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Master’s Thesis in Intellectual Property Law
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AI and creative machines
– copyright protection for AI generated works under EU and Swedish law

AI och kreativa maskiner
– upphovsrättsligt skydd för AI genererade verk enligt EU och svensk rätt

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Foreword

Five and a half years of law school are coming to a close.¹ These past few years have without a doubt been among the toughest and most rewarding of my life, so far. This thesis is the result of the hard work I’ve put in and the experiences I’ve gained over the past five and half years. It is both with excitement and a bit of sorrow that I am finally closing this chapter of my life.

There are a number of people I need to thank for helping me write this thesis. First and foremost, I would like to thank my supervisor Bengt Domeij at Uppsala University for his help and feedback throughout the process of writing this thesis. I would like to thank Joel Englund and Linus Larsén respectively for the discussions we’ve had and for helping me organise my thoughts. Finally I would like thank my family and friends, without whom I wouldn’t be where I am today.

Felix Makarowski
Uppsala, 1 december 2018

¹ Including an exchange semester at Sophia University in Tokyo and a semester as an intern at the Consulate General of Sweden in Jerusalem.
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# Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>AI</td>
<td>Artificial intelligence</td>
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<tr>
<td>CJEU</td>
<td>Court of Justice of the European Union</td>
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<td>EU</td>
<td>European Union</td>
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<tr>
<td>LFH</td>
<td>Lag (2018:588) om företagshemligheter</td>
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<td>IP</td>
<td>Intellectual property</td>
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<tr>
<td>TEU</td>
<td>Treaty on the European Union</td>
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<td>TFEU</td>
<td>Treaty on the Functioning of the European Union</td>
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<td>UK</td>
<td>United Kingdom</td>
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<tr>
<td>URL</td>
<td>Lag (1960:729) om upphovsrätt till litterära och konstnärliga verk (Swedish Copyright Act)</td>
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<td>US</td>
<td>United States of America</td>
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<td>WIPO</td>
<td>World Intellectual Property Organisation</td>
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1 Introduction

1.1 Background

Artificial intelligence (AI) is one of the most important technologies of this era. Once considered a remote possibility reserved for science fiction, advancements in AI research has brought the technology from the realms of fiction and onto the verge of kickstarting a fourth industrial revolution expected to generate groundbreaking effects on humanity and is “likely to leave no stratum of society untouched”. In the short and medium term, AI technology has the potential to bring benefits of efficiency and savings in areas such as production, commerce, transport, medical care, education and farming. AI technology is already all around. It suggests content to people online, it helps companies work more efficiently, and it can drive cars – although AI technology has its limitations. With improvements in AI technology come challenges that are likely to disrupt legal frameworks, including various aspects of intellectual property (IP) law.

As advances are made in AI technology, AI will be able to create works such as music, code and designs. These works will be indistinguishable from works made by humans. With that said, AI are already collaborating with humans to create new works in music and the arts. As AI improves it will likely develop the ability to create works faster and better than humans, and without human involvement. One legal scholar even foresees a future where AI are responsible

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2 European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103 (INL)), § B.
3 Ibid. § E.
4 See i.e. https://www.wired.com/2016/02/ai-is-changing-the-technology-behind-google-searches/, retrieved 15/10/2018.
for the majority of innovation. Using AI to innovate and create will likely require large investments in terms of time, creative energy and money. The people who use AI to create and innovate will also likely have a moral interest in protecting works created by or in collaboration with AI. This raises the question of whether AI generated works are, or should be, protected under the current legal framework for copyright protection.

1.2 Framing of the question

The purpose of this thesis is to examine questions related to copyright protection of AI generated works under EU and Swedish law. To facilitate discussion, this these had been divided into four main questions. These questions are:

Q1: Are AI generated works eligible for copyright protection under the current legal framework?
Q2: Can AI be creators under the current legal framework?
Q3: What are the issues related to copyright protection of AI generated works under the current legal framework?
Q4: How might these issues be solved?

1.3 Demarcation

The scope of this thesis is limited to examining copyright law in relation to AI generated works. Issues facing patent, trade mark and design protection law will therefore not be discussed. Primarily EU and Swedish law will be examined in this thesis. The IP laws of other EU member states will not be considered in the discussion on whether AI generated works are eligible for copyright protection under Swedish law (see below 3), though UK law will be drawn on for inspiration in the discussion on copyright reform (see below 4.2). Inspiration will also be drawn

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from American legal commentary on AI generated works, though US copyright law will not be examined in depth.

The scope of this thesis is further limited to issues that relate directly to AI generated works. For this reason, issues such as the distinction between the common law concept of *copyright* and the civil law concept of *droit d’auteur* will not be discussed.\(^{11}\) Questions concerning the relationship between the legal acts of the EU and the laws of the member states, the relationship between the CJEU and national courts, and the distinctions between national and EU copyright legislation will be touched upon (see below 1.4.3 & 1.4.4). They will, however, not be discussed in depth. Although these questions are both interesting and relevant, they fall outside of the scope of this thesis.

### 1.4 Method and Sources

#### 1.4.1 Opening remarks

The purpose of this thesis is to discuss how EU and Swedish copyright law could be applied to AI and AI generated works. There are currently no specific laws or legal statutes that regulate AI creation and AI generated works. To examine whether AI generated works can be copyright protected the current statutory framework for copyright protection will be applied to different scenarios of AI creation in the third chapter of this thesis. In the third chapter of this thesis a legal dogmatic and an EU legal method will be used to discuss copyright protection and ownership of AI generated works under the current statutory frameworks. In the fourth chapter of this thesis suggestions for potential copyright reform will be examined. To determine what reform might be desirable a comparative legal method and a political legal method will be used in the fourth chapter of this thesis.

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\(^{11}\) See i.e. Levin, *Lärobok i immaterialrätt*, p 71.
1.4.2 Legal dogmatic method

Legal-dogmatic research concerns researching current positive law as laid down in written European or national rules, principles, concepts, doctrines, case law and annotations in the literature.\(^{12}\) The legal dogmatic method can in its wider form be used to critique existing rules and norms, and to suggest changes to the law.\(^{13}\) Its sources are predominantly those that are used in the legal process: principally statutes and case law, supplemented where possible with lawyers’ literature expounding the rule and occasionally reflecting on them.\(^{14}\) In Sweden, these sources are further complemented by official government reports, which often provide crucial information on how to interpret a Swedish legal statutes. In chapter 3 of this thesis, the legal dogmatic method will be applied in the analysis of two cases of AI creation to determine the current legal status of AI generated works in Sweden.

1.4.3 The EU and EU legal method

The primary legislation of the EU are the Treaty on European Union (TEU), the Treaty on the Functioning of the European Union (TFEU) and the Charter of Fundamental Rights of the European Union. The distribution of power and competences between the EU member states and the EU is regulated in the TFEU. The EU has exclusive competence to regulate the customs union and to establish the competition rules necessary for the functioning of the internal market, among other competencies (TFEU article 3). The EU and the member states share competence in the principal areas of internal market; economic, social and territorial cohesion; consumer protection; etc (TFEU article 4). In the areas that the TFEU does not grant the EU competence, the member states have the exclusive competence to act and regulate.

To exercise its competences, the EU can adopt a variety of legal acts. The most important legal acts are regulations and directives. Regulations have general application, are binding in their entirety and are directly applicable in all member states (TFEU article 288). Directives are


\(^{13}\) Kleineman, *Juridisk metodlära*, pp 24-25.

\(^{14}\) McCrudden, *Legal Research and the social sciences*, p 633.
binding as to the result to be achieved, but it is up to the national authorities to choose the form and method for implementation of a directive (TFEU article 288). These legal acts are the secondary legislation of the EU.

The Court of Justice of the European Union (CJEU) is the main judicial organ of the EU. It consists of three judicial bodies: the Court of Justice, the General Court and the Tribunal (TEU article 19). The term “CJEU” will be used throughout this thesis without any distinction between the judicial bodies.

If the Commission or a member state consider that a member state has failed to fulfil an obligation under the treaties, they may bring the matter before the CJEU (TFEU articles 258-259). Such obligations include application and implementation of EU legal acts. If the CJEU finds that a member state has failed to fulfill an obligation it may require a member state to take the necessary measures to comply with the judgement of the court (TFEU article 260).

It has to be noted that it is up to each member state to correctly apply, implement and interpret EU legal acts in their domestic legal orders. The CJEU lacks the jurisdiction to issue rulings in individual cases. Where a member state is unsure how a legal act should be interpreted, it may ask the CJEU for a preliminary ruling (TFEU article 267). In practice, this means that there are twenty eight separate sets of courts tasked with the interpretation and application of EU law in the member states.

To aid national courts in their interpretation and application of EU law there are principles that have been established in the TEU and in the case law of the CJEU. The main principles that national courts have to consider when applying EU law and national legislation are the principle of sincere cooperation, the principle of direct effect and the principle of primacy of EU law. According to the principle of sincere cooperation, national courts have an obligation to implement EU law and interpret national legislation in light of, and in a manner that conforms
with, EU law (TEU article 4.3). According to the principle of direct effect, EU legislation, such as directives, may have direct effect in member states. This means that where a directive is unconditional, sufficiently precise and the member state in question failed to implement the directive correctly, the directive will have direct effect in the member state. Finally, according to the principle of primacy, in the case of conflict, EU law prevails over national law. Read together, these principles mean that national courts are free to apply national legislation as long as the national legislation does not conflict with EU law.

The EU legal method will be used in this thesis in an attempt to interpret and apply EU legislation and case law on a national level in Sweden. Where the CJEU has not settled a matter, Swedish case law and sources will be used to fill in the gaps. To the greatest extent possible, Swedish law will be interpreted in conformity with EU law.

1.4.4 The relationship between EU and Swedish copyright law
There is currently an ongoing legal debate on whether copyright and IP law should be harmonised on an EU or European level. There is also debate over how much harmonisation of copyright law has already been achieved by the EU. Over the past twenty years, the EU has engaged in an extensive harmonisation process of the copyright legislation. The Infosoc directive, the computer programs directive, and the copyright term directive have been adopted during this time period. The CJEU case law in the area of copyrights has further expanded the harmonisation of copyright law within the EU as the directives have been interpreted by the court. The EU has tackled issues such as reproduction rights and the right to

16 See case c-26/62 (Van Gend en Loos), case c-2/73 (Reyners) & case c-43/75 (Defrenne). See also case c-286/06 (Impact), joined cases c-152-154/07 (Arcor) & joined cases c-397-403/01 (Pfeiffer).
18 See case c-6/64 (Costa v ENEL).
20 See i.e. Hugenholtz, Constructing European Intellectual Property, p 274.
21 Directive 2001/29/EC.
22 Directive 2009/24/EC.
23 Directive 2006/116/EC.
communicate works to the public, harmonised copyright protection of computer programs and harmonised term of copyright protection. Despite this, copyright law in the EU is still largely linked to the geographic boundaries of the EU. Consequently, what is applicable copyright law in one EU member state might not be applicable in another.

The EU copyright directives have been implemented in Sweden through the Swedish Copyright Act (URL). URL is an older piece of legislation that was originally adopted by the Swedish parliament in 1960. The URL contains rules in areas that have not been harmonised by the EU and may therefore differ from the rules of other member states. Such rules include the rules on collective license agreements (URL 42 a-h §§) and the penalties for copyright infringement (i.e. URL 53 §). The rules that differ between member states likely contribute to the compartmentalisation of copyrights in the EU along national borders.

One key area where only a partial harmonisation of copyright law has been achieved by the EU is in the definition of the term work. The EU copyright legislation is applicable to works as defined in the Berne Convention (Copyright term directive article 1.1 & Computer programs directive article 1.1). The Berne Convention is a separate international agreement governing copyrights. It is up to each signatory to implement the Berne Convention into its own legislation. All twenty eight EU member states are signatories to the Berne Convention and each member state has its own way of determining whether a work is original and eligible for copyright protection or not.

This creates a problem because a work may be eligible for copyright protection under the laws of one member state, while not being eligible in another. This creates a barrier to the free movement of goods and works within the EU. The EU attempted to counteract this in the area of EU wide copyright protection of computer programs. The EU established that a computer program shall be protected if it is original in the sense that it is the author’s own intellectual creation (Computer programs directive article 1.3). The CJEU has taken this further, establishing that a general

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25 Ibid.
principle that a work is eligible for copyright protection if it is the intellectual creation of its creator.\textsuperscript{26} In its case law, the CJEU has stated that a work is an intellectual creation when it reflects the creator’s personality and when it is the product of the author’s free and creative choices.\textsuperscript{27} The CJEU has in its case law provided examples of free and creative choices that a creator may exercise to produce an intellectual creation. In each case, however, the CJEU leaves it to the national court to determine if a work is an intellectual creation and if it is eligible for copyright protection.\textsuperscript{28} What the CJEU has done is provide national courts with a template on how to determine whether a work should be eligible for copyright protection or not. It is up to the national courts to determine which works are eligible for copyright protection and which works are not.

There has been some debate on the degree to which the originality criteria has been harmonised through EU case law. Rosati\textsuperscript{29} argues that full harmonisation has been achieved and that the case law of the CJEU will completely change how courts determine originality under UK law.\textsuperscript{30} Similarly, Levin\textsuperscript{31} states that the Swedish method of evaluating the originality of a work through looking at its \textit{verkshöjd} is likely forbidden under EU law.\textsuperscript{32} At the same time Levin also argues that the originality criteria under EU law has not been fully developed and that there is much room for national courts to interpret the criteria on their own.\textsuperscript{33} Bengtsson,\textsuperscript{34} meanwhile, argues that the CJEU case law has not changed much about how Swedish courts determine whether a work is original or not.\textsuperscript{35} Because there is still much room for national courts to interpret the

\textsuperscript{26} See i.e. case c-5/08 (Infopaq), case c-145/10 (Painer) & case c-406/10 (SAS Institute).
\textsuperscript{27} See i.e. case c-145/10 (Painer). See also joined cases c-403/08 and c-429/08 (Premier League) paragraph 98 (inter preted à contrario).
\textsuperscript{28} See i.e. case c-5/08 (Infopaq) paragraph 48 & case c-145/10 (Painer) paragraph 94.
\textsuperscript{29} Eleonora Rosati is an Italian qualified lawyer and post-doctoral research associate at the University of Southampton in the UK.
\textsuperscript{30} Rosati has written an entire book on the subject. For more, please see Rosati, \textit{Originality in EU copyright – full harmonisation through case law}.
\textsuperscript{31} Marianne Levin is a professor at the Stockholm University in Sweden.
\textsuperscript{32} Levin, \textit{Lärobok i immaterialrätt}, p 87.
\textsuperscript{33} \textit{Ibid}.
\textsuperscript{34} Henrik Bengtsson is a partner at advokatfirman Delphi in Stockholm, Sweden.
\textsuperscript{35} Bengtsson, \textit{EU-harmonisering av det upphovsrättsliga originalitetskriteriet}, [Infotorg].
originality criteria on their own, copyright law in the EU will likely remain linked to the geographic boundaries of the EU member states.36

For the purpose of this thesis, the partial harmonisation of the originality criteria has two implications. First, it means that the case law of CJEU will be crucial in determining whether AI generated works are eligible for copyright protection as well as to determining who owns such copyrights. Secondly, it means that Swedish case law and official government reports are still important in filling out the gaps left by EU law. Both will therefore be used in this thesis.

1.4.5 Political legal analysis

To facilitate the discussion on legal reform in chapter 4 of this thesis, political legal analysis will be used. The de lege ferenda discussion in this thesis will focus on the purpose of copyright law in order to examine what the law should or should not be.37 Suggestions for potential copyright reform will be examined to determine what solution best meets the underlying purposes of copyright law.

1.4.6 Comparative legal method

A good way to be inspired when discussing legal reform is to look at, borrow from, and compare national legislation to laws of other countries as well as the legal traditions of other countries.38 For this reason, a comparative method will be used in the chapter on copyright reform – together with the political legal method. Inspiration will primarily be drawn from UK and US copyright law, as well as from UK and US legal commentary on copyright protection of AI generated works. In particular the discussion on implementing “the British model” for copyright protection of computer generated works (see below 4.2) will draw heavily on British law and case law. The comparative legal method will be used to complement the political legal method in order to find out what copyright reform might be desirable to enact.

36 Compare to Hugenholtz, Constructing European Intellectual Property, p 273.
38 Compare to Valguarnera, Juridisk metodlära, p 142.
1.5 Outline

There are two questions of relevance to the copyright protection of AI generated works. The first question is whether works created by AI are at all eligible for copyright protection in Sweden. Because it was inconceivable when URL was passed into law, and later amended, that AI could not independently create works, there is a presumption in Swedish copyright law that only humans can create copyright protected works. With advancements in AI technology, however, AI are capable of generating works that would be copyright protected if they were created by humans. It is, as of now, unclear who Swedish copyright law deems to be the creator of such works: the human behind the AI, the AI itself, both, or perhaps nobody. To determine who the creator of an AI generated work is, it is first necessary to define the term creator. The definition will then be applied to two cases. In the first case, a human and an AI collaborate to create a work. In the second case, the AI creates a work without the involvement of a human. Issues related to ownership of AI generated works will also be discussed. These questions will be discussed in the third chapter of this thesis.

The second question that needs to be examined is whether there is a need for copyright reform and how such reform could be achieved. The problems with the existing legal framework for copyright protection will be listed. Different solutions or methods for reform will then be discussed. The two cases will be used to examine whether the proposed solutions would achieve the desired results. Finally, a discussion will be held on whether copyright reform is actually needed and what solution might best achieve the desired goals. These questions will be examined in the fourth chapter of this thesis.

Before issues related to AI and law are discussed, an attempt will be made to explain what AI is in the second chapter of this thesis. There is currently much talk about AI. Some of it is true and some of it is just hype and buzzwords. For this reason, focus will be placed on attempting to distinguish fact from fiction.

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2 About artificial intelligence

2.1 What is being said about AI?

There is no universally agreed definition of the term artificial intelligence,\(^{40}\) but one commonly used definition is that of a computer system capable of performing tasks normally requiring human intelligence – such as visual perception, speech recognition, decision making and translation between languages. Due to AI being defined as performing tasks that normally require human intelligence, AI is often popularly described as intelligent machines or even as intelligent beings. This is further reinforced by talk of neural networks, machine learning and AI functioning and learning like a human brain.

Recent examples of AI that perpetuate the image of AI as intelligent and thinking machines are IBM’s Watson and Google Deepmind’s AlphaGo. IBM’s Watson beat two prominent contestants in the quiz game Jeopardy.\(^{41}\) AlphaGo, meanwhile, beat an eighteen time world champion in the ancient Chinese board game GO – a game with more possible board configurations than there are atoms in the universe.\(^{42}\) What is remarkable about these two achievements in AI technology is that the AI was able to quickly analyse a complex problem, go through vast amounts of data and then predict the correct answer or move in a way that resembled human thought. These advancements, which came decades ahead of what computer scientists would have predicted, have kickstarted discussions on whether AI are approaching artificial general intelligence or artificial super intelligence – the stages where AI are as intelligent as or more intelligent than humans.

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\(^{40}\) See i.e. https://www.forbes.com/sites/bernardmarr/2018/02/14/the-key-definitions-of-artificial-intelligence-ai-that-explain-its-importance/#b66e7fd4f5d8, retrieved 22/10/2018.


The recent advancements in AI technology have led to predictions that AI will soon replace humans in highly qualified jobs. The advancements in AI technology have also led to fears that AI might replace human creatives. It is indeed already creating works of art, which has led to discussions on whether AI creation should be valued the same way as human innovation. With so much happening in the realm of AI technology there is currently a lot of hype, fear and fascination about what might come next and what AI will achieve in the near future.

2.2 AI reality check – what is AI really?

The first thing that needs to be said about AI is that it is currently very limited in its capabilities. The AI that exist today is able to accomplish narrow tasks, or set of tasks, extremely well but when parameters, or the environment the AI functions in are changed, existing AI struggles. The existing AI are currently not able to apply knowledge from other areas or be inspired by how others solve problems because the AI are programmed and trained to do specific tasks under specific conditions. A practical example might illustrate the point. An AI could be taught to open a bottle of wine with a large variety of wine openers. If there was no wine opener, however, the AI would not be able to open the bottle. A human on the other hand could with experience and creativity figure out that a shoe could be used to open the bottle or that the head of the bottle could be sawed off. That is the kind of intelligence, creativity and capacity for thought that the AI that exists today currently lacks. Even AI systems such as the IBM Watson and Google Deepmind’s AlphaGo have to be retrained and reprogrammed to achieve tasks other than the ones they have been specifically trained to do.

Because AI cannot be said to be an intelligent and thinking machine, it is necessary to recognise AI for what it really is – computer software. It might be extremely advanced and powerful software, but it is computer software nonetheless. As a software, AI are just tools that can be used by humans to achieve different goals and results. It might be more efficient and faster than a human, and it doesn’t tire in the way a human does, but there can not yet be any talk of AI as
being intelligent and thinking machines. Similarly, a long way remains before AI are able to do jobs that require human thinking and creativity.

With that said, AI are incredibly cool and powerful tools, and AI can be used by humans in a wide variety of fields. AI can complete some tasks faster than humans, work for longer than humans and analyse larger amounts of data and information than humans. Once AI has been given an instruction or been programmed to accomplish a task, an AI can in many cases complete the tasks without the help or involvement of a human. Such tasks include creative tasks such as creating art, music or code.
3 Copyright protection of AI generated works

3.1 Criteria for eligibility for copyright protection

[The person/the one]\(^{43}\) who has created a literary or artistic work owns the rights to the work (URL 1 §).\(^{44}\) For a work to be eligible for copyright protection there has to be: i. a person or creator; ii. an act of creation; and iii. a work or product of creation. The criteria in URL 1 § are cumulative and interdependent. The work is the object of copyright protection.

A *work* is the manifestation of an idea, such as a piece of music, a book, a piece of code, a live TV-broadcast or a database.\(^{45}\) Because a work is the manifestation of an idea, it is only when it takes a concrete form that it is eligible for copyright protection. An idea, a sound or a feeling can never by themselves be a work.\(^{46}\) It is, however, not enough for something to have a concrete form for it to be a work. A tree, a musical note and a word all take concrete form, yet they do not enjoy copyright protection. To be eligible for copyright protection a work needs to be original.\(^{47}\)

The Swedish government official report on copyrights stated that the purpose of the copyright law is to protect the spiritual creation in literature and the arts.\(^{48}\) This can be interpreted as meaning that a work is original when it reflects the spirit or the essence of its creator. In other words, a work reflects the personality of its creator. In EU law and Swedish case law, the terminology used is that a work is eligible for copyright protection when it is a person’s *intellectual creation*.\(^{49}\)

\(^{43}\) Translation of the Swedish word “den”. “Den” is a pronoun that can refer to a person or a thing. In URL “den” is normally interpreted to refer to a natural person who has created a work (see i.e. NJA 2012 p 483 paragraph 27). Moving forward “den” will be translated as “the person” or “the creator” unless stated otherwise.

\(^{44}\) Author’s own translation of URL 1 §.

\(^{45}\) Levin. *Lärobok i immaterialrätt*, p 76.


\(^{47}\) Bernitz, *Immaterialrätt och otillbörlig konkurrens*, p 56.

\(^{48}\) SOU 1956:25 p 64. The Swedish phrase used in the government report was “*det andliga skapandet inom litteraturens och konstens områden*” which can roughly be translated as “spiritual creation in literature and the arts”.

\(^{49}\) See i.e. directive 2006/116/EC article 6, case c-5/08 (Infopaq) paragraphs 34-37, and NJA 2015 p 1097.
As long as the member states adhere to EU law and the precedent of the CJEU, the EU leaves it up to each member state to determine whether a work is the intellectual creation of its creator in each individual case.\textsuperscript{50} Under EU law a work is a person’s intellectual creation if it reflects the creator’s personality and if it is the expression of the creator’s free and creative choices in the production of the work.\textsuperscript{51} The CJEU has in its case law expanded on, and provided examples of, what free and creative choices in the act of creation can lead to a work being the intellectual creation of its creator. There are two criteria in Swedish law for determining if a work is original. The first criteria is if a work has *verkshöjd*. This means that the work has to differentiate itself from other works to be eligible for copyright protection.\textsuperscript{52} The second criteria is *dubbelskapandekriteriet*. This means that a work has to be created independently from the influence of other works.\textsuperscript{53} These two criteria are similar to the criteria mandated by EU law, though they could be given a wider interpretation than the criteria of *intellectual creation*.\textsuperscript{54}

The *creator* is the person who creates a work. By looking at the definition of the term work it can be deduced that a *creator* is a person who manifests her personality in a concrete form through exercising her free and creative choices in the production of the work. According to this definition who does what in the creative process is instrumental to determining who the creator of a work is.

The above definition of creator is technology neutral. It does not consider whether the creator is using tools such as a pen, musical instrument or computer. Neither does it consider whether the creator is human or not. This leaves the possibility open that an AI could be the creator of a work under the current legal framework for copyrights, even though there is a strong presumption in Swedish law that a creator is always a human.\textsuperscript{55}

\textsuperscript{50} See case c-5/08 (Infopaq) paragraph 48.
\textsuperscript{51} See i.e. case c-145/10 (Painer) paragraphs 88-99.
\textsuperscript{52} See Bertnitz, *Immaterialrätt och otillbörlig konkurrens*, p 57.
\textsuperscript{53} *Ibid.* p 56.
\textsuperscript{54} Bengtsson, *EU-harmonisering av det upphovsrättsliga originalitetskriteriet*, [Infotorg].
3.2 “Hello World” by Skygge & the Flow Machines

3.2.1 Man v machine – how was the album created?

“Hello World” is a musical album composed jointly by the artist Benoit Carré, a.k.a. Skygge, and an AI. The AI used in the album is called Flow Machines. Flow Machines is a set of online tools. On the album website Skygge describes using Flow Machines in the following way:

“In a typical session with Flow Machines, users first select a set of scores (lead sheets) that they want to take inspiration from. These scores determine the style of the scores generated by Flow Machines. Then they select a set of audio recordings that determine the sound textures of the audio stems generated by Flow Machines. Users can go back and forth between the generation of scores and the generation of audio renderings using an interactive interface, until they get a result they are satisfied with. This process can be very quick (1 hour) or slow (a few days) depending on the specific cases. There is no recipe for a good song, fortunately!”

Based on Skygge’s description of the workflow, the AI created music scores and gave them a sound based on the instructions of the artist. It was then up to the artist to arrange the different scores into complete songs. The lyrics were mostly written by the artist, though the AI was able to come up with some lyrics and catchphrases. An example of lyrics composed by AI can be found in the song “Magic Man”. The artist also assisted the AI in the creation of songs by recording additional instruments and vocals.

“Hello World” was composed jointly by Skygge and the Flow Machines, and both made significant contributions to the songs on the album. It is therefore unclear who should be deemed the creator of the works, the artist or the AI. It should be noted that a work can have multiple

56 To listen, visit: https://open.spotify.com/album/0cGWc9bhEJA4l7jAaV7cqR?si=Y4nFKMI6Sxy3Vg9snZWe_w, retrieved 11/09/2018.
57 https://www.helloworldalbum.net/about-hello-world/, retrieved 11/09/2018. Skygge also invited other artists to join in the composition and production of the songs. For the sake of simplicity, the collection of artists will simply be referred to as “the artist” below.
co-creators. There is a possibility that the artist and the AI are co-creators of the album. There is also the possibility that neither can be deemed the creator, in which case the songs on the album are not copyright protected.

3.2.2 The case for and against Skygge

The first criteria that Skygge has to satisfy to be the creator of the songs on the “Hello World” album is that the songs have to be the result of his free and creative choices. For the sake of simplicity, only one song will be analysed. That song will be “Magic Man”. Skygge describes the production of the song like this:

SKYGGE fed Flow Machines with French pop songs from the 80s. The machine generated this simple melody, which sounded excitingly groovy once SKYGGE rendered it with a generated choir. The title comes from a phrase that returns frequently in this choir: Magic Man. It was a nice surprise that the machine came up with a shiny pop song title with such an electro-disco feel. Flow Machines generated guitars from an American folk stem for the demo. Flow Machines also generated other vocals on the verse, and SKYGGE sang over those voices to get a more complex vocal blend. He also asked the singer Mariama to sing with the choir in order to reinforce the groove. The lyrics are a kind of mashup from all the generated syllables. French electro band Napkey worked on the arrangement at the end of the production. Michael Lovett added synthesizer arpeggios.

By Skygge’s own account, his primary contribution to the song is feeding the AI with French pop songs from the 80’s. The AI generated a melody, guitar score, some vocals on the verse and a chorus. Skygge then added some vocals. Skygge is also responsible for putting the song together from the different pieces generated by the AI, as well as asking other artists to help complete the song.

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61 Levin, Lärobok i immaterialrätt, p 117-119.
62 See i.e. case c-5/08 (Infopaq) paragraphs 34-37.
What speaks to Skygge’s advantage is that he put the different AI generated elements of the song together into one piece of music. The CJEU has in its case law stated that a creator may express his creativity in an original manner and achieve a result which is an intellectual creation through the choice, sequence and combination of elements that go into a work. What speaks against Skygge is that he did not write the score, the melody or most other elements of the song, the AI did. What Skygge did was tell the AI that he wanted to write a song inspired by French pop from the 80’s. The AI generated different scores and the elements of the song, based on Skygge’s instructions. Generally, telling somebody else to create a work does not grant a person the copyright to the work that somebody else creates. For comparison, the editor of a newspaper is not the author of the articles the journalists who work for him write, despite telling them what to write and editing the work that they produce. Similarly, Skygge should perhaps not be seen as a composer of the song if he did not actually compose the song. The reason for this is that it is the manifestation of an idea, not the idea itself, that can be copyright protected. It is the person who manifests the idea, not the person who suggests the idea, that is the creator of the work.

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65 Case c-5/08 (Infopaq) paragraph 45.
66 Compare to NJA 1998 p 563.
67 Compare to Levin, Lärobok i immaterialrätt, p 125-129 – on the copyright of employees to the works created on behalf of the employer.
68 SOU 1956:25 p 68. See also Levin. Lärobok i immaterialrätt, p 76 & Bernitz, Immaterialrätt och otillbörlig konkurrens, p 57.
69 Compare to Levin, Lärobok i immaterialrätt, p 125-129 – on the copyright of employees to the works created on behalf of the employer.
An argument can be made for and against Skygge as the person who created the song by exercising his free and creative choices. The question becomes, to what degree does Skygge have to be involved in the process of creation to be the creator of the song. Does he have to put together the sequence of notes and chords that make up the song or is it enough that he put together a song comprised of AI generated material?

Swedish case law might provide an answer to the question. In case NJA 2015 p 1097 the question was whether the broadcast of an ice hockey game is a copyright protected work. The court stated that the central part of the broadcast is the game, which is itself not a copyright protected work.\(^\text{70}\) The interviews and reports that are part of the broadcast, however, can be works. As can the work of the producer, the camera operators and the game commentators. For a broadcast of a sports event to be a work the broadcast needs to be the broadcast producer’s own intellectual creation. In order for the broadcast to be the producer’s intellectual creation it needs to go beyond what is given by the circumstances of the game. The court ruled that the broadcast was not a work because it was primarily dictated by the events of the game. Despite the possibilities for the producer to exercise choice, the result of the broadcast was not deemed independent enough to be the producer’s own intellectual creation.

For Skygge this means that his contributions to the song “Magic Man” need to go beyond what the AI produced. In his description of how “Magic Man” was created, Skygge credits the AI with generating different elements of the song, such as the melody, verse and chorus.\(^\text{71}\) By Skygge’s own admission the AI generated most of the song. With that said, the AI did not generate a finished product. Skygge describes the process of songwriting with Flow Machines as an interactive process of trial and error where the “users can go back and forth between the generation of scores using an interactive interface, until they get a result they are satisfied with”.\(^\text{72}\) This process can take several days. The AI presumably generated a large amount of unstructured material during these few days. It was up to Skygge to select which parts of the AI

\(^{70}\) Compare also to joined cases c-403/08 and c-429/08 (Premier League) paragraph 98.
generated material that he liked and which parts he thought would work well together. He then had to piece them together into a song. In NJA 2015 p 1097 the broadcast was not the intellectual creation of the producer because the events of the game did not allow the broadcast producer to exercise enough free and creative choice. By contrast, Skygge had to filter, select and arrange a large amount of unstructured material into a finished song. The song likely would not have come into existence without Skygge exercising free and creative choices in the process of creating the song “Magic Man”. At the very least, another person likely would not have put the same parts in the same order if they were writing a song with the AI generated material. For this reason, the song could be considered to be the product of Skygge’s free and creative choices.

The second criteria that Skygge has to satisfy to be the song’s creator is that the song has to reflect his personality.73 A work, generally, reflects the personality of its creator if it is independently created and the work is unique enough that another person would not independently recreate it.74 In the case of the song “Magic Man” the AI most likely produced a very large amount of material, which Skygge subsequently combined into a song using his personal taste as guide. Considering the large amount of material that was probably available to Skygge it seems unlikely that another person would combine the different scores in the same way to produce the same song. For this reason, the song “Magic Man” could be considered to be a manifestation of Skygge’s personality.

The song “Magic Man” is the result of Skygge’s free and creative choices, and it should be considered to be a manifestation of Skygge’s personality. For this reason, Skygge is the creator of the song “Magic Man”. To determine whether Skygge is the creator of other songs on the album “Hello World”, the criteria for determining who the creator of a work is have to be applied to each song individually. Depending on the process of producing each song and depending on the number of choices available to Skygge, he could potentially be the creator of the entire album.

73 Compare, case c-145/10 (Painer) paragraph 88.
74 See i.e. NJA 1990 p 499, NJA 1994 p 74 & NJA 1998 p 563. See also, Bernitz, Immaterialrätt och otillbörlig konkurrens, p 55.
3.2.3 The case for and against the Flow Machines

The same criteria that were applied to Skygge have to be applied to the Flow Machines to determine if the AI is also the creator of the song “Magic Man”. There is a presumption in Swedish law that only humans can create works eligible for copyright protection. This presumption is, however, not written in law. Because it was inconceivable that AI would be able to independently create works the Swedish parliament simply did not consider whether an AI can be the creator under URL 1 §. If it can be determined that the song “Magic Man” is the manifestation of the AI’s personality and that it is the product of the AI’s free and creative choices, then the Flow Machines should be listed as a co-creator of the song along with Skygge.

According to Skygge’s account of the creation process, the Flow Machines generated the melody, the score as well as some vocals and instrumental parts. These are the core of any song, especially the melody and the score. If a human had written these parts of “Magic Man” she would have been considered to be the creator of the song. The Flow Machines, however, are not a human. In order for the AI to be the creator of the song it needs to have a personality and it needs to have made free and creative choices.

It is questionable whether the AI that exist today can make free and creative choices because they do not have a free will. Today’s AI are only able to complete certain tasks that they are programmed for or instructed to do. The AI behind Flow Machines cannot on its own choose to start working without the instruction of a human or choose not to follow the instructions of a human. Neither can the AI behind Flow Machines on its own decide to browse additional sources for inspiration without being instructed what to look for by a human and cannot decide what it wants to accomplish by producing a work. Although advanced AI technology can produce results that are unforeseeable to humans, these are not the result of the AI’s conscious decisions to try to

75 See Levin, Lärobok i immaterialrätt, p 116 & NJA 2012 p 483.
76 SOU 1985:51 p 83.
create a new work. The AI are only following the instructions they have been given to the best of their ability. The Swedish government official report on copyrights of 1985 determined that the AI software that existed at the time was nothing more than a tool – like a typewriter, but infinitely more sophisticated.\textsuperscript{78} This should disqualify an AI from being the creator of a work.

With that said, AI technology has come a long way since 1985 and it is therefore necessary to re-examine whether an AI can be the creator of a work. In the case of the song “Magic Man” the AI has done enough to be a creator if it were a human. Since the AI doesn’t have free will and consciousness it’s unclear if the song can be considered to be the AI’s “intellectual creation”. These are, however, not necessarily the requirements for producing an intellectual creation.\textsuperscript{79} What is important is only that the person creating a work is making free and creative choices. Unless the law states otherwise, an AI should perhaps not be held to a higher standard than a human.

Making free and creative choices has been defined in different ways by the CJEU depending on the form of the work in question. When writing newspaper articles, the author exercises her free and creative choices by selecting which words to use, how to combine them and by choosing the sequence of words.\textsuperscript{80} When taking a portrait of someone, the photographer exercises her free and creative choices by choosing the background, telling the subject how to pose, arranging the lighting, framing the photo, selecting a lens and angle of view, and by editing the photo.\textsuperscript{81} When writing a computer program, the programmer exercises her free and creative choices by combining the choice of keywords, syntax, commands and combination of commands, options, and figures or mathematical concepts.\textsuperscript{82}

The CJEU has not yet tried any cases related to the copyright protection of musical works. There are therefore not any set criteria for what constitutes making free and creative choices when

\textsuperscript{78} SOU 1985:51 p 83.
\textsuperscript{79} Compare also Levin, \textit{Lärobok i immaterialrätt}, p 84 & p 116.
\textsuperscript{80} Case c-5/08 (Infopaq) paragraph 45.
\textsuperscript{81} Case c-145/10 (Painer) paragraph 91.
\textsuperscript{82} Case c-406/10 (SAS Institute) paragraphs 66-68.
composing a musical work. By looking at the CJEU’s case law in other areas it is, however, possible to guess what constitutes making free and creative choices in the process of creating a song. Presumably, the criteria include choice and order of notes, choice of tempo and rhythm, and writing lyrics.

Looking at Skygge’s description of the creative process it is clear that the AI has made the relevant choices, but only after being instructed to do so by the human. That the AI was instructed by the human should, however, not disqualify the AI from being the creator of the song. Humans who create works during employment are usually deemed to be the creators of their works despite being asked to create those works by their employers.  

A reason for this is that an idea is not itself eligible for copyright protection, it is the concrete manifestation of the idea that is protected. If an employee manifests the the employer’s idea in a work, then the employee is the creator of the work. By comparison, Skygge input an idea in the form of scores and audio samples into the AI. The AI then proceeded to produce its own scores with different arrangements of notes and rhythms. The AI did this without Skygge’s intervention. After the AI produced its scores, Skygge used a percentage of what the AI produced to puzzle together the song “Magic Man”. Because the AI created the parts that went into the song, it could be said that the AI created the song “Magic Man” by making free and creative choices when composing the different elements of the song.

In order for the Flow Machines to be the creator of the song “Magic Man” it is not enough that the AI made free and creative choices when composing the song. The song also needs to be a manifestation of the AI’s personality.  

The requirement that a work needs to be the manifestation of its creator’s personality can be interpreted in a number of different ways. One way the requirement has been interpreted in the Swedish legal literature is that it is simply a clumsy way of saying that the work has be created by the creator of the work himself, and not by somebody or something else.  

It should also be noted that the requirement that a work be the

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83 Levin, Lärobok i immaterialrätt, pp 126-129.
84 Case c-145/10 (Painer) paragraphs 88-99.
85 Levin, Lärobok i immaterialrätt, p 82.
manifestation of the creator’s personality is not dependent on the quality of the work.\(^{86}\) Also bad and offensive works can be copyright protected if they were created by the person claiming to be the creator. A work is therefore not any less a manifestation of somebody’s personality because it is of low quality. Finally, a work, generally, reflects the personality of its creator if it was independently created and the work is unique enough that another person would not independently recreate it.\(^{87}\)

The Flow Machines have composed the elements of the song “Magic Man” by itself. Although the AI was programmed to create music that sounds like it has been created by humans, it has independently made the free and creative choices that manifested themselves in the song “Magic Man”. The fact that it is has made the choices itself might weigh more heavily than the fact that it was instructed to emulate human creation. A work is, in a similar situation, considered to be the intellectual creation of a human who has created a work by emulating the style and sound of a genre – as long as the human did not directly copy an existing work.\(^{88}\) The song could therefore potentially be considered to be the manifestation of the AI’s personality, making the Flow Machines the creator of the song.

While it is true that the song “Magic Man” is unique and a representation of the Flow Machines’ free and creative choices, saying that the AI is the \textit{creator} of the song would be contrary to the purpose of URL. URL was passed into law to protect the work of human creators. The official government report on copyright law of 1956 expressed that the purpose of the copyright legislation is to protect the individual “spiritual creation in the literature and the arts”.\(^{89}\) By “spiritual creation” the report meant works created by humans. The official government report on copyright law of 1985 expressed that a work created with the help of a computer or AI should be

\(^{86}\) Levin, \textit{Lärobok i immaterialrätt}, pp 84-85.
\(^{89}\) SOU 1956:25 p 64. The Swedish phrase used in the government report was “\textit{det andliga skapandet inom litteraturens och konstens områden}” which can roughly be translated as “spiritual creation in literature and the arts”.

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considered to be created by the human sitting behind the computer, not the AI. The report did acknowledge that the reason the human sitting behind the computer is considered to be the creator of an AI-generated work is that the AI of the time were not capable of creating works without human involvement. Although AI technology has advanced to the point where an AI can independently create works, the current legislation does not permit AI to be creators.

The US legislation faced a similar challenge when an animal rights’ group argued in court that a monkey should be the photographer, and rights owner, of a selfie it took with the help of a human photographer. The US court ruled that the monkey was not the photographer and rights owner on the ground that it was not human. The judge did, however, say that the policy of the US patent and trademark office that only humans can be creators of a work is antithetical to the “public interest in animal art”, but ultimately ruled “that [it] is an argument that should be made to Congress and the President, not to me.”

A similar argument should be made in Sweden. The Swedish copyright legislation currently views AI as a tool – a very advanced tool, but a tool nonetheless. Unless the Swedish parliament passes an amendment to URL, AI should continue to be considered tools used by humans, even though they are capable of independently creating works. A tool is not a human and does not have a personality that can manifest itself in a work. For this reason, the Flow Machines AI should not be considered to be the creator of the song “Magic Man”.

3.2.4 Man v machine – who created the music?

Based on the analysis of the process of composing the song “Magic Man”, Skygge is the creator of the song (see above 3.2.2). Skygge is the creator of the song because his free and creative choices when piecing together the song manifested themselves in a unique work of music (see above 3.2.2). If the Flow Machines had been a human, the AI would have been credited as a

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90 SOU 1985:51 p 83.
91 Ibid.
94 SOU 1985:51 p 83.
co-creator of the song “Magic Man” (see above 3.2.3). Because it is not a human it cannot be the creator of a work despite, arguably, having made free and creative choices during the creation process that manifested themselves in the scores and audio samples that make up the song “Magic Man” (see above 3.2.3). Although the AI did create a work of music, it cannot be the creator of the song because an AI is only a tool under the current EU and Swedish law (see above 3.2.3).

3.3 Work generated independently by AI

3.3.1 AI generated airport software – a fictional scenario

Anna at the Swedish company Software AB has developed a new powerful AI that she claims will revolutionise programming and will make hiring programmers unnecessary in the future. In its current state, however, the AI is only algorithms and lines of code. It is therefore unable to do any programming. Anna therefore asks her colleague Peter to help train the AI. Peter feeds the AI with coding instructions and open source code in several coding languages. Anna and Peter then let the AI write code for a month. Peter corrects any coding mistakes the AI makes.

Software AB licenses the AI to Swedavia, who are in charge of operations at Arlanda Airport. Swedavia is trying to write a new software for tracking and optimising passenger flows in the airport to make boarding, take off and landing more efficient. According to the license agreement, Swedavia has to pay a fee for using the AI and then has to pay a monthly fee for using any potential AI generated software. Swedavia is allowed to use any software the AI generates, but is not allowed to licence it to others. According to the license agreement, Software AB is the creator and sole rights holder of any software the AI generates.

Karin, the lead programmer at Swedavia, is excited about bringing in the AI to help her program the software. Se writes the AI a few instructions for what she wants the software to accomplish.

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95 Please note that this is a fictional scenario. Swedavia is used in the scenario to make it more realistic. The author does not have any insights into the operations of Swedavia or Arlanda airport. The same applies for Københavns Lufthavne.
and what parameters she wants the AI to look at and consider. Karin then leaves the AI to do its thing. After about a week, Karin checks in on the AI to see how it is doing. To her pleasant surprise, the AI has generated a code that works and that does exactly what Swedavia expect it to do. Karin makes a few tweaks to the software’s graphic user interface to make the software easier to use. The new software is subsequently put into action.

The AI generated airport software is a huge success and efficiency at the airport increases. Pleased with the success of the software, Swedavia decides to license the airport software to Københavns Lufthavne for use at the Kastrup airport. Swedavia claims that it is not bound by the license agreement with Software AB because Karin is the creator of the airport software. Swedavia, as Karin’s employer, is therefore the rightful rights holder to the software. Swedavia is no longer using the AI and refuse to pay the agreed license fee for using the software. Software AB sues Swedavia for copyright infringement and breach of contract.

3.3.2 Opening remarks

The scenario described in section 3.3.1 is fictional. Yet AI that can independently create works and perhaps even write software already exists.\(^96\) If AI cannot yet independently write code and software, it will likely soon be capable of doing it. This potentially creates a number of problems. When a human and AI collaborate, works they create jointly can be copyright protected because the works can be considered to be the intellectual creation of the human behind the AI (see above 3.2). When an AI independently generates a work, such as a source code to a software, it is questionable whose intellectual creation it is. It should be noted that had the AI been a human, the AI would likely have been the creator of the code and software. However, an AI cannot produce an intellectual creation and cannot be a creator under URL 1 § because Swedish copyright law views AI technology as a tool, and not as equivalent to humans (see above 3.2.3).\(^97\) Perhaps a human behind the AI could be the creator of such a work, though

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\(^96\) AI that can independently write software likely already exist. The author of this thesis has not been able to find proof of this claim. A possible reason for this is that such AI could be protected company secrets. Please note that the AI has developed a new separate software. The airport software is not a new and developed iteration of the coding AI.

\(^97\) See also SOU 1985:51 p 83.
that may not be the case if the human is not involved in the process of creating the code or the specific work in question (see above 3.2.2).

There are three humans who interact with the AI in the fictional scenario (see above 3.3.1) – Anna the programmer, Peter the “teacher” and Karin the user. The humans each interact with the AI in different ways and could therefore potentially claim to be the creators of the AI generated airport software. It should be noted that only questions regarding who is the creator of AI generated works are examined in this section. Questions regarding ownership of AI generated works will be discussed in chapter 4.

The legal protection of computer programs in the EU is regulated in directive 2009/24/EC (computer programs directive). The computer programs directive has been implemented in Swedish law through URL. The computer programs states that a computer program is protected if it is original in the sense that it is the author’s own intellectual creation (computer programs directive article 1) and that the author of a computer program is the natural person who has created the program (computer programs directive article 2 & URL 40 a §). These requirements are no different than the requirements set out in URL 1 §. With that said, the computer programs directive emphasises that code and software are created by humans.

3.3.3 Is Anna, the programmer, the creator of the airport software?

To determine if Anna is the creator of the AI generated airport software it is necessary to examine if the airport software is her intellectual creation and the result of her free and creative choices. In the scenario, Anna has created the AI and programmed it to be able to create new software. She enlists Peter to teach the AI programming languages and how to use these languages. Software AB then licenses the AI to Swedavia.

On the one hand, an argument could be made that without Anna creating the AI, the airport software would not have come into existence. Swedavia’s own programmers were, presumably, unable to create the airport software before licensing the AI to create the airport software. Anna’s
work in the process of creating the AI could therefore be said to have led to the airport software being created.

On the other hand, Anna did not instruct the AI to create the airport software. Neither did she program the airport software herself or in any other way assist Karin or Swedavia in the creation process, other than having created the AI. It is necessary to remember that AI are nothing more than tools under Swedish copyright.\textsuperscript{98} As such, using an AI to create a work should be no different than using a pen to do so.\textsuperscript{99} If Anna had made a pen that Karin used to write the code to the airport software nobody would claim that Anna is the author of the code. Creating a tool that somebody else uses to create a work, does not give the creator of the tool the right to somebody else’s work.\textsuperscript{100} The reason Anna should not be the creator of the airport software is that there is only a weak correlation between Anna’s work on the AI and the manifestation of Karin’s idea to create the airport software. Anna no longer held the proverbial pen that was used to write the code to the airport software and neither did she tell the holder of the pen what to do. Despite creating the AI, Anna did not herself actually contribute to the code in the airport software. Anna did not make any free and creative choices when Karin and Swedavia used the AI to create the airport software, there is therefore no direct causal connection between her work on the AI and Karin using the AI to manifest her idea. Because there is no direct causal connection between Anna’s actions and the creation of the airport software, Anna should not be considered to be the creator of the airport software.

\textsuperscript{98} SOU 1985:51 p 83.
\textsuperscript{99} Compare to Abbott, \textit{Artificial intelligence, big data and intellectual property: protecting computer-generated works in the United Kingdom}, pp 2-3. Similarly, under Swedish law an AI is just a tool. Using an AI or computer program to create a work can therefore currently be compared to using a pen to create a work.
\textsuperscript{100} Comparing the AI in the scenario to a pen might be a little disingenuous. The AI is a much more sophisticated and powerful tool than a simple pen. A better comparison would be a self-writing pen that is able to write and draw without anybody holding it. Picture Rita Skeeter’s self-writing pen in J K Rowling’s book \textit{Harry Potter and the Goblet of Fire}. The pen has an almost magical ability (pun intended) to spice any news article up by coming up with and writing fake gossip about the subject of an article, without Rita Skeeter ever holding or instructing the pen what to do. In this case, Rita Skeeter does not use the pen, per se, to write the articles. The pen does the writing. It is questionable whether Rita Skeeter is the author of the article because she does not make free and creative choices in the process of writing the articles. The pen-maker doesn’t either make any free and creative choices because he is not involved in writing the articles. For this reason, he cannot be the author of articles written by a self-writing pen.
3.3.4 Is Peter, the “teacher”, the creator of the airport software?

The same criteria that were applied to Anna, have to be applied to Peter as well. Peter’s role in the scenario is teaching the AI different coding languages and giving it instructions on how to code better. For Peter to be the creator of the airport software he needs to have made free and creative choices in the process of creating the software.

On the one hand, an argument could be made that Peter’s work with the AI was indispensable to the creation of the airport software. Without Peter having trained the AI, the AI would not have been able to create the airport software. It could be said said that the AI’s subsequent work is the result of Peter’s teaching, and that he should therefore be the creator of the work.

On the other hand, just like Anna, Peter did not instruct the AI to create the airport software. Neither did he program the airport software himself or in any other way assist Karin or Swedavia in the creation process, other than having taught the AI how to code in different coding languages. While this is a significant contribution, it is not a direct contribution to the creation of the airport software. The AI in the scenario can, perhaps, be compared to a student in a classroom and Peter can be compared to the teacher in the classroom. The teacher passes his knowledge down to the student. The student then creates a work using that knowledge. While the student may not have been able to create the work without first being given knowledge by the teacher, the teacher’s contribution to the creation of the work is only indirect. The teacher does not make any free or creative choices that directly contribute to the creation of the work. Because the teacher did not directly participate in the creation of the work, he cannot be the creator of his student’s work. Similarly, Peter only taught the AI how to code. He did not write the airport software together with the AI and he did not tell the AI what keywords, syntax, commands, figures or mathematical concepts to use when writing the code to the software.\(^\text{101}\) It is again necessary to remember that AI are nothing more than tools under Swedish copyright.\(^\text{102}\) Returning to the analogy of comparing an AI to a pen, it should be noted that if Peter sharpened

\(^{101}\) To see what constitutes making free or creative choices in the process of creating a code or software, see case c-406/10 (SAS Institute) paragraphs 66-68.

\(^{102}\) SOU 1985:51 p 83.
the pen Karin used to write the code to the airport software, Peter would not be an author to the code. Although he, indirectly, helped Karin write the code, he did not make any direct contributions to the creation of the code. Similarly, Peter helped make the AI a sharper tool through teaching the AI how to code. That does, however, not mean that he is the creator of any works subsequently created by, or with the help of, the AI. Just as with Anna, there is a correlation between Peter’s work on the AI and the creation of the airport software. There is, however, no direct causal connection between Peter’s actions and the creation of the software. Peter should therefore not be considered to be the creator of the airport software.

3.3.5 Is Karin, the user, the creator of the airport software?
Karin is the creator of the airport software if the software is her intellectual creation and the product of her free and creative choices. Of the three people in the scenario, Karin is the person closest to the creation of the airport software. Karin instructed the AI what to do and what parameters to consider and include, and then ordered the AI to start working. The AI processed Karin’s instructions and after a week it had produced the source code for the airport software. After the AI had produced the source code for the software, Karin gave the software a more user friendly graphic user interface. The software came into existence as a result of her actions, yet it is still unclear if the airport software is her intellectual creation.

What speaks for the airport software being Karin’s intellectual creation is that it was his idea to create it and that she put in motion the process for creating it. Karin instructed the AI to create a software with a specific function – tracking and optimising passenger flows in the airport to make boarding, take off and landing more efficient. To ensure optimal functionality Karin instructed the AI to look at and consider several parameters. The airport software that the AI created based on Karin’s instructions works and does exactly what Karin wants and expects it do. Karin then tweaked the software’s graphic user interface to make it the software easier to use.

What speaks against the airport software being Karin’s intellectual creation is that she did not actually write the code to the software herself, the AI did. Karin did not make the free and
creative choices that would make the airport software his intellectual creation. She did not choose keywords, syntax, commands, figures or mathematical concepts to use when writing the code to the software. What Karin did was tell the AI that she wanted to program a software with certain features. The AI generated the code to the software. Generally, telling somebody else to create a work doesn’t grant a person the copyright to the work that somebody else creates. For comparison, the editor of a newspaper is not the author of the articles the journalists who work for him write, despite telling them what to write and editing the work that they produce. Similarly, Karin should not be seen as the creator of the airport software if he did not actually write the code to the software. The reason for this is that it is the manifestation of an idea, not the idea itself, that can be copyright protected (see above 3.1 & 3.2.2).

An argument can be made both for and against Karin as the person who created the software by making free and creative choices. Karin’s situation is similar to the situation of Skygge writing music with the help of an AI (see above 3.2.2). The question in Karin’s situation is, just as it was with Skygge, to what degree does Karin have to be involved in the process of creation to be the creator of the airport software.

A parallel can be drawn to case NJA 2015 p 1097. In the case the question was whether the broadcast of an Ice Hockey game is an intellectual creation of the producer. The court argued that the central part of the broadcast was the game. Despite the possibilities for the producer to exercise choice, the result of the broadcast was not deemed independent enough to be the producer’s own intellectual creation. The key takeaway from the case is that in order for a broadcast to be the intellectual creation of its producer the broadcast needs to go beyond what is given by circumstance.

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103 To see what constitutes making free or creative choices in the process of creating a code or software, see case c-406/10 (SAS Institute) paragraphs 66-68.
104 Compare to Levin, Lärobok i immaterialrätt, pp 125-129 – on the copyright of employees to the works created on behalf of the employer.
105 SOU 1956:25 p 68. See also Levin. Lärobok i immaterialrätt, p 76 & Bernitz, Immaterialrätt och otillbörlig konkurrens, p 57.
For Karin, the precedent set in case NJA 2015 p 1097 means that her contribution to the airport software needs to go beyond what is given to her by circumstance – in this case her contribution needs to go beyond what is given to her by the AI. Karin instructs the AI what to create, but she does not contribute any code to the airport software. The code is entirely created by the AI. Karin does tell the AI what parameters to consider and gives the AI access to Swedavia’s systems to help the AI optimise the code for the purpose of tracking passenger flows at Arlanda airport. Doing so, however, does not produce lines of code nor does it help put the lines of code in an order that allows the airport software to function.\textsuperscript{106} Although Karin does not help the AI produce the code to the software, she does make tweaks to the software’s graphic user interface. Making tweaks to the software’s graphic user interface might not be an independent contribution to the airport software, though. The functionality and expression of the graphic user interface is heavily dependent on the code produced by the AI. This means that the components of the graphic user interface do not permit Karin to express her creativity in an original manner and achieve a result which is her own intellectual creation.\textsuperscript{107} Looking at Karin’s contributions to the airport software, these are so insignificant that the airport software should not be deemed to be her intellectual creation.\textsuperscript{108} Although the airport software came into existence because Karin put the process of creation in motion, there is only a weak causal connection between her actions and the lines of code in the software. For this reason, it is doubtful that Karin should be considered to be the creator of the airport software.

3.3.6 \textit{Summary – who is the creator of the software}

There are three humans who could potentially claim to be the creator of the airport software – Anna, Peter and Karin. Based on their roles in the scenario, neither Anna (see above 3.3.3) nor Peter (see above 3.3.4) should be considered to be the creator of the airport software. It is questionable whether Karin is the creator of the airport software (see above 3.3.5). On the one hand, she doesn’t write any of the code to the software herself, the AI does. On the other hand,

\textsuperscript{106} Compare the requirements for making an intellectual creation in, case c-5/08 (Infopaq) paragraph 45 & case c-406/10 (SAS Institute) paragraphs 66-68.
\textsuperscript{107} Compare to case c-393/09 (Bezpečnostní) paragraphs 48-51.
\textsuperscript{108} NJA 2015 p 1097 & case c-393/09 (Bezpečnostní) paragraphs 48-51. See also case c-5/08 (Infopaq) paragraph 45 & case c-406/10 (SAS Institute) paragraphs 66-68 à contrario.
the AI is just a tool that Karin uses to create a desired product. Based on EU and Swedish case law, the airport software should not be considered to be Karin’s intellectual creation because she does not make the necessary free and creative choices in the process of creating the software.

In the likely event that Karin is not the creator of the airport software, the software lacks a human creator. The AI that created the software cannot be a creator under EU and Swedish law because the AI is only a tool. This means that the airport software has no creator. The definition of a work is that it is the intellectual creation of its creator (see above 3.1). If the work lacks a creator, it cannot be an intellectual creation. If it’s not an intellectual creation, it cannot be a copyright protected work under EU and Swedish law. In the likely event that Karin is not the creator of the airport software, the software is not a copyright protected work. This should mean that URL does not apply to the airport software at all. This has an effect on questions of ownership and use of the software.

3.4 Ownership of the AI generated works

3.4.1 Who is the owner of a work?

The purpose of copyright law is to protect the individual “spiritual creation in the literature and the arts”. The legal protection of copyrights is predicated on the belief that rewarding creators of works will foster investment in creativity and innovation. For this reason, EU and Swedish copyright law guarantees creators or rightholders the exclusive right to authorise or prohibit reproduction and communication of a work to the public (Infosoc articles 2-3 and URL 2 §). These so called economic rights are complemented by the creator’s moral right to be credited as the creator of a work (URL 3 §). Copyright protection lasts for the duration of the creator’s life plus seventy additional years after the creator’s death (URL 43 §).

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109 SOU 1956:25 p 64. The Swedish phrase used in the government report was “det andliga skapandet inom litteraturens och konstens områden” which can roughly be translated as “spiritual creation in literature and the arts”.

The creator of a work is almost always the first rightsholder of a work (URL 1-2 §§). The creator can license the work to others – giving them a limited right to use, reproduce and make a work available to the public. The creator can also transfer the economic rights to a work to another natural or legal person (URL 27 §). The creator cannot transfer the moral rights to a work (URL 27 §), though the creator may to a limited extent remit the moral rights (URL 3 §).

The computer programs directive\(^\text{111}\) and URL provide an exception to the rule that the creator of a work is the original rightsholder to the work. According to the computer programs directive article 2.3 and URL 40 a §, “where a computer program is created by an employee in the execution of his duties or following the instructions given by his employer, the employer exclusively shall be entitled to exercise all economic rights in the program so created, unless otherwise provided by contract.” A computer program is copyright protected under EU and Swedish law if it is the intellectual creation of its creator.

If a work does not meet the eligibility requirements for copyright protection, URL and the EU directives are not applicable to the work. In cases where a work is not eligible for copyright protection, it is said to belong to the public domain. Works that belong to the public domain can be freely used, reproduced and made available to the public by anyone.

There is a way to protect works that would otherwise belong to the public domain – keeping them secret. If no one has access to a work, then they cannot use, reproduce or make it available to the public against the wishes of its creator. If an unprotected work belongs to a legal person, they can protect the work through trade secrets directive,\(^\text{112}\) and the Swedish trade secrets act (LFH).\(^\text{113}\) Keeping a work secret or a trade secret is a weak form of IP protection compared to copyright protection. It is, nevertheless, a last resort to protect otherwise unprotected works.

\(^{111}\) Directive 2009/24/EC.
\(^{112}\) Directive 2016/943/EU.
\(^{113}\) Lag (2018:558) om företagshemligheter.
3.4.2 Skygge & the Flow Machines – who owns what?

The song “Magic Man” was created jointly by Skygge and an AI – the Flow Machines. There are two creations that could potentially be copyright protected in the scenario: the final version of the song “Magic Man” and the AI generated material that was used to create the song. Most likely, not all of the AI generated material in the song was used. This material might also deserve copyright or other IP protection.

Skygge is the creator of the final version of the song “Magic Man” (see above 3.2.2). As the creator of the song, Skygge is the copyright owner of the song (URL 1-2 §§) – at least initially, until he decides to sell the economic rights to the song (URL 27 §). The material that Skygge used to create the song, on the other hand, was generated by the AI. The AI, however, cannot be the creator of the material because it is a tool and therefore incapable of producing intellectual creations (see above 3.2.3). Neither is Skygge the creator of the material. Although Skygge fed the AI with scores and audio samples from French pop songs from the 1980’s, the parts of the material that the AI subsequently generated are not his intellectual creations. Because the material is not a person’s intellectual creation, it cannot be copyright protected (URL 1 §). The rights to the material therefore belong to the public domain.

The only way Skygge can currently protect the material and prevent others from using, reproducing and making the material available to the public is to keep it secret. If nobody else has access to the material, nobody else can use it. Although the material that has already been published belongs to the public domain, Skygge is under no obligation to make available the unreleased material to the public. Keeping the unreleased material secret could potentially give Skygge a competitive advantage over other music composers who do not have a large archive of unreleased material to draw from when creating music. This is, however, not a particularly efficient way for Skygge to protect his intellectual property. It is also impractical for Skygge to

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115 See also SOU 1985:51 p 83.

116 NJA 2015 p 1097 & case c-393/09 (Bezpečnostní) paragraphs 48-51. See also case c-5/08 (Infopaq) paragraph 45 & case c-406/10 (SAS Institute) paragraphs 66-68 à contrario.
store the unreleased material to give himself a competitive advantage when he can use the AI to easily create new material. Protecting the material this way therefore seems unattractive.

3.4.3 Who owns the rights to the airport software?
The airport software was created by an AI with the ability to code and create software. None of the three people in the scenario should be deemed to be the creator of the airport software. The reason for this is that the software is not their intellectual creation (see above 3.3.3, 3.3.4 & 3.3.5). Because the airport software is not the intellectual creation of a person it cannot be copyright protected. If the software cannot be copyright protected, it belongs to the public domain. With that said, as long as the airport software remains private and confidential it should remain an IP protected asset in the form of a trade secret. In the improbable event that the airport software is Karin’s intellectual creation (see above 3.3.5), the economic rights to the airport software most likely, initially, belong to Swedavia (URL 40 a §). If the AI in the scenario had created a work other than a software that was Karin’s intellectual creation, the rights to the work would have belonged to Karin (Infosoc articles 2-3 & URL 2 §).

There are two license agreements in the scenario that play an important role in deciding who controls and has the right to use, reproduce and make the airport software available to the public. The first is the license agreement between Software AB and Swedavia. The agreement stipulates that Swedavia may use the AI but that Software AB is the creator and sole rights holder of any software the AI generates. The second license agreement is between Swedavia and Københavns Lufthavne. The agreement grants Københavns Lufthavne permission to use the airport software at Kastrup Airport. Depending on the interpretation of the first license agreement and depending on whether the airport software is a trade secret or a copyright protected work, Swedavia may have illegally licensed the airport software to Københavns Lufthavne (URL 2 § or LFH 3 §). Because the purpose of this thesis is not to discuss the interpretation of license agreements, no further discussion will be held on the license agreements. The license agreements were included in the scenario mostly to illustrate the complexities that could arise when AI that can generate works are used as commercial assets.
3.5 A few remarks about copyright protection of AI generated works

AI generated works are currently not eligible for copyright protection unless they are also the intellectual creations of humans. This is a problem because using AI to generate works can require large human investments in terms of time, creative energy and money. If the results of these investments are not protected there could be little incentive to use AI to create new works (see Infosoc preamble 4). Lack of incentive to use AI to create works could potentially lead to fewer investments in and slowed tempo of advancements in AI technology.

Where AI and humans collaborate there will be difficulties drawing lines between what should and what should not be copyright protected. There are bound to be works created that span from entirely human made to entirely AI generated. When a work is entirely human made it will, as a rule, be copyright protected. When a work is entirely AI generated it will, as a rule, not be copyright protected. Between these two poles there is a gray zone where it is unclear if a work should be copyright protected. Most AI-human collaboration will most likely be placed somewhere along the spectrum between completely human made and entirely AI generated works. Determining who did what and to what degree the human was involved in the process of creation will be crucial to determining what AI generated works are copyright protected. This will, however, not always be possible.

There is a way for companies to heal the lack of human involvement in the creation of AI generated works. Companies can attempt to build in human decision making and choices into the process of creative production. If a human is to a sufficient degree involved in the creation of an AI generated work, the work could potentially be considered to be the intellectual creation of the human. To achieve this, the human needs to make enough free and creative choices in the process of creation.\footnote{See case c-5/08 (Infopaq) paragraph 45 & case c-145/10 (Painer) paragraph 88.}
An example of a joint human and AI venture in creation where the human is sufficiently involved is the creation of the song “Magic Man”. Skygge is the creator of the final version of the song, but he is not the creator of the AI generated material (see above 3.2.2 & 3.4.2). If Skygge had put together the sequence of notes and let the AI give the notes a sound, however, he could potentially have been the creator and copyright holder to the material as well. Similarly, if Karin had put together AI generated lines of code together to create a new software she would likely have been the creator of that software. These are just suggestions and speculations, but they illustrate that there are ways to get around the problem that AI generated works in many cases cannot be copyright protected. It should be noted though, that the human should have an active role in the creation process. Simply choosing which AI generated elements to use and which to not, is likely not enough for an AI generated work to be considered the intellectual creation of a human.118

It needs to be observed that in order for a work to be eligible for copyright protection, there has to be a causal connection between the idea and the work that is produced. In other words, copyright protection and ownership originates from a person undertaking actions that directly lead to the creation of a work. A person who writes a sequence of notes on paper or types a line of code into a computer is the creator of the work. By contrast, people who indirectly contribute to the creation of a work – such as the people who give the creator an idea, teach the creator a skill or provide the creator with a tool – are not creators. For these people, there is a correlation between their contributions and the creation of the work. When examining questions related to the copyright protection of AI generated works it is important to distinguish between causation and correlation. What differentiates using AI from using other tools in the process of creation is that AI can act independently of the people behind the AI. There is therefore more likely to be a correlation between the people behind the AI and the AI generated work, than a direct causal connection between the actions of the people and the work. Because of this, AI generated works are less likely to be eligible for copyright protection.

118 Compare i.e. to NJA 2015 p 1097.
4 Suggesting a model for possible copyright reform

4.1 Issues facing EU and Swedish copyright law

The purpose of copyright law is to reward creators for producing works, with the belief that rewarding creators gives them incentives to invest in creativity and innovation (see above 3.4.1). With this in mind, it is clear that entirely human made works should be copyright protected. Entirely AI generated works should perhaps not be copyright protected because there is no human involvement in the creation process. It is unclear whether works created by human-AI collaboration, that fall somewhere in the grayzone on the spectrum between human made and AI generated, should be eligible for copyright protection.

There are two primary interests that need to be taken into account when discussing copyright protection of, or ownership of, AI generated works. The first interest is that creators should benefit from innovating and from creating works. Creators should be able to sustain themselves and their families by engaging in innovation and creation. AI, however, have no need for rewards. They will not starve to death or be unable to pay their rents if they are not financially rewarded for creating a work. By this logic, only works created by humans should be copyright protected. The second interest that needs to be taken into account is that investments into AI technology and using AI should be protected. Using AI to generate works can require large human investments in terms of time, creative energy and money. As a quick example, it likely took Skygge several days to create the song “Magic Man”. Creating an AI capable of generating music took several years and required funding from the European Research Council, Sony Computer Science Laboratories, and the Pierre and Marie Curie University, among others. Similarly, it likely took Anna at Software AB large amounts of time to create the AI and Swedavia likely had to pay a hefty license fee to use the AI. In the case that works that require

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121 Ibid.
large amounts of time, creative energy and money to create are not protected, there is little incentive to invest in creating such works. If there is little financial incentive to innovate, innovation in AI technology as well as in development of music and other arts by using AI in the creative process is likely to be stifled.

Not rewarding people who use AI to generate works could have other consequences. A likely consequence is that people fail to disclose that a work was AI generated, or that people start lying and wrongfully claiming that AI generated works are in fact their intellectual creations. Unlike patents, trademarks and designs, copyright protection is granted automatically. There is therefore no review of whether a work is in fact the intellectual creation of the person claiming to be its creator. An unearned copyright ownership of an AI generated work would likely go unchallenged, unless it was somehow revealed that the person claiming ownership did not actually create the work. As an example, a person using the Flow Machines AI to create a musical composition without disclosing the use of the AI would be granted full copyright ownership of the AI generated work and material. Skygge by comparison would be “penalised” for being honest about using the AI in the process of creation. Honesty should be rewarded, not punished.

The flipside of the same coin is that people who use AI to create should not be rewarded for work that they did not do themselves. Skygge will be used as an example again. Skygge should not be rewarded for creation that he did not actually do himself when using the AI. Although Skygge did make creative contributions to the AI generated material, the material is still not his intellectual creation. Rewarding Skygge with a lifetime plus seventy years copyright ownership (URL 43 §) to the material would seem a bit excessive because the material is not his intellectual creation, but rather something generated by a machine on his behalf. It should be noted that ideas, as such, cannot be copyright protected (see above 3.2). Skygge’s idea, to create a song

122 Compare to Abbott, Artificial intelligence, big data and intellectual property: protecting computer-generated works in the United Kingdom, p 4.
124 See Levin, Lärobok i immaterialrätt, p 76 & Bernitz, Immaterialrätt och otillbörlig konkurrens, p 57. See also NJA 2004 p 149.
in the style of French pop songs from the 1980’s, should therefore not be protected. His creative contributions to the AI generated material, might, however, be worth protecting.

There is another set of interests that has to be taken into account when discussing copyright law – the interests of the general public. When a work belongs to the public domain, it gives people leeway to freely use and exploit that work. A work that belongs to the public domain can be used to create other works, thus benefiting society through an increased speed of innovation.

With all that said, the purpose of having a copyright law that rewards creation would be defeated if people start lying and claiming ownership of works that they did not create. Likewise, there is little point in having a copyright law if people are not rewarded for their creative ideas and efforts to manifest these ideas into reality. To give fair protection for AI generated works, a balance has to be struck between the various set of interests involved. Finding the “right” amount of human involvement necessary when AI are used to generate works might be difficult, however.

4.2 The British model

4.2.1 Legal context

The legal framework for copyrights was written with human creation in mind. When the Berne Convention for the Protection of Literary and Artistic Works was signed in 1886, computers did not exist. Computers had limited capabilities when URL was passed into law in Sweden in 1960. When URL was amended in the 1980’s, computers independently generating works without human intervention was dismissed as not yet possible. Computers were therefore only viewed as a tool that can help humans create works. This leads to practical problems now that AI technology has advanced to the point where AI can actually independently create works.

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126 SOU 1985:51 p 83.
127 Ibid. See also, Abbott, Artificial intelligence, big data and intellectual property: protecting computer-generated works in the United Kingdom, pp 2-3.
The World Intellectual Property Organisation (WIPO) foresaw this issue. In its monthly recommendations from September of 1982, WIPO wrote that:

“In the case of works produced with the use of computer systems, the copyright owner in such works can basically only be the person who produced the creative element without which the resulting work would not be entitled to copyright protection.”

In the September 1982 recommendations, WIPO also wrote that:

“Where [computers are used to create] works, States should basically consider them as a technical means used in the process of creation for achieving the results desired by human beings.”

The WIPO recommendations from 1982 can be interpreted in two different ways. The first possible interpretation of the WIPO recommendation is that a person should be granted copyright ownership of a computer generated work if that person “produced the creative element without which the resulting work would not be entitled to copyright protection”. In other words, the person that told the computer to create the work should be given copyright ownership of the work as long as she contributed the creative element. The second possible interpretation of the WIPO recommendation is that a person should be granted copyright ownership in a computer generated work if the work is the intellectual creation of that person. In other words, the person has to create the work through exercising free and creative choices. These two interpretations appear to set different standards for when a human is the rightsholder to a computer generated work. The WIPO recommendations are not binding, and it is up to each country to interpret and implement them into their legal system.

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The second interpretation of the WIPO recommendations seems to be applied in Sweden. According to the official government report on copyright reform of 1985, a work generated by a computer can only be copyright protected if it meets the same criteria for intellectual creation as a work created by a human.\textsuperscript{130} Under Swedish copyright law, computers and AI are two tools – among a wide variety of tools – that can be used to create works.\textsuperscript{131} The creative element referenced in the WIPO recommendations can thus be equated to intellectual creation. This means that under Swedish copyright law, works created by human-AI collaboration are only copyright protected as long as the works are the intellectual creation of the human involved. Likely, only a small percentage of AI generated works on the spectrum between entirely human made and entirely AI generated will be protected under Swedish law.

For comparison, the first interpretation of the WIPO recommendation seems to be applied in the UK. The primary legislation for copyrights in the UK is the Copyright, Designs and Patents Act 1988 (CDPA). The CDPA defines computer generated works as works “generated by a computer in circumstances such that there is no human author of the work[s]” (CDPA § 178). For computer generated works, the term of the copyright is fifty years from the end of the calendar year in which the work was made (CDPA § 12(7)). The CDPA provides that for computer generated works, “the author shall be taken to be the person by whom the arrangement necessary for the creation of the work are undertaken” (CDPA § 9(3)). The “undertake the necessary arrangement” requirement in the CDPA can perhaps be likened to the phrase “contributed the creative element” in the WIPO recommendations. What is unique about the CDPA is that it grants copyright ownership of computer generated works to the person using the computer, even where the work was not created by the person.\textsuperscript{132} This should, in theory, give a wider protection for works generated by joint human-AI creation than is granted under the Swedish legal regime for copyright protection.

\textsuperscript{130} SOU 1985:51 p 83.
\textsuperscript{131} Ibid. Other tools such as a pen.
\textsuperscript{132} Abbott, \textit{Artificial intelligence, big data and intellectual property: protecting computer-generated works in the United Kingdom}, p 1.
A way to enact copyright reform in Sweden would be to implement the British model as set out in the CDPA. A benefit of enacting the British model is that it is in line with the September 1982 WIPO recommendation for interpreting the Berne Convention,133 on which the current Swedish rules on AI generated works are based (see above 4.1).134 Following the WIPO recommendations for interpreting the Berne Convention would ensure that the new rules on copyright protection remain congruent with the current Swedish copyright law as well as with the copyright legislation of other countries. The British model could potentially be implemented as a related right in the fifth chapter of URL, similar to the right of record and film producers to reproduce and communicate certain works to the public (URL 46 §).

4.2.2 A necessary arrangement

The British CDPA provides that for computer generated works, “the author shall be taken to be the person by whom the arrangement necessary for the creation of the work are undertaken” (CDPA § 9(3)). It is unclear what constitutes such a necessary arrangement and how the requirement compares to the requirement of URL that the creator of a work is the person who has produced an intellectual creation. It’s also unclear where the line between a copyright protected and an unprotected AI generated work is drawn.

The British High Court of Justice has tried whether a person is the creator of a computer generated work in one case. In the Nova Productions case, the court discussed the meaning of what constitutes undertaking an arrangement necessary for the creation of a work. The court stated that:

“In so far as each composite frame [of a computer game] is a computer generated work then the arrangements necessary for the creation of the work were undertaken by [the programmer] because he devised the appearance of the various elements of the game and the rules and logic by which each frame is generated and he wrote the relevant computer program. In these circumstances I am satisfied

134 See also SOU 1985:51 pp 83-84.
that [the programmer] is the person by whom the arrangements necessary for the creation of the works were undertaken and therefore is deemed to be the author by virtue of [CDPA § 9(3)].

Before leaving this topic there is one further complexity I must consider and that is the effect of player input. The appearance of any particular screen depends to some extent on the way the game is being played. For example, when the rotary knob is turned the cue rotates around the cue ball. Similarly, the power of the shot is affected by the precise moment the player chooses to press the play button. The player is not, however, an author of any of the artistic works created in the successive frame images. His input is not artistic in nature and he has contributed no skill or labour of an artistic kind. Nor has he undertaken any of the arrangements necessary for the creation of the frame images. All he has done is to play the game.”

The dispute in the Nova Productions case concerned copyright protection of a computer game of different variations of billiards and snooker. The computer generated works in question were the different frames of the game generated by the computer. The court held that the person who created the game – the programmer– was the creator of the computer generated works because he was the person who undertook arrangements necessary for the creation of the works. The arrangements undertaken by the programmer included designing the appearance of the various elements of the game, devising the rules and logic by which each frame is generated, and writing the code to the game software.

Meanwhile, the game was played on the computer of each player. Although the frames were generated on the player’s computer based on how the player played the game, the player was not considered to make arrangements necessary for the creation of the frames. The court ruled that the player could not be the creator of the frame because his input was not artistic in nature and he contributed no skill or labour of an artistic kind.

136 Ibid. paragraph 105.
137 Ibid. paragraph 106.
The Nova Productions case is interesting. It reflects the view expressed in the September 1982 WIPO recommendations that the creator of a computer generated work should be the person who contributes the creative element without which the work would not be eligible for copyright protection.\textsuperscript{138} In the case there are two relevant parties who contribute to the computer generated works: the programmer and the players. The programmer made all the arrangement to make the computer generate the frames as he intended, from designing the pool tables in the game to devising the rules and logic of the frames, and writing the code to make the game playable. The player on the other hand decided how the frames were generated by moving his mouse over the computer screen and by playing the game. The court ruled that the programmer undertook all the necessary arrangements for the creation of the work. The player, meanwhile, contributed no labour of a skilled or artistic kind and is therefore not the creator of the work.

To determine how applying the British model in Sweden would affect copyright protection for AI generated works, it is first necessary to examine how a Swedish court could potentially have argued in the Nova Productions case.

The requirement under EU and Swedish law is that a work be the intellectual creation of its creator (see above 3.2).\textsuperscript{139} A work is the intellectual creation if it is the result of the creator’s free and creative choices.\textsuperscript{140} When designing the visual elements of the game the programmer presumably made several choices regarding color, design of the different billiards tables, proportions of the different elements of the game, and so on. These would presumably be considered to be his intellectual creations.\textsuperscript{141} The frames are, however, part of the game’s graphic user interface.\textsuperscript{142} The CJEU has in its case law stated that a graphic user interface can only be protected if the arrangement or configuration of all the components meet the criteria of

\textsuperscript{139} See case c-5/08 (Infopaq) and NJA 2015 p 1097.
\textsuperscript{140} Case c-5/08 (Infopaq) paragraph 45.
\textsuperscript{141} Compare to c-145/10 (Painer) paragraph 88.
\textsuperscript{142} When talking about video games, the correct term is head-up display (HUD), rather than graphic user interface. The term graphic user interface is used here for the sake of clarity when discussing the relevant case law.
originality, or intellectual creation. The components of the graphic user interface which are dictated by the function are, however, not protected. In the Nova Productions case, the judge argues that the frames should be protected because the programmer created the design of the frames, the rules and logic for how the frames would be generated, and he has written the code to the game. Under current EU and Swedish law, only the basic design itself can be protected. It is therefore questionable if the different variations of the frames – such as different placement of the que and billiards balls, as well as score display and shot power meter – which are dependent on how the player plays the game are dictated by the function of the software and should be protected. The frames are unlikely to be protected because they might not be the programmer’s intellectual creations under EU and Swedish.

Applying British and Swedish models for copyright protection of computer generated works leads to different outcomes in the Nova Productions case. Under the British model, the programmer owns the copyright to the frames because he undertook the arrangements necessary for the creation of the work. Under EU and Swedish law, meanwhile, the frames might not be protected because they are unlikely to be the programmer’s intellectual creations. Because the programmer, likely, put in a significant amount of work into creating the game, applying the CDPA and the British model to his case gives him better and fairer copyright protection for the game he created.

It should be noted that the Nova Productions case is only a singular case. It’s usefulness in determining the outcome in other cases is therefore limited. It does, however, provide some guidance on how to interpret the phrase undertake the “arrangements necessary for the creation of the work” (CDPA § 9(3)). The legal literature suggests that deciding who the person responsible for the arrangement is will depend on what factors are weighed in. The factors can include taking the initiative to create the work, the proximity of the human to the final act of

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143 Case c-393/09 (Bezpečnostní) paragraph 48.
144 Ibid. paragraphs 48-49.
145 Ibid.
creation,\textsuperscript{147} or the extent to which the arrangements are responsible for the creation of the work.\textsuperscript{148}

4.2.3 Applying the British model

The British model is similar to the current Swedish legal framework for copyright protection in that it views computers and AI as tools used by a human creator (see above 4.2.1). At first look, though, the British model gives the human creator more rights to AI generated works than URL does. Under the British model the person who undertakes the arrangements necessary for the creation of a computer generated work is the creator of the work. Under Swedish law, meanwhile, a work needs to be the intellectual creation of the human using the computer for the work to be eligible for copyright protection. It is questionable, however, how much more protection the British model grants for AI generated works than is currently granted under Swedish law. The issues stem from the distinction between regular software, such as the computer game in the Nova Productions case, and AI. AI are much more powerful tools than regular software and are in many cases able to produce results that the human behind the AI can neither explain nor predict. The phrase necessary arrangements begs three questions: i. what amount of control does a human need to exercise over the creation; ii. how close does the human have to be to the act of creation; and iii. how is a necessary arrangement different from an intellectual creation?

To begin, it needs to be stated that entirely and independently AI generated works are not copyright protected under the British model (CDPA § 9(3) interpreted à contrario). AI generated works are only copyright protected when a human has undertaken the necessary arrangement for the creation of the work. This means that the British model is plagued by the same issues as URL

\textsuperscript{147} The closer the person is to the final creation, the more likely that person is to be in charge of the arrangements to create the work.

\textsuperscript{148} Ibid. See also, McCutcheon, Curing the authorless void, pp 55-56. Further consider: Is the arrangement made by the person responsible for the creation of the work or is the operation and function of the software responsible for the creation of the work? This will put more emphasis on examining the role of the software or AI in the creation of the work.
– it is unclear what a human using the AI has to do to be deemed the creator and copyright owner of an AI generated work.

Applying the British model to Skygge’s case could be a good place to start examining what undertaking a necessary arrangement when using an AI might entail. The British model will be applied to the AI generated musical material that went into the song “Magic Man”. The AI generated material should not be considered to be Skygge’s intellectual creation (see above 3.4.2) and it is questionable whether Skygge undertook the arrangements necessary for the creation of the material.

A few things speak in favor of Skygge having undertaken the arrangements necessary for the creation of the AI generated material. To begin, Skygge had the idea of using the AI to create a song in the style of French pop from the 1980’s and he took action to manifest the idea into reality. The idea, per se, should not be protected though. The work that is the result of Skygge’s actions – such as licensing the AI, feeding the AI with scores and audio samples, and pressing the start button – should perhaps be copyright protected. Without Skygge’s actions and contributions the AI would never by itself have created the musical material.

The case against Skygge is that he had little to no control over what the AI generated once he pressed the start button. In the Nova Productions case, the software generated frames followed the rules and logic devised by the programmer and the variations of the frames were dependent on the code written by the programmer. The AI used by Skygge is significantly more advanced that the software in the Nova Productions case. The AI is able to create results that were unforeseen to Skygge when he started the production process and the AI does not follow any rules or logic that was devised by Skygge. It is for this reason questionable whether Skygge

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149 SOU 1956:25 p 68. See also Levin. Lärobok i immaterialrätt, p 76 & Bernitz, Immaterialrätt och otillhörig konkurrens, p 57.

should be considered to have undertaken the arrangements necessary for the creation of the work.

With strong arguments both for and against Skygge, the question boils down to whether Skygge’s relationship to the AI is more like the relationship of the programmer or the relationship of player to the game in the Nova Productions case.151 Under the British model, the AI is a tool (see above 4.2.1). The AI in the scenario can be compared to a pen that Skygge uses to write the music.152 Skygge doesn’t hold the pen, however. The pen writes the music on its own. Whether Skygge has undertaken the arrangements necessary for the creation of the work depends on whether the pen acts on his instructions or on another set of instructions. In other words, how much control does Skygge exercise over the proverbial music writing pen?

In the Nova productions case, the programmer designed the frames, devised the rules and logic by which the frames are generated and he wrote the software to the game.153 If the computer game is compared to a pen, the programmer created the pen, gave it templates with which to work and instructed it how it could draw the frames. The player, meanwhile, made the frames appear on his computer screen without making any creative contributions to the frames.154 By playing the game, the player used the proverbial pen and let it independently draw the frames by telling the pen what he wanted to do within a limited set parameters. Because the programmer was the person who exercised control over the proverbial pen, the court ruled that he was the person who undertook the arrangements necessary for the creation of the computer generated frames.

152 Compare to Abbott, *Artificial intelligence, big data and intellectual property: protecting computer-generated works in the United Kingdom*, pp 2-3. The analogy is also used above in section 3.3.
Skygge cannot really be likened to either the programmer or the player in the Nova Productions case. Skygge did more than the player to help the AI generate the music material and he contributed his own creative elements to the material. At the same time, although he set some parameters for the AI, he did not do as much as the programmer to help the AI generate the material. Under the British model, Skygge is stuck in a legal limbo where it is highly uncertain if he did enough and exercised enough control over the AI to have undertaken the arrangements necessary for the creation of the work.

The uncertainty over who undertook the necessary arrangement for the creation of an AI generated work is even greater when there are multiple parties that can make a claim to having undertaken the arrangements. Such is the case in the airport software scenario where Anna, Peter and Karin can all make a claim to having made arrangements that enabled the AI to created the software. The airport software scenario the question of who controls the AI is complemented by the question of how close a person has to be to the act of creation to be the creator of an AI generated work.

In the airport software scenario, Karin is in the same seat as Skygge. Karin used the AI to create a work through giving it a set of instructions. Because Karin made similar but fewer contributions to the creation of the airport software than Skygge made to the creation of the music material it is unlikely that she undertook the arrangements necessary for the creation of the work (see above 3.3.1).

Anna and Peter, meanwhile, combine to create the AI through writing its algorithm, programming it and teaching it how to code (see above 3.3.1). The AI behaves according to the rules and teachings that they devised and implemented. This is similar to what the programmer did in the Nova Productions case. With this mind, perhaps Anna and Peter undertook the arrangements necessary for the creation of the software together, potentially making them the co-creators of the airport software. There are significant differences, however, between the

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programmer in the Nova Productions case on the one hand and Anna and Peter on the other. The main difference is that there is a direct causal connection between the work of the programmer and the computer generated frames while there is no such direct causal connection between Anna and Peter, and the airport software. The programmer in the Nova Productions case designed the frames, devised the rules and logic of the frames and coded the software with a specific result in mind. That result was then achieved when the players played the game. Anna and Peter, meanwhile, created and trained the AI to generate software. They didn’t have the idea to create the airport software, they didn’t instruct the AI to create the airport software, and they could not have foreseen that the AI would create the code to the software and they could not have controlled the AI’s work. There is a lack of causal connection between their work on the AI and the final product that the AI generated. That gap is filled by Karin who had the idea to create the airport software and used the AI to create it. Although the airport software could not have been created without the Anna’s and Peter’s work on the AI, they should probably not be considered to have undertaken the arrangements necessary for the creation of the airport software because their efforts did not lead directly to the creation of the software.

4.2.4 Evaluating the British model

In theory, the British model would grant greater copyright protection for works generated by a computer in circumstances such that there is no human author of the work(s) (CDPA § 9(3) & CDPA § 178). This means that where an AI has generated a work that is not eligible for copyright protection under URL because it lacks human intellectual creation, the work could potentially be protected under the British model. To be eligible for copyright protection under the British model, however, there needs to be a human who has undertaken the arrangements necessary for the creation of the work (CDPA § 9(3)). In practice, this means that where an AI has independently generated a work without sufficient human involvement that work will still not be eligible for copyright protection. In relation to copyright protection for AI generated works, there thus seems to be little practical difference between URL and the British model, and between the terms intellectual creation and necessary arrangement. Implementing the British
model in Swedish law would therefore, likely, not solve any of the problems that plague URL in relation to AI generated works.

4.3 Alternative solutions

4.3.1 Introducing alternative solutions to AI authorship

Legal scholars have begun examining alternative models for copyright protecting AI generated works, and whether AI should be granted authorship or status as creators of AI generated works. There are two primary ways AI could be granted status as creators. The first way is to apply the rules on employee rights to copyright protected works made for hire. The other way is to grant AI separate legal personhood, making AI capable of owning the copyright to works generated by the AI. Both solutions have their advantages and disadvantages.

4.3.2 AI and work made for hire

In the United States, when an employee creates a copyright protected work on the job for the employer – work made for hire – the employer is legally considered the author or creator of the work. The employer can be a firm, organisation or an individual. Some US legal scholars have proposed that the term employee can be redefined to include AI to ensure that AI generated works are copyright protected and to ensure that they do not fall into the public domain.

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161 Ibid.

Although EU and Swedish law currently does not, as a general rule, grant automatic authorship of employee created works to the employer,¹⁶³ the EU or the Swedish parliament could introduce a special statute on authorship to AI generated works into URL. Such a statute would likely be similar to the provision that the economic rights to computer programs that an employee creates automatically pass to the employer (URL 40 a § & Computer Programs directive article 2.3).

There are several advantages to applying the US rules for copyright protecting works made for hire to AI generated works. According to Bridy,¹⁶⁴ treating AI generated works as works made for hire allows for the mistake of “treating the programmer as the author-in-fact of works that are actually made by code” to be avoided.¹⁶⁵ Such a solution also avoids the problem of vesting legal rights to AI generated works in a machine, which Bridy believes to be impractical.¹⁶⁶ Hristov,¹⁶⁷ meanwhile, states that the advantage of the work for hire model is that it prevents AI generated works from falling into the public domain.¹⁶⁸ It does this by considering the developer or the owner of the AI to be “considered the author for the purpose of the title.”¹⁶⁹ The clear advantage of the work made for hire model is that it grants copyright protection to works that generated by an AI and that AI generated works do not have to be the intellectual creations of humans.

The disadvantage of the work made for hire model is that it is unclear for whom an AI has generated a work. In other words, who is the AI’s “employer”. Hristov suggests that it should be the programmer or the owner of the AI.¹⁷⁰ Bridy, similarly, suggests that the programmer should be the author of the AI generated work despite not being the “author-in-fact”.¹⁷¹ That is,

¹⁶³ See Levin, Lärobok i immaterialrätt, pp 125-129.
¹⁶⁴ Annemarie Bridy is a professor of law at the University of Idaho and an affiliate scholar at the Stanford University Center for Internet and Society.
¹⁶⁵ Bridy, Coding Creativity: Copyright and the Artificially Intelligent Author, 5 STAN.TECH.L.REV.1,¶ 52(2012), p 400.
¹⁶⁶ Ibid.
¹⁶⁷ Kalin Hristov is a grad student at the University of Science and Technology of China.
¹⁶⁹ Ibid.
¹⁷⁰ Ibid.
¹⁷¹ Bridy, Coding Creativity: Copyright and the Artificially Intelligent Author, 5 STAN.TECH.L.REV.1,¶ 52(2012), p 400.
however, not necessarily a desirable result as it would leave the people who actually use the AI to create works with nothing. Skygge did not program the Flow Machines AI, but he used it to create the song “Magic Man”.172 Similarly, Karin instructed the AI to create the airport software and told it what parameters to consider (see above 3.3.1). Anna and Peter, meanwhile, had no direct involvement in the creation of the airport software (see above 3.3.1). If the work made for hire model is implemented in Swedish law, it might be hard to determine who should be the legal creator or author of an AI generated work. The same issues of control and proximity to the creative process that plagues the British model are relevant to the work mode for hire model as well. Additionally, if the work made for hire were to be implemented into Swedish law there would be a need to ensure that only AI generated works made with the help of a human are protected. A way to achieve this would be to only grant copyright protection to works where a human has contributed a creative element to the AI generated works.173 The term *creative element* would have to be defined much more loosely than the term *intellectual creation* to ensure that a wider range of works created by human-AI collaboration can be copyright protected than currently under Swedish law. Otherwise there is a risk that the work made for hire model will be a solution that doesn’t actually solve any problems at all.

### 4.3.3 AI and legal personhood

Proponents of granting AI legal personhood and rights to intellectual property claim that AI have outgrown their current legal status as tools used in human creation and that the AI are the entities best entitled to be granted copyright to their creations.174 The argument goes that copyright law doesn’t explicitly require the creative effort in the creation of a work to emanate from a human and that companies can own copyrights despite not being human.175 For this reason, there is nothing that should prevent AI from being granted copyright ownership of AI generated works.

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Two of the presumptions underlying the argument for granting AI legal personhood and copyright ownership of AI generated works are not true under Swedish law. To begin, although a legal person can acquire copyright ownership of works generated by an AI, a legal person can never be the creator of a work.\(^\text{176}\) Secondly, under EU and Swedish case law a work needs to be an intellectual creation to be eligible for copyright protection and an AI cannot produce an intellectual creation (see above 3.2.3). With that said, there are a number of problems that face Swedish law in regard to copyright protection of AI generated works (see above 4.1). Some of these problems stem from uncertainty over whether AI generated works are eligible for copyright protection or not and from the problem of AI generated works falling into the public domain. Granting AI legal personhood and copyright ownership of AI generated works could ensure that such works are copyright protected and that there is more clarity over who owns them.

A major problem with granting AI legal personhood is that an AI does not have a will and cannot represent itself in court. AI generated works would therefore, in practice belong to the public domain because the AI would be unable to defend its copyright in case of infringement. Only if a natural or legal person controls or owns the AI would AI generated works be copyright protected. Presumably the owner of the AI would be the creator of the AI or the natural or legal person who purchased the rights to the AI. Copyright ownership of AI generated works will, in practice, therefore go to the owner of the AI.

The issue with granting copyright ownership of AI generated works to the owner of the AI is that the AI’s owner will in many cases not be involved in the creation of the work. Such is in the airport software scenario. Anna’s and Peter’s employer, Software AB, would presumably be the owner of the AI (computer programs directive article 2.3 & URL 40 a §). Software AB would therefore be granted the copyright ownership of the airport software despite the fact that it was Karin at Swedavia who used the AI to create the software. The only way for Karin and Swedavia to gain copyright ownership of the AI generated work would be failing to disclose the use of AI

\(^{176}\) Levin, Lärobok i immaterialrätt, p 116.
in the process of using the AI. That is one of the problems that a potential copyright reform is supposed to fix, not exacerbate (see above 4.1).

It is unclear if granting copyright ownership of AI generated works to the owner of the AI is in line with the purpose of URL. On the one hand, granting the owner of the AI copyright ownership of AI generated works goes against the purpose of copyright law that human creators should be rewarded for their creative endeavors. On the other hand, it is in line with the view that the purpose of copyright law is to stimulate investments in innovation and creation. Granting copyright ownership of AI generated works goes to the owner of the AI could stimulate more companies and people to create AI and to invest in AI technology. Few people would, however, most likely want to use AI to generate new works if they are not granted ownership rights to the AI’s creations. If more people invest in AI technology, the future where AI is responsible for the majority of creation that some legal scholars predict is more likely to come sooner rather than later.\textsuperscript{177} The risk with such a future is that the ownership of all or most AI generated works could be concentrated in the hands of a few people or companies that own powerful creative AI. For these reasons, granting AI legal personhood might not be a desirable way to solve the existing problems with copyright protecting AI generated works.

4.4 Term of copyright protection for AI generated works

The term of copyright protection to a work in Sweden is the life of the author plus seventy years (URL 43 §). The reason the term of copyright protection is so long is to ensure that creators can enjoy the fruits of their creation for the duration of their lives and to ensure that children can also benefit from the fruits of their parents’ creation.\textsuperscript{178} When an AI generates a work there is no such interest. An AI doesn’t need to eat or pay rent. Neither does an AI have children to feed. The people behind the AI have an interest in being able to exploit AI generated works for personal gain, however. When an AI generated work is also the intellectual creation of a human, the


\textsuperscript{178} Bernitz, \textit{Immaterialrätt och otillbörlig konkurrens}, p 75.
human should be granted full copyright ownership of the work. If an AI generated work is not the intellectual creation of a human, yet still eligible for copyright protection under one of the other potential models for copyright protection of such works, it would seem wrong to grant the person behind the AI the full term of copyright protection for work that the person didn’t actually do. For works that result from human-AI collaboration, a shorter term for copyright protection might therefore be desirable. There are a few different periods of time that could be considered. The alternative terms that will be considered for AI generated works are: fifty years, twenty years and two years.

The minimum term for copyright protection of works under the Berne Convention is the lifetime of the author plus fifty years (Berne Convention article 7(1)). Where a work has an anonymous or pseudonymous author, the term of protection is fifty years after the work has been lawfully made available to the public (Berne Convention article 7(3)). Similarly, the CDPA mandates that for computer generated works the term for protection is fifty years from the year the work was created (CDPA § 12(7)). Fifty years seems like a more reasonable term for the protection of AI generated works than the life of the author plus seventy years. Considering the tempo with which AI can generate new works and considering that the human involvement in the act of creation is limited, fifty years might still seem like a rather long period of time to protect AI generated works.

Another alternative for the term of copyright protection for AI generated works is twenty years, which corresponds to the term of protection for patentable inventions under the Swedish Patent Act (PL 40 §).\textsuperscript{179} Inventions are patentable for twenty years to ensure that the inventor or company holding the patent have enough time bring an invention to the market and to make some money from the invention.\textsuperscript{180} After twenty years, the patent expires and the invention falls into the public domain. The reason for this is that one company or person should not be able to hold back innovation by holding a monopoly to an invention for too long. The term for copyright

\begin{footnotesize}
\begin{enumerate}
\item In patent law the term is 20 years from the date of application. Because there is no application process for copyright protection in Sweden the term would have to be 20 years from the date of creation or publication.
\item Levin, \textit{Lärobok i immaterialrätt}, pp 333-334.
\end{enumerate}
\end{footnotesize}
protection for AI generated work could be set to twenty years for similar reasons. The person behind the AI would then be granted enough time to bring a work to the market and to make some money from the work, while not holding back innovation for too long.

The third option for the term of copyright protection for AI generated works is two years. A two year term for copyright protection of AI generated works would correspond to Moore’s Law.\textsuperscript{181} Because AI is getting more and more powerful and will be able to increase the speed of innovation, it might be prudent to have a shorter term for copyright protection to AI generated works. On the one hand, two years might be a good term because after two year more powerful AI systems will be able to generate even more works. On the other hand, two years might not be enough time to bring a product to market, which would mean that investors in AI creation would be left with no protection once a work was made available to the public.

When an AI generates a work the term of copyright protection to the work should perhaps not be the lifetime of the human behind the AI plus seventy years, especially not if the human’s contribution to the work was limited. Rewarding somebody with such an extensive term of protection for work that an AI did would seem excessive. Determining an alternative term for copyright protection of AI generated works is difficult, however. A balance needs to be struck between the interests of the creator or the human behind an AI generated work, the economic interests of the creator or the rightsholder, and the interests of the general public. An alternative term needs to rewards creators for using AI to innovate and incentivise innovation, while simultaneously ensuring that innovation is not stifled through giving people excessively long legal monopolies to AI generated works.

\textsuperscript{181} For Moore’s Law, see https://en.wikipedia.org/wiki/Moore%27s_law, retrieved 14/10/2018. Moore’s Law is the observation that the number of transistors in a dense integrated circuit doubles about every two years, meaning that computing power doubles every two years for processors of similar size.
4.5 Evaluating the reform proposals

Under the current legal framework for copyright protection, a work is eligible for copyright protection when it is the intellectual creation of a person. In other words, there is direct causal connection between the creator’s free and creative choices and the creation of the work (see above 3.1 & 3.3). This leads to problems when an AI generates a work, because there is no causal connection – or a weak connection – between the actions of the people behind the AI and the AI generated work (see above 3.3). When there is only a weak correlation or connection between the actions of the people behind the AI and an AI generated work, a work is currently not eligible for copyright protection and it therefore belongs to the public domain (see above 3.4). The issue with the current legal framework is that using AI to generate works can require large investments in terms of time, creative energy and money. If these investments are left unprotected people might stop investing in AI and could begin falsely claiming to be the creators of AI generated works. This would go against the purpose of copyright law to incentivise people to create and innovate (see above 3.4.1 & 4.1).

To solve these issues, three solutions were proposed: the British model, the work made for hire model and granting AI legal personhood. What differentiates these solutions from the current legal framework is that they move from a causation based system of awarding copyrights to a correlation based system – though the British model was shown to still require a causal connection between the actions of a person and the creation of an AI generated work. The question is, however, are the issues with the current legal framework pressing enough to warrant such reforms?

It is questionable whether granting copyright protection and ownership in AI generated works would further incentivise investment and innovation in AI technology. After all, there are already other incentives in place. The AI itself could potentially be patented or copyright protected, meaning that the main investment – the investment into developing the AI – could likely already
be protected.\textsuperscript{182} Using AI to generate work will also increase the speed and volume of innovation and creation, which is another likely incentive for using AI in the creative process.

There are also risks associated with moving from a causation based system of copyright protection to a correlation based system for protecting AI generated works. One such risk is that in a future where AI is responsible for the majority of innovation,\textsuperscript{183} ownership to all or most AI generated works could be concentrated in the hands of a few people or companies that own powerful creative AI. This could potentially lead to problems with inequality, an inability for human creators to be rewarded for innovation and a monopolised economy.

It further has to be noted that AI generated works could potentially be eligible for copyright protection under the current legal framework if they are created through human-AI collaboration. For this to be the case, a person has to make enough free and creative choices in the process of creating the work that the work could be considered to be the person’s intellectual creation. An example of such human-AI collaboration is the final version of the song “Magic Man” (see above 3.2.2).\textsuperscript{184} It is unclear how much a human has to contribute to the work to be eligible for copyright protection, however. The fact that lacking copyright protection for AI generated works can easily be healed by involving humans in the process of creation (see above 3.4) is a strong argument against sweeping copyright reforms.

There is still a risk that people will falsely claim to be the creator’s of AI generated works to gain unearned copyright ownership in such works. Though this is certainly troubling, it is questionable whether the problem warrants wholesale copyright reform. It might, however, justify minor reforms such as implementing the work for hire model as a related right in the fifth chapter of URL (see above 4.2.2) with a short term of protection for AI generated works (see above 4.4). With that said, the author of this thesis does not currently recommend any copyright

\textsuperscript{182} See i.e. https://e-courses.epo.org/pluginfile.php/23523/mod_resource/content/2/Summary%20Artificial%20Intelligence%20Conference.pdf, retrieved 01/11/2018.


\textsuperscript{184} See also NJA 2015 p 1097.
reform because the current legal framework is not as ill equipped to handle AI generated works as the author expected when beginning work on this thesis. Enacting copyright reform would only solve a minor problem, while bringing with it potential risks.
5 Summary and concluding remarks

5.1 Summary

[The person/the one] who has created a literary or artistic work owns the rights to the work (URL 1 §). For a work to be eligible for copyright protection there has to be: i. a person or creator; ii. an act of creation; and iii. a work or product of creation. The criteria in URL 1 § are cumulative and interdependent. The work is the object of copyright protection. For a work to be eligible for copyright protection it has to be the intellectual creation of its creator (see above 3.1). Under EU law a work is a person’s intellectual creation if it reflects the creator’s personality and if it is the expression of the creator’s free and creative choices in the production of the work.¹⁸⁵

Entirely AI generated works are not eligible for copyright protection under EU and Swedish law (see above 3.2.3). Even though AI are arguably capable of making free and creative choices within a process of creation, AI are only tools that lack personality that can manifest itself in a work (see above 3.2.3).¹⁸⁶ For this reason, works generated independently by an AI cannot currently be protected under EU and Swedish copyright law.

For an AI generated work to be eligible for copyright protection it needs to be the intellectual creation of a human. To be the intellectual creation of a human, there needs to be a causal connection between the AI generated work, and the free and creative choices made by the person behind the AI (see above 3.5). It is, however, not enough that a person makes a choice between different AI generated products. The free and creative choices of the person behind the AI need to go beyond what the AI has created for an AI generated work to be eligible for copyright protection (see above 3.2.2).¹⁸⁷ When there is no causal connection, only a correlation, between the work of a person and the AI generated work or when the contributions of the person don’t go beyond what is given by the AI, an AI generated work cannot be copyright protected (see above

¹⁸⁵ Case c-5/08 (Infopaq) paragraph 45 & case c-145/10 (Painer) paragraphs 88-99.
¹⁸⁶ See also SOU 1985:51 p 83.
¹⁸⁷ Compare also to NJA 2015 p 1097.
3.3). When an AI generated work is eligible for copyright protection, it is as a general rule owned by the person who created the work (see above 3.4). Computer programs are notably exempt from this rule, and are owned by the company employing the creator (URL 40 a).

There are several challenges associated with AI generated works and the fact that such works are not eligible for copyright protection. One such challenge is that people might start lying about their roles in the creation process to claim AI generated works as their own intellectual creations (see above 4.1). Another challenge is that if AI generated works cannot be copyright protected, there could potentially be little incentive to invest in creating AI capable of generating new things (see above 4.1). On the flip side, if AI generated works are not eligible for copyright protection they would potentially be available for the public to use and exploit – leading to more innovation and creation (see above 4.1). To examine how these challenges might best be solved, several potential proposals for copyright reforms were examined.

Three alternative proposals for copyright reform were examined in this thesis. The first of these was the British model. Under the British model the creator of a computer (or AI) generated work is the person who undertakes the arrangements necessary for the creation of the work (CDPA § 9(3)). The British model, however, faces many of the same challenges as the current Swedish legal framework for copyright protection, and implementing it in Sweden wouldn’t change much for the copyright protection of AI generated works (see above 4.2). The other proposals examined in this thesis were a work made for hire model and a model of granting AI legal personhood. These models mark a potential shift from a causation based system for earning copyrights – through actions such as making free and creative choices – to a system of copyrights earned through correlation to the AI generated work (see above 4.3). Both of these proposals have their advantages and disadvantages. After examining the different proposals and looking at the problems that need to be fixed, it was determined that there is currently perhaps no need to enact copyright reform (see above 4.5). If copyright reform were to be enacted, copyright ownership to AI generated works should be shorter than the current term of the creator’s lifetime plus seventy year (see above 4.4).
5.2 Concluding remarks

Not much is being written about the challenges facing IP law as AI technology continues to improve. A few students have written their master’s theses about AI related topics and the Swedish copyright society recently held a lecture about AI, big data and AI generated works in October of 2018. The purpose of this thesis is to contribute to the early discussion about the implications AI will have on EU and Swedish law. While writing this thesis, more questions were raised, however, than were answered. Hopefully somebody else picks up the baton where this thesis leaves it. The author of this thesis will certainly continue working with exploring the questions and challenges that face EU and Swedish law as technology such as AI continues to improve and develop.
Bibliography

Official documents

*European Union*

European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103 (INL)).

*Sweden*

SOU 1956:25 *Upphovsmannarätt till litterära och konstnärliga verk lagförslag*  
SOU 1985:51 *Upphovsrätt. 3*

*United States of America*


*Other*


Case law

*European Union*

Case c-26/62 (van Gend en Loos)  
Case c-6/64 (Costa v ENEL)  
Case c-2/73 (Reyners)  
Case c-43/75 (Defrenne)  
Case c-286/06 (Impact)  
Joined cases c- 397-403/01 (Pfeifer)  
Joined cases c-152-154/07 (Arcor)  
Case c-5/08 (Infopaq)  
Joined cases c-403/08 and c-429/08 (Premier League)  
Case c- 393/09 (Bezpečnostní)  
Case c-145/10 (Painer)  
Case c-406/10 (SAS Institute)
Sweden
NJA 1990 p 499
NJA 1994 p 74
NJA 1998 p 563
NJA 2002 p 178
NJA 2012 p 483
NJA 2015 p 1097

United Kingdom

United States of America

Literature

Books


Articles


Bengtsson, H, *EU-harmonisering av det upphovsrättsliga originalitetskriteriet*, Infotorg (2012). Available at: [Infotorg].


UWA Faculty of Law Research Paper No. 28. Available at SSRN:

https://ssrn.com/abstract=2987757 or http://dx.doi.org/10.2139/ssrn.2987757


Other sources

*Internet Sources*


TechRepublic, *IBM Watson: The inside story of how the Jeopardy-winning supercomputer was born, and what it wants to do next,*

The Verge, *Self-driving cars are headed toward an AI roadblock*,


Wired, *AI is transforming google search. The rest of the web is next*,

Wired, *In two moves, AlphaGo and Lee Sedol redefined the future*,

Youtube, *SKYGGE - Magic Man (Lyrics video) / composed with AI*,

*Other*