of the Regulation (EU) No 1257/2012 of the European Parliament and of the Council of December 17th 2012 implementing enhanced cooperation in the area of the creation of unitary patent protection (patenförordningen).

¹³⁶ Nilsson Zamel, et. al. (n 48) 12.

3.2.7 Patentability

A work may be deemed an invention eligible for patent protection under Swedish law once it fulfils three cumulative requirements: *novelty*, *inventive step*, and *industrial applicability*. These requirements originate in the European Patent Convention's definitions of the same cumulative requirements.¹³⁷ As set forth in the above research questions, this thesis will focus on the inventive step requirement. This choice is partly determined on the basis of limitations in relation to the thesis scope, see 1.5. above, but it is also based on relevance and scope. Inventive step is, comparatively to the requirements of novelty and industrial applicability, the one requirement that most prominently features considerations relating to the creation of an invention, which is the one aspect of invention where machines and natural persons are clearly distinguished from one another. This distinction, however, is not one of capabilities but one of rights. It is not AI's inability to invent through creative action that has led to their disenfranchisement but rather the fact that such actions originate from what has come to be defined as *algorithmic authorship* instead of human creativity.¹³⁸ As far as the legal challenge to inventive AI goes – and thus the point of concern for this thesis – the eventual solution to legally addressing the inventive output of inventive AI is likely to be found within the requirement of inventive step.¹³⁹ For this reason of relevance within the scope of the subject matter covered by this thesis, inventive step is the only cumulative requirement that will be detailed and discussed in the following.

In Swedish law, inventions that achieves inventive step is defined in the second part of the operative phrase in chapter 1 2 § patentlagen as¹⁴⁰ “[P]atent meddelas endast på en uppfinning som är ny i förhållande till vad som blivit känt före dagen för patentansökan och tillika väsentligen skiljer sig därifrån ([patents are granted only for] inventions that are novel in relation to what is known in the prior art on the day of the application and thereto also exhibit essential differences to the prior art). The term *väsentlig skillnad* (essential difference) should in this context be understood as equated to *uppfinningshöjd* (inventive step).¹⁴¹

¹³⁷ See Article 52(1) EPC.

¹³⁸ Margot E. Kaminski, 'Authorship, Disrupted: AI Authors in Copyright and First Amendment Law' (2017) U.C. Davis Law Review 51 589.

¹³⁹ Noll (ed) et. al. (n 2) 229.

¹⁴⁰ C. f. the definition of inventive step in article 56(1) EPC.

¹⁴¹ Leif Karlsson and Ragnar Lundgren, *Patentlagen: kommentar till lagen som den lyder den 1 juli 2013* (Norstedts Juridik 2013) 20.

The Swedish courts' interpretation of inventive step is done in light of the concept of *non-obviousness*. The origin of this interpretation, which stems from the English and French translations of article 56 EPC, was illustrated in PBR 09 364. In PBR 09 364, the Court was tasked with determining whether or not a certain type of granules for industrial scale production differentiated in an essential way from what was already known the prior art. Put differently, the Court was tasked with determining if the applicant's invention had achieved inventive step.¹⁴² PBR 09 364 is illustrative of subsequent practice and current reasoning in Swedish courts vis-à-vis the determination of an invention's non-obviousness, as determined by a person skilled in the art operating with the knowledge currently accessible within the state of the art at that time.

The applicant argued – in relation to the requirement of inventive step – that their invention was essentially different enough from the prior art to warrant patentability.¹⁴³ The applicant was confident in arguing this due to the nature of the perceived novelty of their invention: an additive to the granules in the dishwasher that contained plastic base materials and antimicrobial granules derived from plastic base materials, subsequently loaded with an antimicrobial substance suspended into the plastic base material.¹⁴⁴ These unique features, the applicant argued, would have a positive impact on the granules lifespan and improve the quality of residue left over in the dishwasher.

The Court, however, was not convinced that the product had achieved inventive step, regardless of its unique features. In making its determination, the Court illustrated its thinking through a hypothetical scenario. In this scenario, a person skilled in the art was faced with the same problem addressed by the applicant in their description of their invention, i.e., the problem of modifying the existing granules in such a way so that bacterial growth is lessened or eliminated completely.¹⁴⁵ The Court then argued that a person skilled in the art could be expected to be aware of the issue of bacterial growth outside the scope of dishwashers, and thus be inclined to proactively search for solutions to the problem. Such a person would subsequently, through application of the same method of problem solution as the applicant, in the opinion of the Court, arrive at similar technical solution as the one described by the applicant in their patent claim.¹⁴⁶ Furthermore, the Court argued, in assessing the applicant's invention and its feature of mixed

¹⁴² Patent och marknadsdomstolen, 09-364 2.

¹⁴³ Patent och marknadsdomstolen, 09-364 4.

¹⁴⁴ Patent och marknadsdomstolen, 09-364 4.

¹⁴⁵ Patent och marknadsdomstolen, 09-364 9.

¹⁴⁶ Patent och marknadsdomstolen, 09-364 9.

granules, the applicant did not manage to sufficiently show how a person skilled in the art faced with the same problem and equipped with the same publicly available information and knowledge reasonable to believe to be in his or her possession would not arrive at the same solution themselves. It was, in the words of the Court, “of course so that a person skilled in the art would attempt to exercise all means available to him or her within their general knowledge to [resolve the problem at hand]”. Put differently, the Court held that the devised solution of mixing granules was not sufficiently non-obvious, thus prompting a person skilled in the art to – with a sufficiently high degree of likelihood¹⁴⁷ - arrive at a similar solution if left to operate within the framework and in the manner described by the Court in the above.¹⁴⁸

The Court’s line of argumentation and approach in BPR 09-364 is not unique for the singular instance, but rather highly harmonized with preceding provisions in European patent law. Illustratively, when determining a work’s inventive step, the Court builds on what has been available in the state of the art in order to ascertain whether or not an invention essentially differentiate¹⁴⁹ itself by a large enough margin to comply with the inventive step.¹⁵⁰ By comparing the applicant’s invention to what was already available in the prior art at the time of filing for the original patent claim, the Court is referencing the definition of the state of the art, i.e., that everything that is made available before the day of a patent application is to be considered part of the state of the art and that *made available* is to be defined as having been potentially available¹⁵¹ to a wider or undefined circle.¹⁵²

3.3 Illustrative Swedish Case Law

3.3.1 NJA 1972 s. 462

The definition of patentable inventions set forth in chapter 1 2 § patentlagen states – inter alia – that patentable inventions are built on a previously not-known function in a known contraption. In NJA 1972 s. 462, such functions were determined to be a significant technical leap, suited for determining the matter of whether or not a work has achieved inventive step.

¹⁴⁷ C. f. the differentiation between *could* and *would* described in 3.2.4.

¹⁴⁸ Patent och marknadsdomstolen, 09-364 11.

¹⁴⁹ See Chapter 1 2 § Patentlagen.

¹⁵⁰ Nilsson and Holtz (n 117) 66.

¹⁵¹ ”Potentially available” was defined by the EPO Boards of Appeals in T 84/83, T 381/87, T 444/88, and T 2254/08. T 2254/08 specifically determines that information made available online only still falls under the definition of potentially available.

¹⁵² See arts. 54(1) and 54(2) EPC.

Or, put differently, the case determined whether a known apparatus updated with a novel function could differentiate itself enough from existing apparatuses in the prior art and achieve inventive step.¹⁵³

In NJA 1972 s. 462, a Danish inventor held a Swedish patent concerning an apparatus designed to facilitate blood infusions that ten years after its granting became subject of a lawsuit, wherein the complainant argued for the patent to be revoked. The complainant initially stated that the apparatus as such did not essentially differentiate itself from what was known in the prior art at the time of its patent registration's priority date. According to its inventor, the accosted patent in question was indeed different in that it allowed for a constant liquid flow which reduced the risk for unwanted air in what was described as the target liquid. The complainant, nevertheless, argued that anyone, taking what was known in the prior art into consideration in an inventive process, could have reasonably arrived at the creation of a similar invention.¹⁵⁴

Once before the Swedish Supreme Court, the Court argued that the original patent application – from that time when it acquired priority – showcased enough technical innovation to acquire inventive step.¹⁵⁵ Through its technical investigation – the methodology of which has been described in the above – the Court became satisfied that the technical innovations achieved by the patent holder were not only uniquely suited to the invention's purpose, but also visually distinctive enough to differentiate the invention from the complainant's product.

The Court subsequently held that the innovation brought into question by the complainant should be considered to have acquired inventive step through its technical design and function and that the original patent should not be overturned.¹⁵⁶ The Court's approach to NJA 1972 s. 462 showcases its use of the *problem solution approach* (problemlösningsmetoden) when finding out whether or not an invention differentiates itself essentially from what is known in the prior art.¹⁵⁷ By applying the problem solution method to the case at hand, the Court made it a clear that any investigate technical investigation if the kind it had carried out should include study of all potentially invasive patents as part of the prior art and thoroughly explain how the invention in the case before the court potentially differed from these pre-existing inventions.

¹⁵³ Nilsson Zamel, et. al. (n 48) 16.

¹⁵⁴ NJA 1972 s. 462 462 – 463.

¹⁵⁵ NJA 1972 s. 462 485.

¹⁵⁶ NJA 1972 s. 462 486.

¹⁵⁷ Rasmus Vang and Jakob Plesner Mathiasen, 'Problem-and-solution-metodens anvendelse ved vurdering af opfindelses og frembringelseshøjde', (2011) 4 NIR 353-354.

Another prominent feature of NJA 1972 s. 462 is the fact that the Court acknowledged that a U.S. patent that predated the priority date of the invention in the applicant's patent claim had indeed provided the market with a solution to the problem addressed by the Danish inventor in the original Swedish patent whilst still choosing not to overturn the patent claim. The Court motivated this by referring to the *differentiation in purpose* between the two inventions. This distinction became the first instance of *problem inventions* (problemuppfinnningar) being defined in Swedish doctrine.

3.3.1.1 Summary of Precedence

The key precedence set forth in NJA 1972 s. 462 is how the case helped define the problem inventions as an invention through which a previously unknown or unidentified problem gets addressed by a function inherent to the invention which on its own would not sufficiently be able to claim inventive step, but that as part of outlining and identifying a new problem is sufficient to claim inventive step.¹⁵⁸

3.3.2 RÅ 1998 ref 55 I

In RÅ 1998 ref 55, the Supreme Administrative Court (HFD) (Högsta förvaltningsdomstolen), set out to define further the concept of inventive step in Swedish law.

In 1987, a Swedish inventor, CS, was advised by the Swedish Patent and Registration Office (PRV) to amend his original patent application with documentation that more clearly would separate his work from the state of prior art.¹⁵⁹ After having resubmitted his application with the suggested amendments, another party, ABCM, inferred that the amended application remained essentially similar to what was already shown to have existed in the prior art at the time of CS' original filing. The PRV nevertheless granted CS the patent, arguing that CS' work differentiated itself essentially from the cited prior art through what the Court cited as "placement and functionality of certain key features".¹⁶⁰

The PRV's decision was appealed by ABCM to Patent och marknadsdomstolen where the Court subsequently struck down the PRV's decision to grant CS his patent.¹⁶¹ HFD eventually took the case on appeal,

¹⁵⁸ See Mikael Nyberg, *Patenträttsliga bedömningsgrunder – särskilt om fackmannen*, (1st ed. Jure 1999) 26.

¹⁵⁹ RÅ 1998 ref 55, see I.

¹⁶⁰ RÅ 1998 ref 55, see I.

¹⁶¹ RÅ 1998 ref 55, see I.

wherein CS argued that the Court should overturn the decision of the lower court on the basis of Patenbesvärsträtten having decided against existing EU precedence when announcing their judgement.¹⁶² HFD agreed with CS in theory and proceeded to look at Patenbesvärsträtten's interpretation and application of cited precedence for determining inventive step developed by the EPO and subsequently established as part of Swedish doctrine.¹⁶³

During deliberations, the Court reaffirmed the validity of the problem solution approach,¹⁶⁴ whilst also offering additional clarification for how the third step of the method – if an invention, judging by the results of step (1) and (2), are to be considered causal for a person skilled in the art to arrive at¹⁶⁵ – should be applied. In the third step of the problem solution approach, the Court argued, the objective of determination should be whether there is a feature in the prior art that, if considered as a whole, not only *could* lead a person skilled in the art, but that *would* lead a person skilled in the art – faced with the task of adapting or modifying the closest available existing technology – to a technical solution that would fall within the framework of the patent standard and that would be capable of the same functionality as the invention in question.¹⁶⁶

The Court continued on to also state that, when assessing an invention's inventive step, it was allowed to combine information compiled from two or more sources only when such an action would have been causal for a person skilled in the art at the patent claim's priority date. Such an assessment would also have to include whether or not a combination of information compiled would be reasonable for the person skilled in the art when faced with the specific technical challenge that prompted the inception of the original invention. The Court needed also to think about whether or not the sources used by the person skilled in the art originated from similar areas and the number of sources that the person would have to combine in the process.¹⁶⁷

An invention, the Court argued, that on its face would appear to be closely related to the prior art could in fact achieve inventive step. Once a new idea is formulated, it can oftentimes be realized theoretically by starting out on a baseline of what is known in the prior art and advance through a series of steps that might appear simple when looked back on after an

¹⁶² RÅ 1998 ref 55, see I.

¹⁶³ See Prop. 1977/78:1 Del A s. 323 and RÅ 1990 ref 84.

¹⁶⁴ RÅ 1998 ref 55, see I.

¹⁶⁵ In the original Swedish, "*Slutligen bedöms om uppfinningen från dessa utgångspunkter skulle vara närliggande för fackmannen.*"

¹⁶⁶ RÅ 1998 ref 55, see I.

¹⁶⁷ RÅ 1998 ref 55, see I.

invention resulting thereof has come to fruition. The Court therefore argued that looking at inventive processes in hindsight in order to fairly gauge the technical value and advancement could not be considered a fair practice. This too, the Court noted, goes for an invention that solves a technical problem that persons within the field have attempted to solve for a long time or if it in any other way satisfies a longstanding need for a technical solution.¹⁶⁸

The Court decided that CS's amended design indeed was essentially different from the prior art and that the invention was not obvious to a person skilled in the art. Inventive step was perceived to exist and the lower court's judgement was overturned.¹⁶⁹

3.3.3 RÅ 1998 ref 55 II

In RÅ 1998 ref 55 II, the Court focused on persons skilled in the arts in terms of them determining the rate of essential similarities between two inventions.¹⁷⁰

RÅ 1998 ref 55 II concerned vacuum filters for causticizing and, much like in RÅ 1998 ref 55 I, one of the issues before the Court was that of ascertaining the existence of inventive step through determination of the invention's essential difference from the prior art.¹⁷¹ After having concluded what constituted the closest existing work in the prior art, following the problem solution approach previously outlined in this thesis, the Court went on to define the problem that the invention in question aimed to solve, namely that vacuum filters existing in the prior art at the time of the patent claim's filing were unable to handle temperatures north of 70 degrees Celsius. The inventor had attempted to design a technology that would allow for filtration to occur at these higher temperatures by utilizing a specific type of continuously working disc pressure-filter.¹⁷²

After having asserted what type of technology the inventor had used in his invention, the Court set out to determine whether or not the technical solution would appear causal for an average person skilled in the art. This was done under the third step of the problem solution approach, outlined in its entirety above.¹⁷³ The Court asserted that, compared to what had been shown by the complainant, the patent application (1) relied on what could be proven to have existed in the prior art in terms of invention-specific components and

¹⁶⁸ RÅ 1998 ref 55, see I.

¹⁶⁹ RÅ 1998 ref 55, see I.

¹⁷⁰ RÅ 1998 ref 55, see II.

¹⁷¹ RÅ 1998 ref 55 II.

¹⁷² RÅ 1998 ref 55 II.

¹⁷³ RÅ 1998 ref 55 II.

functionality at the time of filing and that it was reasonable to assume (2) that a person skilled in the art would have a good knowledge of the general baseline technology behind filtration technology. However, the Court also noted that the application of existing knowledge and technological solution aimed towards solving the problem addressed in the patent filing indeed would most likely result in a suboptimal result.¹⁷⁴

If a person skilled in the art, tasked with solving the problem identified by the object of the patent filing, would attempt to do so by combining the knowledge specifically deemed accessible in the prior art, the resulting work “would not lead the person skilled in the art to known techniques and solutions addressing the problems identified by the invention.” Instead, the Court held, it could only “[could it] lead the person skilled in the art to the combination of known techniques and solutions addressing the problems identified by the invention.”¹⁷⁵ The Court subsequently deemed the invention to have achieved inventive step and remanded the case back to the PRV.¹⁷⁶

3.3.3.1 Summary of Precedence

In RÅ 1998 ref 55 II, the Court reaffirmed the use of the problem solution approach. It provided additional clarity for the method’s third step especially, holding that the threshold for sufficient non-obviousness for a person skilled in the art when hypothetically confronted with the problem addressed by the invention seeking patent status could be determined by ascertaining whether or not such a person most likely would or could arrive at an invention of sufficient functionality and essential difference from the prior art.

In RÅ 1998 ref 55 I, the Court set a standard for non-obviousness in terms of design and functionality, arguing that an invention – although reliant on existing technology known to exist in the prior art – could still be non-obvious to a person skilled in the art if the invention as a whole addresses and solves a problem in an inventive enough fashion. Put differently, the Court decided that an invention should be able to achieve inventive step even if its technological functionality is closely related to what is known in the prior art at the time.

In RÅ 1998 ref 55 II, the Court further explained its reasoning on the point of non-obviousness. It argued that a person skilled in the art simply

¹⁷⁴ RÅ 1998 ref 55 II.

¹⁷⁵ RÅ 1998 ref 55 II.

¹⁷⁶ RÅ 1998 ref 55 II.

having theoretical or potential access to the same information and technology in the prior art as the inventor would not *prima facie* exclude the invention from patentability. Put differently, the Court established that in order to deny patentability for an invention on grounds of obviousness, it would not be enough that knowledge of and access to information and technology in the prior art *could* lead the person skilled in the art to the combination of known techniques and solutions addressing the problems identified by the inventor. For patentability to be denied on these grounds, it would require that such access *would* lead the person skilled in the art to known techniques and solutions addressing the problems identified by the invention.

3.4 Illustrative European Case Law

As noted above, when it comes to patent law cases, Swedish Courts are bound by precedence from EU courts and other institutions with doctrinal power. In some aspects of patent law that affect autonomous inventions more or less directly, case law precedence from EU institutions are the only sources of case law available.

In the last part of this chapter, this thesis will – despite having cited European case law also in the above – take a look at a few examples of European case law of significance for AI, patentability, and inventorship.

3.4.1 G 1/19 (Simulations)

In Simulations, the Extended Board of Appeals of the EPO discussed at length the technical and non-technical character of computer-implemented simulations and the assessment of patentability against the backdrop of non-technical elements not contributing to the determination of inventive step, the principle otherwise known as the COMVIK-approach.¹⁷⁷

Whilst the Board did not provide an exhaustive definition of the term technical, it did present arguments that pointed to cognitive content of data as not being technical in nature¹⁷⁸ by referring to the 1969 Red Dove decision, in which a German court held that the meaning of a technical subject matter could be defined as “an instruction to methodically utilize natural forces to achieve a direct causal result.”¹⁷⁹ In relation to computer-implemented processes, the Board argued, based on the above, that:

¹⁷⁷ C. f. European Board of Appeals T 641/00.

¹⁷⁸ G 1/19, point 76 and T 1000/09, point 7.

¹⁷⁹ Brad Sherman, ‘Computer Programs as Excluded Patentable Subject Matter’ [2010] Standing Committee on the Law of Patents 15th Session Annex II 78

"[...] features that can be considered technical per se may still not contribute to inventive step if they do not contribute to the solution of a technical problem (...) [A] technical step within a computer-implemented process may or may not contribute to the problem solved by the invention."¹⁸⁰

In keeping with the Board's desire to proceed in accordance with the COMVIK-approach, it determined that a feature only should be considered for inventive step if it contributes to the technical character of an invention and that a requirement for doing so would be that its technical character extended to the entire invention for which a claim had been filed. Technical effects was thus determined to be occurring inside of the computer-implemented process' input and output sequences by ways of specific adaptations of the computer itself, transfer of data, and various methods of enabling storage.¹⁸¹ The Board concluded its deliberation by holding that computer-implemented simulations of technical systems or processes could, in fact, be considered able to solve a technical problem through technical effect and – more importantly – that the same reasoning could be applied to processes wherein a computer-based simulation would be used in a design process.

3.4.1.1 Summary of Precedence

Although not a case with direct bearing on AI, G 1/19 illustrates the EPO's initial view on software-based processes and inventive step in light of the concept of an invention's technical features. From the EPO's decision it is possible to extrapolate a general opinion that seeks to avoid alienation of computer-based solution from equal assessment of inventive step.

3.4.2 J 7/99 (Heavy-duty Power)

J 7/99 concerned a late filing of designation of inventor in relation to a previously submitted patent claim. The professional representative of the would-be applicant filed a request subsequent to the initial patent claim, arguing for re-establishment in accordance with article 122 EPC and a request to achieve inventorship status.

The case primarily concerned the applicant's formal rights to appeal, but it also serves as precedence for determining natural persons as the only legal subjects available to achieve inventorship status. The Board in J 7/99 argued that an omission to designate could not constitute a disproportionate

<https://www.wipo.int/edocs/mdocs/scp/en/scp_15/scp_15_3-annex2.pdf> accessed on December 21st, 2021

¹⁸⁰ G 1/19, point 80.

¹⁸¹ G 1/19, point 85.

legal consequence for the applicant but held that the right of designation under article 81 EPC embodies an important moral right on the part of the inventor.¹⁸²

Furthermore, the Board differentiated between legal incapacity on the side of the applying party under national laws and legal incapacity under rule 90(1)(c) EPC, arguing that – as far as the EPO was concerned – legal incapacity should only be understood as a uniform standard under EU law when discussed by the EPO BoA or EBoA.

3.4.2.1 Summary of Precedence

Albeit, again, not an AI-specific case, J 7/99 is cited by the EPO in its decisions vis-à-vis its DABUS decisions as establishing the formal requirements for applicants listed on a patent claim, wherein natural persons are recognized as a legitimate holder of the title of inventor.¹⁸³ It is worth mentioning, however, that the Board in J 7/99 – whilst defining inventors as natural persons and thus implicitly creating the normative baseline for future rulings on the matter – never actually makes the definition exhaustive. The EPO indeed subsequently acknowledges this in both EP 18 275 163 and EP 18 275 174, when they admit that there is an absence of case law covering the topic.

¹⁸² J 7/99, point 2.

¹⁸³ EP 18 275 163, p. 7 para 29.

4 Comparative Judicial Review

4.1 The United States of America

The United States Patent and Trademark Office (USPTO) summarized the prevailing views of the country's main IP stakeholders in their 2020 publication *Public Views on Artificial Intelligence and Intellectual Property Policy*, wherein it has taken a relatively conservative stance on AI compared to other institutions.¹⁸⁴

In the publication, stakeholders acknowledged that inventions that may be produced by an AI could potentially fall under the umbrella of AI inventiveness.¹⁸⁵ However, this acknowledgement came with the caveat that U.S. law in its current state calls for the determination of inventor to be strictly limited to individuals only, per 35 U.S.C. § 100. Furthermore, the Federal Circuit has made it clear that the inventiveness requires conception, which has been defined as an act requiring an inventor, an individual, to have had a specific solution to a problem in mind, rather than simply a general goal or broad outcome.¹⁸⁶

The requirement of conception is only fulfilled – or in the words of the court: “a conception is finished” – when the idea on which the eventual invention is going to be based is “so clearly defined in the mind of the inventor that only ordinary skill would be necessary to reduce the invention to practice without needing extensive research or experimentation.”¹⁸⁷ In reality, this means that for an inventor to be legally recognized they would have had to have undergone a “moment of conception culminating in an idea so fully formed and flushed out that it could be assembled without extensive facultative work by someone of only ordinary skill.”¹⁸⁸ Similarly, for joint inventorship it is true that contributions to the conception or reduction to practice of the invention in some significant manner make a contribution to

¹⁸⁴ USPTO, 'Public Views on Artificial Intelligence and Intellectual Property Policy' [2020] p. 1

¹⁸⁵ USPTO 2020, p. 1

¹⁸⁶ *Burroughs Wellcome Co. v. Barr Labs., Inc.*, 40 F.3d 1223, 1227-28 (Fed. Cir. 1994), see also *In re Verhoef*, 888 F.3d 1362, 1366 (Fed. Cir. 2018) and *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1376, 231 USPQ 81, 87 (Fed. Cir. 1986).

¹⁸⁷ *Burroughs Wellcome Co. v. Barr Labs., Inc.*, 40 F.3d 1223, 1227-28 (Fed. Cir. 1994), see also *In re Verhoef*, 888 F.3d 1362, 1366 (Fed. Cir. 2018).

¹⁸⁸ USPTO, 'Public Views on Artificial Intelligence and Intellectual Property Policy' [2020] 1, 2.

the claimed invention if it is not insignificant in quality when measured against the full invention, or do more than merely explain to the real inventors well-known concepts or current state of the art.¹⁸⁹

In instances where AI takes creative steps of its own, this limitation – considering how it within the scope of the definition of joint inventorship¹⁹⁰ would seem unlikely to include AIs – coupled with the implausibility of registering an AI inventor creates an interesting hypothetical. In this hypothetical, products developed with enough AI autonomy could fall outside of the defined threshold for inventions. Currently, the use of AI systems is nominally equated to using a software that aids in production of the final invention. AI is seen as a tool that, when used by a natural person, may lead that user to achieve the status of inventor, if the usage would have reached the thresholds outlined above regardless of the involvement of AI.¹⁹¹

If we consider the above hypothetical as a potential threat to the spirit and purpose of the law from the ways in which it is being enforced by the courts, it is worth discussing whether current U.S. laws and regulations pertaining to inventorship and patentability adequately considers inventions where an entity other than an individual, or natural person, may be said to undergo a moment of conception. AI today, like previously stated, are by and large narrow in scope, meaning that they are primarily useful for achieving application-specific objectives. The rapid pace with which the industry is currently developing, however, actualizes the need to consider the potential impact of artificial general intelligence (AGI) as part of a similar inventive process to that described by the law.¹⁹²

Assuming an AI advanced enough to fulfill the conception requirement, see 35 U.S.C. § 100(f) and 35 U.S.C. § 101, it would still fail to meet the requirement of an inventor being defined as a natural person as defined by the blackletter law and further settled in case law. Under the current laws and regulations, an AI would summarily not be allowed to enter into a position of inventor.¹⁹³ Seeing how the law appears to strictly not permit AIs to attain inventorship status, it is worth exploring how far removed from the process culminating in the moment of conception an individual can be while still being able to be theoretically successful in claiming the title of inventor or ownership.

¹⁸⁹ *Kimberly-Clark Corp. v. Procter Gamble Distrib. Co.*, 973 F.2d 911, 917, 23 USPQ2d 1921, 1926 (Fed. Cir. 1992), see also USPTO, 'Public Views on Artificial Intelligence and Intellectual Property Policy' [2020] 1. 2-3.

¹⁹⁰ USPTO 2-3.

¹⁹¹ USPTO 5.

¹⁹² USPTO 3.

¹⁹³ C. f. 37 CFR 1.27(a)(1).

In this regard, the USPTO has concluded¹⁹⁴ that a significant minority of patent law professionals and academics argue that consideration should be given to the notion of expanding the definition to a natural person who either trains an AI process, or owns and/or control an AI system.¹⁹⁵

4.1.1 Patentability and Inventorship

The USPTO had to put their above outlined thinking to the test when in 2018, Dr. Thaler applied for two patents, citing the AI DABUS as the inventor. After an initial rejection from the USPTO, the case was taken up on appeal by the U.S. District Court for the Eastern District of Virginia after the plaintiff, Dr. Thaler, and the defendant filed cross-motions for summary judgement procedure.

The matter before the Court was, similarly to what will be described regarding the DABUS-cases in other jurisdictions, that of AIs achieving inventorship status. General U.S. patent law states that inventions are eligible for patent protection *prima facie* unless they fall within the exceptions to the statutory categories outlining these rights. These exceptions are laws of nature, natural phenomena, and abstract ideas. If an AI invention passes both this first criterion and can be considered patent-eligible under something known as the Alice/Mayo test¹⁹⁶ - meaning that the invention as a whole includes additional limitations that amounts to a level significantly higher than the exceptions allow – it may be patent protected per 35 U.S.C. § 101.

According to the Supreme Court precedence in *BedRoc Ltd., LLC v. United States*, statutory interpretation requires the interpreter to view the statute as “saying what it means and meaning what it says.”¹⁹⁷ The Court in *Thaler v. Hirshfeld* cited the decision in *BedRoc Ltd., LLC v. United States* and held that the decision of whether or not the Patent Act limited the term of inventor from including any entity other than human beings was one of statutory construction and thus ruled that machines and AIs could not be included in that definition based on their explicit exclusion per 35 U.S.C. § 100(f).¹⁹⁸ To further address the point raised by the plaintiff regarding the definition of individual, the Court referred to the Supreme Court’s

¹⁹⁴ USPTO (n 120) 7.

¹⁹⁵ USPTO (n 120) 7.

¹⁹⁶ *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 573 U.S. 208, 221 (2014), see also *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66 (2012).

¹⁹⁷ *BedRoc Ltd., LLC v. United States*, 541 U.S. 176, 183 (2004).

¹⁹⁸ *C. f. Dawson Chem. Co. v. Rohm & Haas Co.*, 448 U.S. 176, 180 (1980) in which Congress’ 1952 codification of the Patent Act was defined and the America Invents Act amendments to 35 U.S.C. § 100(f).

designation of individual to mean natural person by extension of its “statutory context” in *Mohamad v. Palestinian Auth.*¹⁹⁹ In *Mohamad v. Palestinian Auth.*, the Supreme Court recognized the term’s use in “everyday parlance”, leading the Court in *Thaler v. Hirshfeld* to hold that “when used as a noun, ‘individual’ ordinarily means a human being, a person.”²⁰⁰

Under the method of determining patentability outline above, the most commonly used AI algorithms risks being characterized as certain methods of organizing human activity and mental processes, or mathematical concepts, which – if that were to happen – would exempt any invention resulting from the use of AI from achieving patentability.²⁰¹

Furthermore, an invention must also satisfy the enablement requirement expressed in 35 U.S.C. § 112(a). The enablement requirement – that may be loosely compared to the determinations made based on a person skilled in the art – states that access to the patent specification should be sufficient to teach a hypothetical person of ordinary skill in the art how to make and use the full scope of the claimed invention.²⁰² The determination of the enablement requirement takes into account several factors, like breadth of claims, nature of the invention, state of the prior art, skill level of a person of ordinary skill, level of predictability in the art, amount of direction provided by the inventor, existence of working examples, and quantity of experimentation necessary to make or use the invention based on the content of the disclosure.²⁰³

Generally speaking, the eventual degree of enablement, or “the amount of guidance and direction needed in the patent specification”, is considered “inversely related to the amount of knowledge in the state of the art.”²⁰⁴ This means that the enablement requirement for AI inventions is relatively high, seeing how not much is known in the state of the art.²⁰⁵ This in turn puts increased focus on the specification. This is especially tangible for more unpredictable AI inventions that operates in a black box or rely more heavily on the inherent randomness of AI algorithmic inventive expression.²⁰⁶

¹⁹⁹ *Mohamad v. Palestinian Auth.*, 566 U.S. 449, 453-454 (2012).

²⁰⁰ *Thaler v. Hirshfeld*, 1:20-cv-903(LMB/TCB), (E.D. Va. Sep. 2, 2021) 6.

²⁰¹ U.S. Department of Commerce, *Manual of Patent Examining Procedure MPEP* (Practice Manual, 9th edition, 2020) chapter 0300 1-8
<<http://www.uspto.gov/web/offices/pac/mpep/index/htm>> accessed on September 25th, 2021.

²⁰² C. f. 84 Fed. Reg. 62, and USPTO *Manual of Patent Examining Procedure MPEP* chapter 82164 1.

²⁰³ U.S. Department of Commerce (n 203) 10

²⁰⁴ USPTO 2019, 2163.03

²⁰⁵ U.S. Department of Commerce (n 203) 11

²⁰⁶ U.S. Department of Commerce (n 203) 11

Thaler v. Hirshfeld thus concluded that an AI would not at this time be considered for inventorship. The importance of safeguarding intellectual and economical rights to its inventions notwithstanding.²⁰⁷ AI-developed creations resulting from machine-human interaction, however, might yet remain copyrightable as creative works.²⁰⁸ The U.S. Copyright Office surmises the question of human contribution as *original works of authorship*, in accordance with 17 U.S.C. § 102(a). *E contrario*, works that because of the nature of their conception were created by a process that operates randomly, automatically, without any creative input, or intervention from a human author²⁰⁹ does not qualify under this rule and subsequently cannot be subject to copyright protection.²¹⁰

4.1.2 Summary

Conclusively, then, the debate around patentability of AI inventions in the United States is tied to the preemptive matter of inventorship, which in turn is firmly decided by *stare decisis*. Both the USPTO and the Court in Thaler v. Hirshfeld asserted that question relating to AI-developed inventions had been recently evaluated from both a policy standpoint and a statutory standpoint.²¹¹

4.2 The United Kingdom

4.2.1 Patentability and Inventorship

On September 21, 2021, the UK Court of Appeal ruled that an AI could not be listed as the inventor on a patent claim,²¹² following two patent applications before the UK Intellectual Property Office (UKIPO) by a one Dr. Thaler. Similarly to the DABUS case before the EPO, the appeal filings only listed DABUS as the inventor.²¹³ In response to this, Justice Smith held in the Court of First Instance that the British Patents Act of 1977 strictly did not allow for an inventor to be anything but a person, and that Dr. Thaler thus

²⁰⁷ *Thaler v. Hirshfeld*, 1:20-cv-903(LMB/TCB), (E.D. Va. Sep. 2, 2021), p. 9 - 10

²⁰⁸ *C. f. Feist Publ'ns, Inc., v. Rural Tel. Serv. Co.*, 499 U.S. 340 (1991)

²⁰⁹ U.S. Copyright Office, *Compendium of U.S. Copyright Office Practices*, (Practice Manual, 3rd ed, 2017) § 313.2 <<https://www.copyright.gov/comp3/docs/compendium.pdf>> accessed on September 24th, 2021.

²¹⁰ USPTO (n 120) 19.

²¹¹ *C. f. U.S. Department of Commerce* (n 203) 1 and *Thaler v. Hirshfeld*, 1:20-cv-903(LMB/TCB), (E.D. Va. Sep. 2, 2021) 8 – 9.

²¹² *Thaler v Comptroller General of Patents* [2021] EWCA Civ 1374 [2021].

²¹³ Technology Law Dispatch, 'UK Court of Appeal rules AI is not an inventor (2021) paras 1-2 <<https://www.technologylawdispatch.com/2021/09/in-the-courts/uk-court-of-appeal-rules-ai-is-not-an-inventor/>> accessed on October 8th 2021.

was not entitled to apply for the patents at all by extension of DABUS's inability to attain any thereto related rights.²¹⁴

The Court of Appeals, hearing Dr. Thaler's appeal of the decision in the Court of First Instance, considered three key issues in its deliberation. Put in somewhat simplified terms, these issues were: (1) if an inventor have to be a person, (2) if Dr. Thaler was in fact entitled to apply for a patent for an invention created by an AI, and (3) if the UK IPO responded correctly by rejecting the patent application in the first place.²¹⁵

Addressing the first question, the Court settled that the British Patents Act of 1977 defines inventor as an invention's *actual deviser*.²¹⁶ Furthermore, the Court held that the 1977 Act was drafted with the understanding that an inventor would have to be a natural person in order to qualify as actual deviser.²¹⁷ Thus, the Court concluded, the first question had to be answered in such a way so that AI machines would not be recognized as able to attain inventorship status. This would be true even if an AI managed to create an invention in the material sense.²¹⁸ On this issue, the Justices were all in agreement.²¹⁹

In addressing the second question, the Court held that an applicant who is not the inventor must be able to point to an entitlement in order to successfully apply for a patent. However, the Court also agreed to some boundaries of Section 13 of the 1977 Act. Especially that in making a statement under s13(2) of the 1977 Act, an applicant need only indicate who they believe to be the inventor, making it so that an application would not be rejected or suffer prejudice for errors or omissions not caused or under the control of the applicant.²²⁰ The Court also agreed that the UKIPO would not be required to take a substantive review of the accuracy of any s13 statement²²¹. Despite this initial inclining towards joint resolution, the Justices then split. Birss LJ argued that given that Dr. Thaler in his submission having to the best of his abilities attempted to identify the correct inventor

²¹⁴ Technology Law Dispatch paras 1-5.

²¹⁵ *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [48] – [87].

²¹⁶ *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [50].

²¹⁷ *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [51], c. f. S7(2)(c) of the Patents Act of 1977's continuous mention of "person or persons (...)" and the Court's understanding of that to implicitly equate inventor with an entity with legal status through the vehicle of actual deviser.

²¹⁸ *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [53].

²¹⁹ Nick Michelmore, Katie Cambrook, 'Patenting AI inventions in the UK' [2021] Kluwer Patent Blog paras 25-27 <<http://patentblog.kluweriplaw.com/2021/09/28/patenting-ai-inventions-in-the-uk/>> accessed on October 11th 2021.

²²⁰ *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [58].

²²¹ Nick Michelmore and Katie Cambrook (n 222) para 24.

and his own rights vis-à-vis the invention resulting from that inventor's inventive process. Birss LJ claimed that the information provided by the appellant to the UKIPO was honest, correct, and would in fact provide the public with enough information as to the identity of the inventor. In boiling the argument down to be about the purpose and spirit of the law itself, it is noted in the court transcripts how the Court ponders the argument made by the applicant that the UKIPO does not have a legal obligation to visually inspect any documentation pertaining to claims made towards an applicant's rights to an invention *by assignment*, as Dr. Thaler claimed in this particular case.²²² The legal status – or lack thereof – of the listed inventor notwithstanding, Birss LJ argued, the patent claim should be greenlit to proceed.²²³

The remaining two Justices, however, disagreed. They argued that while a substantial review of the accuracy of any submission of information under s13(2) is indeed not necessary, the applicant, Dr. Thaler, had on two separate occasions failed to accurately identify a person as the inventor despite being encouraged to do so by the lower instance.²²⁴ In the remaining Justices' words:

*“Granting Dr. Thaler the rights to DABUS’ inventions by assignment does not require satisfaction on the side of the Court that the applicant’s claim to title is good. It does nevertheless require that any such claim made explains how an applicant like Dr. Thaler could possibly derive that right.”*²²⁵

Based on the Court's determination of DABUS not having the right to attain inventorship status, Dr. Thaler could subsequently not satisfyingly convince the Court that he had any legitimate right to claim title to begin with.²²⁶

The appellant, Dr. Thaler, indeed held in his argumentation that he, as the owner of the AI, was entitled to the property rights of any and all of DABUS' inventions. In response, Lord Justice Arnold commented that this assertion – technically in reference to the UK common law doctrine of assertion – was incorrect as a matter of law, asserting that the rule in question only applies to tangible property, and seeing how there is no principle of law that says that an intangible property right created by a person's property is in turn owned by that person, the same must be true in this case. Or put differently, the notion of assertion did not – in the eyes of the Court – hold up in relation to intangible property as the appellant made an argument about

²²² *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [65].

²²³ Nick Michelmore and Katie Cambrook (n 222) paras 24-25.

²²⁴ *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [67] – [68].

²²⁵ *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [69].

²²⁶ *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [58].

where the law ought to be, and not to where it currently is.²²⁷ In this instance, the doctrine of accession could simply not be applied to a new intangible produced by an existing tangible. All other things being equal in terms of statutory compliance, individual A may have claims to pictures taken by individual A on individual B’s digital camera – but not individual B.²²⁸

Having addressed all three questions set forth by the Court, Dr. Thaler was determined to have failed to accurately identify a person as the inventor as well as having failed in identifying the derivation of his right to be granted the patent.²²⁹

4.2.2 Summary

The final ruling in *Thaler v. Comptroller General of Patents* is interesting for two reasons. Firstly, it adds to the growing international plethora of decisions vis-à-vis inventive AI, patentability, and inventorship with a ruling that brought the matter up front and center in one of the world’s most prominent legal systems. Secondly, the ruling illustrates both the difficulty in balancing the letter of the law with the purpose and spirit of the law. This is apparent in the extensive research undertaken by Birss LJ and Arnold LJ specifically.²³⁰

English patent law is – as pointed out by Laing LJ in her judgement – by and large guided by statute.²³¹ This means that despite some individual differences between the Justices, apparent – inter alia – in Birss LJ’s and Arnold LJ’s descriptions of the above detailed three main questions raised by the Court, it is unlikely that future arguments are going to diverge much from the central points raised by all three Justices in *Thaler v. Comptroller of Patents*. This is unless statutory amendments are introduced by the legislature.²³² Furthermore, all three Justices in this case agreed on the matter of real significance, namely that of defining the term inventor. This agreement led to the natural conclusion that patentability – a statutory right in English patent law – continues to only be awardable to a person, leading section 7(2)(a) of the Patent Act of 1977 to include only persons in the definition of inventor. This means that what is prescribed in 7(2)(c) and 7(2)(d) of the same act about patents being grantable “primarily to the inventor” must be assumed

²²⁷ *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [134].

²²⁸ *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [135].

²²⁹ *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [97].

²³⁰ *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [99] – [100].

²³¹ *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [136].

²³² *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [27], [115].

to mean that AIs cannot achieve inventorship status under the current statutes of the Patent Act of 1977.²³³

4.3 Australia

4.3.1 Patentability and Inventorship

Thaler v. Commissioner of Patents was precluded by the Deputy Commissioner of Patents determination that the patent application was noncompliant with the rules governing the formal application process, specifically Reg 3.2C(2)(aa) of the Patents Regulations 1991 that states how an inventor's name should be provided in a patent claim in order for admissibility to exist.

After being taken up on appeal, however, the core discussion became one of whether an AI system could be said to achieve inventorship status under the definition of inventor in the Patents Act 1990, thus turning the case into one including a fair amount of material evaluation. From reading the Patents Act 1990, the Court concluded that there was no definition of the term inventor and so the Court proceeded to assign the term status of an agent noun²³⁴, implying that if an AI were to enter into a position through which they may become “the agent that invents”, the machine should be considered for inventorship or at least not be denied such consideration *prima facie*.²³⁵ The Court then turned to how the term inventor has come to be defined in its dictionary usage. The Court argued that although the term itself may historically been applied exclusively to describe human behavior, that should not be reason alone for gatekeeping inclusion into that term. Instead, the Court suggested, its historic application should be seen as a result of the state of technology available at the time of its inception shaping the common understanding of the term and thus not as a finite point after which the term may not be understood to include anything else.²³⁶ If AI are becoming increasingly able to perform actions that was previously understood to be reserved only for human capabilities, the term should be expanded to include not only human inventors but also AI inventors, the Court argued.²³⁷ The

²³³ *Thaler v. Comptroller General of Patents* [2021] EWCA Civ 1374 [102].

²³⁴ An agent noun is in normal linguistic usage understood as denoting someone or something that performs the action of a verb.

²³⁵ *Thaler v Commissioner of Patents* [2021] FCA 879 [120].

²³⁶ John Collins, Natalie Shoolman, Rose Jenkins, ‘Robots are taking over the patent world – AI systems or devices can be “inventors” under the Australian Patents Act’ [2021] Kluwer Patent Blog para 12 <<http://patentblog.kluweriplaw.com/2021/09/08/robots-are-taking-over-the-patent-world-ai-systems-or-devices-can-be-inventors-under-the-australian-patents-act/>> accessed on October 11th 2021.

²³⁷ *Thaler v Commissioner of Patents* [2021] FCA 879 [119].

Court further illustrated its reasoning by comparing an expansion of the term inventor to the suggested contemporary widening of the concept of manner of manufacture. The move to potentially widening the concept manner of manufacture had been made prior to the Court taken on *Thaler v. Commissioner of Patents* on appeal and had been motivated by the emergence of new technologies that had actualized the need for developing Australian patent law to better reflect the present reality.²³⁸

The Court continued to connect the expansion of the term inventor to that of similar societal trends, arguing that a widening of the term would also be consistent with the – at the time – recently introduced object clause in section 2A of the Patents Act 1990, which the Court reprimanded the Deputy Commissioner of having wrongly applied in the lower instance only where any legal ambiguity could be said to exist. The clause, the Court instead argued, should always be considered, regardless of any legal ambiguity. The object clause, as cited in *Thaler v. Commissioner of Patents*, states that the Patent Act 1990 seeks to:

*“[p]rovide a patent system in Australia that promotes economic wellbeing through technological innovation and the transfer and dissemination of technology (...) the patent system balances over time the interests of producers, owners and users of technology and the public.”*²³⁹

The Court noted how a broadening of manner of manufacture had been suggested in a similar spirit, citing language used in the suggestion arguing for “[the promotion of] economic wellbeing through technological innovation” and “[balancing] the basic patent-related interests of producers, owners, and end users over time.”²⁴⁰ Rewarding innovation, irrespective of whether the inventor is human or not, the Court contended, would promote technological innovation and its dissemination into the general public in a similar fashion to what had been agreed would be the intended outcome of widening the term of manner of manufacture as well as being in line with the Patent Act 1990’s object clause. Not recognizing the reality of how inventions are conceived in a modern age could – *e contrario* – suppress innovation and lead to overbearing protectionism of AI-generated inventions and an increase in the utilization of alternative modes of legal protection. Leading in turn to otherwise useful inventions not being introduced to the public, the Court concluded.²⁴¹

²³⁸ *Thaler v Commissioner of Patents* [2021] FCA 879 [121].

²³⁹ *Thaler v Commissioner of Patents* [2021] FCA 879 [122].

²⁴⁰ Collins, Shoolman, Jenkins paras 15-16.

²⁴¹ Collins, Shoolman, Jenkins (n 239) para 16.

After having asserted these initial facts, the Australian Federal Court, however, did what none of its overseas counterparts facing similar DABUS-cases had done. The Court, under Justice Beach, chose to argue that the original questions regarding inventorship and patentability posed in the patent claim and subsequently addressed in the first instance had been inherently confused by the manner in which the statutes of the Patents Act 1990 had been applied to the case.²⁴² In section 15(1) of the Patents Act 1990, a patent is said to only be grantable to a person who (a) is the inventor, or (b) would, on the grant of a patent for the invention, be entitled to have the patent assigned to the person, or (c) derives title to the invention from the inventor or a person mentioned in paragraph (b), or (d) is the legal representative of a deceased person mentioned in paragraph (b). From reading of this provision alone, the argument could be made that the inventor is assumed to be a person and not a machine. The Court, however, argued, in principle, that the appellant could be granted a patent in relation to an AI-developed invention under – at least – section 15(1)(c). Potentially, also under section 15(1)(b) due to the law’s lack of definition of the term inventor.²⁴³ In relation to the latter statute, the Court stated, on established principles of Australian property law and the “logical fallacy” of treating the designation “person” in 15(1)(a) as an exhaustive term for who or what may attain inventorship²⁴⁴, that Dr. Thaler should be considered eligible for derivation of title. As the owner of the invention and on the grounds of him being the owner, programmer, and operator of DABUS, such derivation would be in line with both the Patents Act 1990 and other relevant sources of law cited by the Court.²⁴⁵

Section 15(1)(b), in fact, in the opinion of the Court, cannot be said to require the existence of an inventor at all in order to apply. It requires no more than an entitled recipient of derivation.²⁴⁶ According to the Court, it does not even necessarily require assignment at all from the inventor.²⁴⁷ The Court concludes its reasoning vis-à-vis section 15 of the Patents Act 1990 by stating how the provisions therein “on a fair reading” would allow for “a patent [to] be granted to a legal person for an invention with an artificial intelligence system or device as the inventor.”²⁴⁸

In his concluding remarks, Justice Beach returns to the formal matter of the correctness of the appellant’s initial patent claim, on which he was initially set to rule, armed with the results of the discussion briefly

²⁴² *Thaler v Commissioner of Patents* [2021] FCA 879 [128] – [132].

²⁴³ *Thaler v Commissioner of Patents* [2021] FCA 879 [161] – [162].

²⁴⁴ *Thaler v Commissioner of Patents* [2021] FCA 879 [160].

²⁴⁵ *Thaler v Commissioner of Patents* [2021] FCA 879 [167] – [170].

²⁴⁶ *Thaler v Commissioner of Patents* [2021] FCA 879 [119], [160] – [162].

²⁴⁷ *Thaler v Commissioner of Patents* [2021] FCA 879 [168] – [169].

²⁴⁸ *Thaler v Commissioner of Patents* [2021] FCA 879 [200].

summarized in the above. In his ruling, Justice Beach juxtaposes the formal requirements for patent claims in reg 3.2C(2)(aa) with the material requirements of who may be granted a patent.²⁴⁹ He argues that the statutory reason for the Commissioner of Patent having rejected the appellant’s initial claim, the rule expressed in reg 3.2C(2)(aa), is a misinterpretation of what section 15 of the Patents Act 1990 really mandates. The Court therefore holds that there is nothing in the Patent Act 1990 that would suggest that a non-human inventor could not be named as such.²⁵⁰ The Court concludes its judgement by stating that an AI should be able to attain inventorship status under the current law, but that AIs lack of legal status directly bars them from directly applying for or be the grantee of a patent.

4.3.2 Summary

Thaler v. Commissioner of Patents is a monumental ruling for AI-led inventions attaining equal protection under the law. Justice Beach’s ruling implies that title can be derived from an AI inventor to an applicant with legal status, notwithstanding that AIs *ab initio* cannot hold any rights due to their own lack of legal status. Given the Court’s motivation for its decision being a keeping with the spirit and purpose of the law and that a subsequent progressive interpretation of the guiding statutes does not go against the historic definition of the term inventor.²⁵¹

4.4 Comparative Conclusions

The above mentioned jurisdictions are of particular interest for two reasons. For one, they all share common legal traditions – although they all have individual and in some areas quite divergent patent laws²⁵² – and exhibit a similar outlook to Europe, and Sweden, in terms of the emergence of inventive AI. Secondly, they have all had to contest with the DABUS-case, which, of course, makes them uniquely suited for comparison.

In the United States, the USPTO refused Dr. Thaler’s initial application, stating that legislation and Federal Circuit case law on inventorship required a natural person to be the inventor. Upon appeal, the Virginia Eastern District Court ruled in favor of the USPTO, holding that the defendant’s interpretation of statute was correct, and that any wider

²⁴⁹ *Thaler v Commissioner of Patents* [2021] FCA 879 [221].

²⁵⁰ *Thaler v Commissioner of Patents* [2021] FCA 879 [222].

²⁵¹ Collins, Shoolman, Jenkins (n 239) para 16.

²⁵² *Thaler v Comptroller General of Patents* [2021] EWCA Civ 1374 [2021] [94] – [95].

interpretation of the law had to emanate from the legislative amending the blackletter law.

The judgement in *Thaler v. Hirshfeld* expresses – especially if contended to the concurrent cases in overseas jurisdictions – how arguments that may render some success in one particular jurisdiction should not be considered a legal panacea. Even in instances where the material aspects of the case remains the same.²⁵³ In this aspect is *Thaler v. Hirshfeld* especially interesting as the 2011 America Invents Act amended the Patent Act after the introduction of inventive AI and still omitted AI from its definition of entities that can attain inventorship status alongside U.S. states and other non-person entities.²⁵⁴

Evidently, then, the omission or inclusion of AI as a potential inventor in the blackletter law due to an act predating the inception of AI cannot be designated as the *casus belli* for how a ruling is likely to be handed down. Rather, the judgement in *Thaler v. Hirshfeld*, compared to *Thaler v. Commissioner of Patents* and *Thaler v. Comptroller of Patents*, would suggest that courts will make little adjustment for anything outside of established statutes principles.

Thaler v. Hirshfeld in this regard clearly seeks to define AI as a tool, albeit one inviting creative action, and not as an entity that may be on the cusp of achieving any right in regard to inventorship and patents.²⁵⁵ While the courts in *Thaler v. Commissioner of Patents* and *Thaler v. Comptroller of Patents* concerned itself with the rationale behind either adapting or refraining from adapting old legislation to modern problems, the Court in *Thaler v. Hirshfeld* steered clear of any such discussion, instead choosing to cite the statutory nature of applicable law as reason enough for dismissal. The statutory nature of the law, of course, was also cited in *Thaler v. Comptroller of Patents*. However, in the latter instance, that did not mean that the Court dismissed any argument concerning the soundness of the applicable law without merit.

The Court of Appeals in the UK and the Virginia Eastern District Court did however draw a similar line in the sand to when it came to the impossibility of AI achieving inventorship status, the predetermined issue to that of patentability. The Court in *Thaler v. Comptroller of Patents* did however find itself split on the matter of whether or not Dr. Thaler's noncompliance with the requirement to provide an inventor in his application

²⁵³ *Thaler v. Hirshfeld*, 1:20-cv-903(LMB/TCB), (E.D. Va. Sep. 2, 2021).

²⁵⁴ *C.f. Univ. of Utah v. Max-Planck-Gesellschaft*, 734 F.3d 1315, 1323 (Fed. Cir. 2013).

²⁵⁵ *Thaler v. Hirshfeld*, 1:20-cv-903(LMB/TCB), (E.D. Va. Sep. 2, 2021) 3.

to the UKIPO, focusing on the above discussed noncumulative nature of inventorship and patent entitlement under the Patent Act of 1977. This line of argument could be interpreted as the Court warming towards the prospect of separating further formal and material requirements under the Patent Act of 1977, despite the statutory issues that would presumably actualize.

Nevertheless, the Court held that this line of thinking could – at best – be classified as *pro forma*, seeing how it was not in the Court’s interest to debate how the law ought to be, but rather how it should be applied.

The Australian Federal Court took an academically similar – but differently yielding – approach in *Thaler v. Commissioner of Patents*. The main feature of Justice Beach’s judgement that differentiates from the judgements in the other DABUS-cases covered above is the importance given to the importance of statute.²⁵⁶ Citing precedence,²⁵⁷ the Court argues that a correct application of the Patent Act requires that “limitations and qualifications are not read into a statutory definition unless clearly required by its terms of its context”.²⁵⁸ Having asserted this, the Court continuously sets out to define the law’s statutory purpose by contrasting the spirit and purpose of the law with emerging technologies like AI.²⁵⁹ Similarly to *Thaler v. Hirsfeld*, the Court in *Thaler v. Commissioner of Patents* makes an analogous comparison with copyright law. In stark contrast to what the Court concludes in *Thaler v. Hirsfeld*, however, Justice Beach concludes that the more flushed out definition of human intervention versus autonomous action expressed in Australian copyright law should not be considered to have any effect on the Courts’ reasoning vis-à-vis matters of patent law.²⁶⁰

Summarily, the Court, in stark contrast to its peers in the UK and America, argued – if not primarily, then certainly secondarily – from a societal and utilitarian perspective rather than a principally legal one, especially when concluding in its judgement that their hold was consistent with the reality of the current technology as well as the Act and the concept of promotion of innovation.²⁶¹

²⁵⁶ *Thaler v Commissioner of Patents* [2021] FCA 879 [14].

²⁵⁷ *PMT Partners Pty Ltd (in liq) v Australian National Parks & Wildlife Service* (1995) 184 CLR 301 [310].

²⁵⁸ *Thaler v Commissioner of Patents* [2021] FCA 879 [14] – [15].

²⁵⁹ *Thaler v Commissioner of Patents* [2021] FCA 879 [101].

²⁶⁰ *Thaler v Commissioner of Patents* [2021] FCA 879 [102].

²⁶¹ Kingsley Egbonu, ‘The latest news on the DABUS patent case’ [2021] IP Stars 1 <<https://www.ipstars.com/NewsAndAnalysis/the-latest-news-on-the-dabus-patent-case/Index/7366>> accessed October 11th 2021.

5 Applying Patent Law to Artificial Intelligence

5.1 A Note on Applicable Law

As stated in this thesis' introductory chapter, Swedish IP law in general – and patent law in particular – is heavily influenced by legal precedence set forth by EU patent institutions. As such, the discussion in the following chapter(s) will consider the role of EU law as it has to be applied by Swedish courts. Where appropriate, special notes will be made of arguments pertaining patent law where Swedish courts have significant autonomy vis-a-vis EU law in line with previous discussions in this thesis.

5.2 The DABUS Case and AI Inventorship

In January of 2020, the EPO refused Dr. Thaler's two patent claims that both had the AI DABUS listed as inventor. In its refusal, the EPO cited three main reasons for its decision. The EPO argued in summary that (1) contemporarily correct interpretations of the European patent system could only lead to the conclusion the anyone holding the title of inventor must be a physical person and that such terminological interpretation was to be understood as an internationally applicable standard, that (2) inventor designation implies legal consequences that could only be conceived as exercisable by someone with a legal status, and that (3) simply naming an AI does not negate its lack of legal status nor enable it to exercise any rights tied to inventorship status.²⁶²

In the following, these three main arguments will be addressed from the standpoint of how a Swedish court hypothetically could address a case based on a patent claim similar to that presented to the EPO in EP 18 275 163 and EP 18 275 174.

5.2.1 The First Argument

As previously stated, article 81 EPC implies that the designation of inventor is reserved for natural or legal persons.²⁶³ Similarly, article 58 EPC states that the convention's statutory framework only recognizes natural persons or legal persons. With regard to inventorship, the window is even

²⁶² EP 18 275 163 points 19 – 41 and EP 18 275 174 points 20 – 42

²⁶³ C. f. J 7/99, point 2

narrower as only natural persons are considered viable. In the eyes of the EPO, these indices indicate a legislative understanding holding that only natural persons may become inventors. Based on this, the EPO holds that an AI like DABUS is a machine and not a person, and therefore not conform with the naming standards expressed in rule 19(1) EPC. Although this determination has not been addressed in case law, the EPO argues that the EPC's legislative history shows no intent on the side of the legislator to allow for anyone, or anything, other than a natural person to attain inventorship status. However, since the EPO's initial decision vis-à-vis DABUS, the decision in the appellant's favor in *Thaler v. Commissioner of Patents* has delivered its landmark ruling that has created a deviation from what was cited by the EPO in the reasons for its decision as an "internationally applicable standard."²⁶⁴

The only deviating opinion to the one the EPO conveys in EP 18 275 163 and EP 18 275 174 is the one expressed in *Thaler v. Commissioner*. Although of course not applicable by Swedish courts, the ruling remains interesting from an academic standpoint. In *Thaler v. Commissioner of Patents*, the Court decided to separate, for all intents and purposes, the term inventor from the term person in its deliberations. Illustratively, the Court argued that Section 15(1) of the Australian Patents Act – that states that a patent only can be granted to a person who could be so assigned in accordance with that person's entitlements – should be read separately from the conceptualization and designation of the term inventor in lieu of a definition to the contrary. The Court also looked at specifically section 15(1)(c) of the Australian Patents Act, which concerns the deriving of title from an inventor or other person. The Court argued that, again, in lieu of any legal definition to the contrary – was possible for a person to derive title from an AI, even if that AI could itself not legally assign the invention.

There is no reason – at least *prima facie* – barring the EPO or a national court applying the same legal provisions from arriving at a similar conclusion. In its decision of EP 18 275 163, the EPO motivates its interpretation of the terms *person* and *inventor* by referencing legal provisions in a series of member states.²⁶⁵ These references are presumably to provide EPO with additional substance for its claim of internationally applicable standard.²⁶⁶ To that point, the EPO further notes that it had not been called upon to decide in a matter relating to non-natural persons attaining inventorship status and that it would therefore focus its judgement entirely on

²⁶⁴ EP 18 275 163 point 29.

²⁶⁵ EP 18 275 163 5.

²⁶⁶ The EPO also cited more recent caselaw in both EP 18 275 163 and EP 275 174, *inter alia University of Southampton's Applications* and *University of Utah v. Max Planck*.

the formal aspects of the case.²⁶⁷ The EPO, however, has previously – albeit carefully – ventured into a broader discussion around statutory law, discussing widening the scope of who or what may attain inventorship status under the EPC.²⁶⁸ The EPO, in its decision of EP 18 275 163, claims that the current scope of the definition of inventor – limiting the term to only include natural persons – is to be seen as confirmation of the legislator’s understanding of the inventor as a natural person. The EPO, however, does not provide any further evidence for this conclusion, not does it contrast its reasoning to any analogous discussion in the *Travaux Préparatoires*. One reason for this could be that the EPO decided that doing so would fall outside of the scope of the determination asked of its BoA.²⁶⁹ The applicant, however, did ask the Board to consider the consequences of not trying the case on its merits, something that – if having been done – would have put the above described matter within the scope of the EPO’s determination.²⁷⁰ It would appear, then, that the differences in outcome between the judgment in *Thaler v. Commissioner of Patents* and the decisions of EP 18 275 163 and EP 275 174 is not rooted in matters of the law as much as it is the result of a variance of lateral thinking. Looking again at the EPO’s aforementioned decisions in light of recent contemporaneous matters before non-EU entities, it seems reasonable that the relatively high standard of autonomy enjoyed by national courts in patent law matters could be used by a Swedish court seeking to remedy this perceived oversight by the EPO.

Continuing on down the path set out in *Thaler v. Commissioner*, it is worth elaborating further on whether it would be possible to separate the rights of the inventor and the title. In its decisions vis-à-vis *DABUS*, the EPO cites its previous decision in J 8/82, wherein it seeks to establish a strong legal position for inventors by limiting the term to only include natural persons.²⁷¹ The EPO, however, fails to define how the precedence of J 8/82 – that sought to bar legal persons from claiming inventorship status – strengthens the legal position of natural persons whose AI machines acts like inventors and creates inventions. It would appear that the reliance on the precedence in J 8/82, if not misguided, is at least faultily conceived if it is to serve the spirit and purpose of the EPC.

Similarly to the Australian Federal Court, the EPO also discusses the concept of derivation of title – or succession in title, as it is known in the EPC.²⁷² The EPO argued that the applicant’s correction of his initial filing to

²⁶⁷ EP 18 275 163 points 28 – 29.

²⁶⁸ *Travaux Préparatoires* IV/4860/61-F 18.

²⁶⁹ EP 18 275 163 point 17.

²⁷⁰ EP 18 275 163 points 17 – 18.

²⁷¹ European Patent Office, J 8/82.

²⁷² EP 18 275 163 7 and EP 275 174 7. C.f. *Thaler v. Commissioner of Patents* 33.

address a succession in title from DABUS to the applicant was non-conform with article 60(1) EPC because AI systems could not transfer such rights on account of them not being able to attain them in the first instance.²⁷³ The Court in *Thaler v. Commissioner of Patents*, when deliberating the same feature of patent law, instead reasoned that the wording of section 15(1)(b) of the Patent Act did not explicitly equate the act of inventing with the existence of an inventor, and that section 15(1)(c) of the Australian Patent Act subsequently could apply to the applicant, Dr. Thaler, in his capacity as inventor of DABUS. This effectively meant that section 15(1)(c) provided for an AI to be considered as an inventor in the eyes of the law through redefinition of the term derivation in title.²⁷⁴

Thaler v. Commissioner of Patents opted to define the term *derives*, as any explicit definition could not be found in the Patent Act, nor could it be found in case law. As a result, the Court argued, the term should be understood in its ordinary meaning, i.e., meaning to “receive or obtain from a source or origin, to get, gain or obtain, and emanating or arising from.”²⁷⁵ With regards to the EPO’s notion that only physical persons may hold the title of inventor, article 60(1) EPC only states that the right to a European patent may belong to the inventor of a work or his successor in title. The argument made by EPO in its decisions of EP 18 275 163 and EP 275 174 referenced an implicit understanding amongst European lawmakers regarding the definition of inventor. This understanding was based on the EPO’s interpretation of the word *his* to include, exhaustingly, natural persons. There is, however, nothing in the convention’s preparatory works or its preamble that would suggest that the undefined nature of the term inventor would be of an automatically exclusionary nature. Rather, its preamble alludes to the contrary by stating one of the convention’s desired purposes to be the strengthening inter-state cooperation in regard to the protection of inventions.²⁷⁶

The term inventor is not closely defined in Swedish blackletter law. 1 § patentlagen states that “he who has created an invention” is to be considered its inventor. 8 § patentlagen states that “the applicant shall submit details about the inventor’s name and address in the patent claim.” It should be noted ahead of further discussion that the precise Swedish wording of 1 § utilizes the non-gendered and non-specific pronoun *den*. For contextual purposes, this thesis will be using *he* when referring to the provision in English but retain the linguistic characteristics of the Swedish word. If interpreted according to

²⁷³ See discussion above regarding natural and legal persons and thereto related rights.

²⁷⁴ *Thaler v. Commissioner of Patents* 34

²⁷⁵ *Thaler v. Commissioner of Patents* 34, para 179

²⁷⁶ European Patent Convention 8

conventional use in context of ownership, the noun *den* would most likely be understood as referring to a natural person. Within the context of legal use, however, *den* also extends to legal persons.²⁷⁷ The definition of *den* has been further expanded through case law to – *inter alia* – include not only the single individual, but several people.²⁷⁸ Similar to the discussion in *Thaler v. Commissioner of Patents*, the fact that tradition points to the expansion of the definition of *den* arguably opens the door for further argumentation against excluding AIs from falling within the definition of inventor in 1 § patentlagen.

The preparatory works to patentlagen has no explicit provision barring AIs from attaining inventorship. There is, however, a clear distinction between natural and legal persons, whereby the latter is excluded from attaining inventorship status as a result of that privilege being exclusively afforded to the former, which is in line with the EPC.²⁷⁹ Based on the spirit and purpose of the law stated in its preparatory works, it may be reasonably deduced that the legislator sought to avoid legal persons to attain inventorship. It is not clear, however, that a narrowing of the term inventor would include AIs by sheer guilt by association with other non-natural persons.

5.2.2 The Second Argument

As this thesis has previously asserted, patent law is partly intended to protect the work undertaken by the inventor, which implies that a burgeoning inventorship status comes with inalienable rights for the attaining party. In the EPO's opinion, the rights conferred through the granting of a patent claim could not be bestowed upon an AI inventor due to a machine's lack of legal status. As described in the above, however, a rephrasing of the original question of AI inventorship might void this question in its entirety.

Observing the international nature of patent law, it is worth exploring how a similarly expansive interpretation of Swedish and EU patent law by a Swedish court could look like. The naming requirement – which will be discussed in more detail below – has explicitly been detailed by the EPO as aimed to safeguard that proprietary rights pertinent to conceiving and realizing an invention is tied to the correct inventor, or to a person to whom title may be succeeded. The EPO has further argued that the impossibility for AIs to fulfill said naming requirements – due to their lack legal status – makes

²⁷⁷ Svante Johansson, *Svensk associationsrätt i huvuddrag* (12 ed., Norstedts Juridik 2018) 75.

²⁷⁸ Nilsson and Holtz (n 117) 29.

²⁷⁹ Prop. 2006/07:56 39.

it equally impossible for AIs to attain inventorship status.²⁸⁰ However, on further study of the naming requirements in both patentlagen and the EPC, it is not clear how refusing AIs the title of inventor over not clearing the threshold of the naming requirement serves the purpose and spirit of the law.

The purpose behind rule 19 expressed in article 81 EPC is to safeguard the rights of the applicant's rights against wrongful infringement. Similarly, the spirit and purpose of patentlagen is to protect inventors by empowering the owner of a right to pursue legal remedies against infringement and thus to subsequently also motivate innovation on a societal level. The implied annulment of an AI's possibility to attain inventorship on these grounds appears dubious at best, seeing how a potential loss of recognition or economic benefits should not matter for an AI. By denying inventorship status – and by extension the ability to pass on rights only attainable by a natural person – along the lines of the existing rules for succession of title, the reality is that neither AI nor its creator by succession of title can enjoy the recognition or economic benefits of an invention.

There is, however, also an element of natural law to consider when reviewing the law's functionality in comparison to its purpose. The inevitable march towards autonomous inventions – as PRV's lead attorney Nilsson Zamel argued in PRV's thought paper *Artificiell intelligens & immaterialrätt - ett tankepaper från Patent- och registreringsverket*²⁸¹ – does mean that giving AI the possibility to take on inventorship status with the rationale of having it pass via succession of title to a natural person designee may aid in the latter retaining their rights and help stimulate creativity and inventorship on a societal level. Separating the term inventor from the rights only attainable by natural persons would in that regard be the most likely way of effectively keeping with the spirit and purpose of the law whilst acknowledging its limitations.

5.2.3 The Third Argument

It is obviously so that the act of simply naming an AI does not give it the right to legal status. The naming requirements is, however, firmly rooted in the purpose of the law. By explicitly framing an inventor on an individual level, the law purposefully aims to protect the inventor as an individual rightsholder. This is reflected in the EPO's DABUS case in its decision of EP 18 275 163 and EP 18275 174 through the EPO's discussion on article 58

²⁸⁰ C. f. EP 18 275 163 4 para 21: “*Indicating the name of a machine (DABUS) does not meet the requirements of Rule 19(1) EPC.*”

²⁸¹ Nilsson Zamel, et. al. (n 48)

EPC and the non-comparable nature of names given to natural persons and names given to things.²⁸²

Summarily, in both EU law and Swedish law, the naming requirement is heralded by the courts as a means to protect the individual inventor, and by extension, parts of the law's purpose vis-à-vis safeguarding rights connected to inventorship and patent protection. What *Thaler v. Commissioner of patents* explored, nonetheless, was the concept of retaining the right of the individual expressed in a naming requirement statute whilst still affording sufficient functionality to the law's implementation.

In light of the discussion under the first and second argument, there appears to be no further need of debating the question raised by the EPO under argument three.

²⁸² C. f. EP 18 275 163 5, paras 19 – 24

6 The Impact of AI on Swedish Patent law

6.1 AI Inventions and Inventive Step?

As discussed in chapter 2.1 above, the two main functional types of AI addressed in this thesis are those utilizing traditional machine learning and those that utilize enhanced deep learning. Inventive AI employs the latter, drawing its strength from computer-powered statistical methodology in order to find solutions to problems from a vast roster of available datasets. In terms of inventing, utilizing ML means that computers find a solution or a design by evaluating examples of what they eventually should accomplish. ML, on its own, is, alas, overtly dependent on human guidance. Every ML AI requires a human creator or programmer to set up the framework within which it may operate. DL AI, on the other hand, are able to mostly overcome this need for direct human input, referred to in chapter 2.5 as “the guiding hand of humans”, by automatically and independently construct data representations suitable for addressing the problem the AI aims to solve through its inventive action.²⁸³ On the one hand, AI systems utilizing DL are capable of performing tasks that normally require human intelligence, like recognition, advanced decision making etcetera.²⁸⁴ On the other hand, in the majority of its applications, primarily those not involving DL AI, AI would more correctly be defined as an instrument that makes existing, human-led, processes more efficient.

In the context of inventing, the dual nature of AI capabilities is paradoxically enough beginning to look like that of the natural person the law will not equate them to. Are humans capable of inventive actions? Certainly. Are all humans? Alas, probably not. Are all AIs capable of inventing in accordance with human standards? Definitely not. Are some? Most likely. This chapter will in the following provide a final discussion on the functionality of AI, as discussed in chapter 2, and put that functionality into a Swedish legal context, drawing from the discussion in chapter 3. It will also provide a comparative outlook, drawing on the discussions in chapter 4 and chapter 5.

In all jurisdictions discussed above where a patent claim was filed on behalf of the AI DABUS, the claim was subsequently struck down due to AI's

²⁸³ Ajanki (n 42) 9-11.

²⁸⁴ Hutter (n 53) 125–126, 231.

lack of legal status and thereto related lack of ability to achieve inventorship status. Before that particular issue is discussed further, however, the matter of an AI-developed invention achieving inventive step will be discussed here.

Although not having been tried by any of the courts that tried the DABUS case, the fact is that inventions such as the ones created by DABUS do – although such determinations lies outside the scope of this thesis – appear clear the material requirements for novelty and industrial application. Given AI's unique ability amongst machines to create, the more poignant question is, if tried by a court of law, could an AI invention, inventorship status attainability notwithstanding, potentially achieve inventive step?

The first point to address here would be whether or not merely qualifying for consideration regarding inventive step would require an invention to have a natural person as an inventor. Neither 1 kap 2 § patentlagen or article 56 EPC states that a determination of inventive step need a natural person in order to proceed. This might be the result of legislative oversight, as the prospect of fully autonomous inventors not really existing at the time of drafting the respective pieces of legislation, or a simple omission due to lack of case law actualizing the need of such clarification. Either way, it is not stated in either patentlagen or the EPC that a natural person is a pre-requisite for achieving inventive step.

Next, the person skilled in the art. While the person skilled in the art is defined as a *person*, by which it is implied that such a person should be understood as a natural person²⁸⁵, it is not clear whether or not the thought process and creative steps undertaken by the inventor have to be those of a natural person.

Both patentlagen and the EPC are concerned only with the features in the prior art that the person skilled in the art may take into consideration when attempting to resolve the technical problem addressed by the invention currently under investigation by the court. Neither patentlagen nor the EPC defines this procedure any differently depending on the origin of the invention under investigation. Additionally, it is pertinent for the courts to characterize the person skilled in the art as someone who does not question established notions in their technical field. Since using a person skilled in the art for identifying inventive step is both a hypothetical and objective operation, it is important to note that the concept of established notions is, as of the time of writing, undefined in the law, and thus subject to the courts' interpretation. It

²⁸⁵ Especially so in patentlagen's definition of the person skilled in the art, c. f. *fackmannen*, as an agent noun traditionally understood to be referring to a natural person of either gender.

should be clear, then, that in patent cases like the ones involving an AI like DABUS, there is no reason for the courts to not interpret established notions to include inventive outcomes of AI-led processes.

Next, the state of the art. In determining whether or not the invention sets itself apart by a significant enough margin, there are two main factors to consider: (1) what type of information was available in the prior art at the priority date and (2) who had access to it. The way inventive AIs like DABUS works is, as mentioned above, by combining information found in available datasets until an invention is produced that can remedy the problem for which it was created. Albeit more linear and systematic, this approach of creating something new from pieces of what is already known is remarkably similar to how humans invent in the traditional sense. Hence, a court tasked with determining whether or not an AI-developed invention sets itself apart from the prior art by a significant enough margin should be able to apply the same rationale as for natural person inventors.

While acknowledging that making the assumption that there are no material factors that would hinder a court from assessing an AI-developed invention in much the same way it would one developed by a natural person through a person skilled in the art and the prior art is due to the lack of case law and relevant statutes merely an assumption based on circumstantial evidence from the materials covered in the above, it is worth looking at the problem solving approach. As mentioned above, the problem solving approach combines the concepts of person skilled in the art and prior art into a method of assessing inventive step depending on an invention's relation to the nearest prior art, determined by a person skilled in the art.

First of all, in ascertaining what constitutes the nearest technological prior art, the court must look at one individual document related to the same technical field as the invention. The nearest prior art must also be defined by the court as the most logical place for a person skilled in the art to start their own research into the problem addressed by the invention. This art-specific literature must be similar, if not equal, to what is referred to in the patent claim. This is where determining inventive AI's differentiation from the prior art gets significantly harder.

The first problem the court would run into in making the above assessment would be the choice of documentation. Whilst the inventive process may be comparable, AIs and natural persons research sources for their creative output in very different ways, which makes ascertaining comparative documentation in the same technical field somewhat complicated. If the person skilled in the art were shown the raw datasets that an AI would use as

a core piece of its functionality, it is not entirely certain how helpful that would be to that person. It would also actualize the need to redefine the skillset of the person skilled in the art, suggesting that a person skilled in the art set to determine an AI-developed car bumper might need to be skilled in both automotive impact protection and computer engineering. This, presumably, would not constitute a very large professional community.

The second problem appears when the court would have to identify the objective problem addressed by the invention detailed in the patent claim and determine its differentiation from the prior art. Assessing this step shares in the complications discovered in the first step, namely defining the desired skillset of the person skilled in the art. The remainder of step two, determining technical effect and objective problem, should not prove to be any harder than for an invention created by a natural person seeing how the subject of the court's investigation is not the AI but its invention.

The third problem is one where the court would need to determine whether or not an invention has achieved inventive step based on the court's determination of the nearest prior art and definition of the objective problem. Whether or not the solution to the objective problem may be found in an accessible document or within the sphere of general knowledge feasibly held by a person skilled in the art determines if the combination of knowledge in the prior art can be defined as *reasonably attainable* (närliggande) and thus able to lead a person skilled in the art to the invention. Again, this actualizes the need to define further the types of materials needed for an AI to invent. Datasets utilized by an AI are made up of pre-existing knowledge that a person skilled in the art could technically access. However, that person's ability to access – and more importantly, be able to understand – the information contained in those datasets raises the question about what reasonably attainable really means in this context.

The court would then need to formulate the objective problem and pose the question to itself whether there, somewhere in the prior art, is a solution to the objective problem. This is again a matter of redefinition. In a scenario like this, the AI is the quote – unquote inventor, but it is undeniably also a tool and an essential part of the process in of itself. Since a solution, or a notion relating to what a solution might look like, does not have to be within the nearest prior art but may also be found in unrelated documentation or in the general knowledge of the person skilled in the art. This opens the door for separating technological skills from art-specific skills on account of the person skilled in the art.

For the last step of the third problem, the courts would need to determine whether the invention for which a patent claim has been filed might achieve inventive step in comparison to what is known in the nearest prior art. This matter is, again, addressed by determining if the information available in the nearest prior art sufficiently would lead a person skilled in the art to the same solution as that defined in the patent claim. Earlier, this thesis discussed the difference between knowledge in the nearest prior art that *could* lead to a similar solution and knowledge that *would* lead to a similar solution if utilized by a person skilled in the art. This distinction conveniently addresses the problem from steps one and two, namely that of differentiating between the knowledge needed to understand the invention in relation the relevant prior art and the knowledge needed to understand AI functionality. Adopting this distinction in their determination, the courts would have to determine whether a person skilled in the art without greater knowledge of AI would in fact arrive at the same conclusion as the inventive AI or if that person merely could arrive at that conclusion. The case for a person skilled in the art arriving at the same conclusion would be due to the fact that they technically could access the same information that the inventive AI utilized, but that without sufficient knowledge of AIs they would not be able to use it in any constructive or meaningful way.

In order to deny inventive step under this third step, a court must be able to state that the information available to a person skilled in the art would lead them to attain similar results as the invention developed by the AI. The determination would have to originate in the nearest prior art and then explain how a person skilled in the art would proceed to address the problem facing them. The resulting depiction of that person's actions would also have to be continuously coherent and believable.

According to this contemporary understanding of the law, it is hard to see how an AI invention would automatically fail to achieve inventive step merely on the merits. It is possible to argue that the AI itself should be seen as a tool, and therefore be readily available for a person skilled in the art. For that line of argumentation to work, however, the court would most likely have to presuppose that no matter what prior art the invention in question is related to, a person skilled in that art would automatically – not only be able to, but also inclined to – use an inventive AI for the purpose of replicating the invention in question. The Patent and Markets Court argued this point – albeit not in relation to AIs – in 09-364, stating that “[it is] of course so that a person skilled in the art would attempt to exercise all means available to him or her within their general knowledge to [resolve the problem at hand]”.²⁸⁶ Keeping

²⁸⁶ Patent och marknadsdomstolen 09-364 11.

with the Court’s reasoning in 09-364, it would appear fair to assume that a person skilled in the art of computer science would resort to suitable AI-based solutions when faced with a problem likely solvable by such an approach. It is, however, less likely that a person skilled in a non-computer based art would do the same, much less do so successfully. As has been determined, and discussed throughout this thesis, through precedence, the court finding that an alternative solution to a problem addressed by an invention exists does not mean that the invention in question *prima facie* lacks inventive step. Such findings must be accompanied by a rationale as to why a person skilled in the art would arrive at a similar solution. In such an instance, there must either be a viable alternative to using an inventive AI that appears coherent and believable, or the person skilled in the art would have to operate an inventive AI on the basis of what was available in the prior art at the priority date – something that, it should be mentioned, might not be possible, depending on the public or private nature of the AI’s datasets.²⁸⁷ Drawn to its extremes, this argument actualizes a potential scenario in which AI-developed inventions becomes so specific in its nature so that the court must use an AI as the person skilled in the art in order to lodge a fair assessment. This actualizes the matter of AIs and legal status, which will be addressed in the following.

6.2 AI and Inventorship Status

6.2.1 Determining International Precedence

When determining whether or not an inventive AI, functioning in the manner described in chapter 2 and chapter 5, could potentially achieve status as inventor in Sweden, one must first, in lieu of any landmark Swedish case, look to the international precedence that may come to influence, primarily directly, but also indirectly, how Swedish courts can, or will have to, apply the law. The fact that the EPO in its decisions *vis-à-vis* DABUS referred to an international consensus about the status of AIs as right-holders makes this type of comparative exercise even more crucial in a post-Thaler v. Commissioner of Patents world where the proverbial Pandora’s box has been opened.

As determined in 5.2.1, RÅ 1990 ref 84 settled that precedence from the EPO should be afforded a fair amount of influence – especially in cases

²⁸⁷ It would appear likely, given the current discourse, that in lieu of dependable patent protection, AI-assets like algorithms and datasets would be heavily protected as trade secrets and thus not accessible in the prior art. Further evaluation of this point is, granted, outside the scope of the thesis, but it would seem relevant to mention in this context nonetheless.

where overbearing similarities between actualized provisions in the Swedish law and the EU law exist. Since then, the concept of increased harmonization between EU law and Swedish law within the realm of patent law has been strengthened through decisions in – inter alia – RÅ 1998 ref 4, RÅ 1998 ref 55, and NJA 2000 s. 497.

There is, however, no explicit rule that demands that member states harmonize their domestic patent law with the EPC.²⁸⁸ In NJA 200 s. 497, the Swedish Supreme Court did argue that it saw no direct benefit from a patent claim granted by the PRV and a patent claim granted by the EPO being interpreted differently, but the matter yet remains unburdened by strict harmonization. This makes it arguably so that the rationale behind the Court's impetus in NJA 2000 s. 497 was not driven by adherence to formal rules but rather motivated by practicality.

6.2.2 Applying International Precedence on the Swedish Patent System

The problematic nature of having the EPO potentially deny protection to a patent similar to one granted under Swedish law would be a costly and ineffective result for both the court(s) and the applicant. Daring to go against EPO precedence would therefore require a case to be on as solid of a legal footing as possible. Having analyzed the EPO's three reservations against allowing the AI DABUS to attain inventorship status in chapter 5, the most viable path towards securing patent protection for AI-generated inventions would appear to be further exploration of succession of title, as discussed at length in *Thaler v. Commissioner of Patents*.²⁸⁹

As previously mentioned, today's patent claims are becoming exceedingly complex in nature due to the increase in collaborative efforts spurring on new inventions. The Swedish legislator even acknowledged this issue in SOU 2015:41 by pointing to the problem of differentiating between inventors and co-inventors.²⁹⁰ Inventive AIs that are unable to attain any rights connected to the construct of inventorship would certainly add to the complexity of this issue by supplying an additional layer between inventor and prospective rightsholder. In lieu of AIs being able to hold rights reserved legal right holders, the only option for AI-developed inventions to attain patent protection is through succession of title. This is currently a legally

²⁸⁸ Domeij (n 84) 23 and NJA 2000 s. 497.

²⁸⁹ C. f. Cited in *Thaler v. Commissioner of Patents* as derivation of title but used interchangeably in this thesis depending on the jurisdiction subjected to discussion.

²⁹⁰ SOU 2015:41 228.

ambiguous matter, seeing how not qualifying as an inventor disqualifies AIs from succeeding title down the line. This reasoning leads inevitably to the conclusion – barring any changes to the current status quo vis-à-vis inventive AI – that inventions that on their merits alone would qualify for patent protection will for material reasons be denied that protection. This conclusion appears to exist in direct conflict with the purpose of the law.

Under the existing relevant provisions in Swedish law, an invention is exposed to a series of tests in order to ascertain whom should be beholden of inventorship thereof. These tests aim to – generally speaking – establish the person(s) responsible for solving the technical problem that the applicant(s) argues is the *raison d'être* for the invention. Already at this stage, the legislator has acted to separate the would-be inventor from the applicant. It may thus be inferred that the concept of inventorship has a dual purpose under its stated commitment to protect the individual – to protect the creator of an invention whilst also acknowledging the rights of the applicant.²⁹¹

The term inventor is, again, not fully defined in Swedish law. The EPC states that an inventor has to be a natural person, a sentiment seemingly echoed in chapter 2 4 § patentlagen²⁹² and in the act's stated goal as seeking to promote *novel technical problem solution* (nyskapande teknisk problemlösning).

Novel technical problem solution, in turn, is determined to require *independent intellectual contribution* (självständigt intellektuellt bidrag). In T 2522-16, the Gothenburg District Court determined that such contributions should be defined as:

*“[i]ndependent performative actions involving the whole, or parts of the whole, thought process that resulted in the invention by the person that through an applied technical solution yields a solution to a technical problem.”*²⁹³

Together with Bengt Domeij's narrower definition of inventorship discussed above,²⁹⁴ the operational words in determining inventorship under Swedish patent law may be identified as *independent* and *intellectual*.

²⁹¹ C. f. the discussion vis-à-vis economic and administrative contributions in chapter 3.2.6.

²⁹² Whilst not explicitly stated, the references to the applicant having to file the inventor's name and address along with the patent claim has come to be interpreted as an *de facto* acknowledgement of the definition of inventor as a natural person.

²⁹³ Göteborgs Tingsrätt, T 2522-16 p. 15

²⁹⁴ C. f. the definition of *eget tankearbete* in Domeij (n 84).

In terms of an independent contribution, the first thing to address is an AI's ability to undertake independent performative actions. The major point of contest here would be the fact that even advanced AIs relies on access to pre-made datasets. The requirement of independent contribution, however, does allow for exceptions in instances where the applying party has given instructions that could be considered part of the technical solution. In terms of the demand for a technically creative dimension, it must be defined whether an inventive AI contributes intrinsic value to an inventive process or merely extrinsic value. The prevailing sentiment in the past has been that AIs are to be considered as a tool, but the more advanced and independent AI gets, the less that sentiment rings true. In terms of the the causality between human contribution and eventual AI-led invention, the significance of the contribution as it relates to seriously advanced AI – like DABUS – is very likely within that threshold.

In *Thaler v. Commissioner of Patents*, the Court accepted the complications associated with giving AIs legal status that was pointed out by the first instance. The EPO, similarly, refused Dr. Thaler's patent claim on the basis of an inventor being understood as a natural person. An expansive reading of the EPO's decision would infer that AI-assisted inventions with little discernible human contribution are not patentable under the EPC. A less expansive reading of the EPO's decision would hold that AIs lack of legal status bars them from attaining inventorship status altogether.

The reason for AIs not being able to succeed title under the EPC is their inability to attain inventorship status. This, in turn, is due to their lack of legal status. This causality has not been tried under patentlagen but seeing how patentlagen also requires the applicant to file details relating to the inventor's identity that non-legal persons cannot obtain, it would appear likely that the same causality would indeed be true also under patentlagen.

The only thing precluding AIs from attaining inventorship status under the EPC is the perceived notion of legal status being a prerequisite for doing so. This, however, is not a defined requirement in patentlagen. Much like the Court's description of the term inventor in *Thaler v. Commissioner of Patents*, the Swedish term for inventor, *uppfinnare*, is an agent noun – meaning that while it once upon a time was understood to mean one singular thing and thus did not need defining in any more specific terms, it has with time become a tool of exclusionary practices.

When patentlagen was drafted and subsequently turned from bill into law, only human beings was capable of inventive action. In the present day, that is no longer the case. The term inventor is, nevertheless, how the

performer of an inventive process is exclusively defined and the term as such should be applicable to everyone and everything that invents in accordance with the letter of the law. The act of inventing, as discussed above, is something that AIs both can and does undertake, which motivates their inclusion in the term inventor.

The use of the word inventor as an undefined agent noun in a legally undefined sense implies that the term is being understood – and should thus be interpreted – in the dictionary sense. Because of this, the EPO’s argument that AIs are automatically barred from inventorship due to the fact that they do not comply with the qualifications of a natural person might be true under the stricter definitions of the EPC, but in a Swedish context it appears based on a misleading notion around the term inventor being exhaustive defined in patentlagen. Given the nature of dictionary definitions, an argument could most certainly be made that it would be more correct to interpret the blackletter law in both the EPC and patentlagen in such a way so that human inventors do need to be natural persons – and subsequently compliant with what is prescribed in the law in terms of application-specific details – but that the term inventor also can interpreted to include more inventive entities than humans.²⁹⁵

²⁹⁵ C. f. the Swedish definition of inventor as discoverer, finder. *Uppfinnare: upptäckare, upphittare* in SAOB: https://svenska.se/saob/?sok=uppinna&pz=4#U_U275_223239

7 Concluding Remarks

This thesis has taken a long and winding road to its destination. In this concluding chapter, an attempt will be made to summarize the outcome of the above in relation to this thesis' research questions.

The technological advances within AI has led us to a point in time where a machine feasibly can be said to clear the most distinctly human of prerequisites for patentability, namely that of creative action. By studying the AI inventive process through the prism of inventive step, this thesis has compared the inventive process as presented by an inventive AI with that of a natural person and found that, in terms of compliance with the statutes of Swedish and European patent law, there is an, at least academic, argument to be made in support for the former achieving some form of recognition in relation to the latter. This holds true even in terms of independent intellectual contributions, considering the complexity of DL AIs inventive process. Now, this theory will remain just that – a theory – until such a time when a Swedish or European court or patent office gathers its *compus mentis* and decides to try the material aspects of a case involving an inventive AI rather than opting for dismissal *ab initio* on formal grounds.

The mention of formal grounds brings us to the second research question, namely that of AI's relation to acquiring legal rights. First of all, it should be said that an AI clearly cannot attain *legal personhood* (rättssubjektivitet) or legal status, natural or otherwise, under the law. As far as Swedish and European patent law is concerned, AIs are – and will most likely remain – machines without any legal status. If that remains true in the future is a question best left to the philosophers of tomorrow. It is at this point, however, that this thesis deviates from the common understanding of AI and proposes that the technology and the inventive results thereof could be viewed *sui generis* under Swedish and European patent law. The current reality wherein AIs' lack of legal status makes them ineligible to succeed title related to their inventive works leads to a subsequent and causal loss of protection for any inventions that arise from AI on behalf of its creator. This gray area in which inventions that, if they the fruit of human labor, would normally be able to achieve patentability now is not even considered for such protection is not compliant with the spirit and purpose of the law – on the contrary, the mere existence of such a gray area is demonstrably contrarian to the spirit and purpose of the law.

Accepting that an AI-developed invention may be able to achieve the most human-centric elements of the inventive step requirement, the only

hindrance left are the formal requirements regarding inventorship and who may attain it. Combining the conclusion that AIs cannot achieve the required legal status to succeed title with the conclusion that they can invent according to the legal definition of the act leaves this thesis with only reasonable conclusion: redefining the term inventor by separating the concepts of inventor and person in order to achieve a coherent application of the statutes in keeping with the spirit and purpose of the law whilst avoiding directly contradicting general patent law precedence.

Society has never been able to stop the progressive flow of time, much less the technical and philosophical advancements that comes with it. When AIs started to aid in manufacturing and development, nobody of any reputable standing would have argued that they could act like natural persons. Now, in 2021, AIs are everywhere. In our computers and in our cars – and they are operating on a level that in terms of problem identification, technical problem-solving, and independent creativity not only equals natural persons but indeed surpasses most of them.

The – clearly stated – purpose of Swedish and European patent law is to protect the individual's right to the fruit of their labor and to promote economic prosperity on a societal level. To refuse AI-developed inventions the protections they *prima facie* would deserve on the basis of their conception and functionality is therefore to go against the very purpose and spirit of the law itself, risking flaunting protection for a generation of inventions. In summary, this thesis does not advocate for giving AIs rights and protections *in absurdum*, but it nevertheless would like to raise awareness about the increasing usage and ability of AI and the increasing disparity between AIs inventive capabilities and their standing under Swedish and European patent law and the thereto related need for further discussion about and investigation into the matter.

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