EU copyright protection of works created by artificial intelligence systems

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1 Introduction

1.1 The topic

Throughout the last century, advances in technology have placed tension on the scope and application of European intellectual property law, causing it to adjust to meet emerging demands for protection. One such need for adjustment was caused by the development and commercialization of computer programs, which led to new regulation constituting software as subject matter eligible for copyright protection.[1] Currently, copyright is faced with an arguably even greater challenge: The rapid advances in artificial intelligence are calling into question some of the fundamental assumptions upon which intellectual property law rests.[2]

Currently, the European framework of copyright law does not take non-human innovation into account. Meanwhile, advances in artificial intelligence are quickly making machine-generation of creative works a reality.[3] Recent developments enable autonomous programs to create works of great value, ranging from software to literary works, music and images. The creative process involves limited or non-existent human contribution to the work. Thus, the process of artificial intelligence creation is fundamentally different from the creative processes traditional copyright regulation has previously been applied to. Consequently, copyright legislation is presented with a novel challenge; namely the regulation of works created by artificial intelligence programs.

Institutions of the European Union have recently explicitly addressed the need to clarify legal implications of advancements in artificial intelligence. In May of 2016 the European Parliament's Committee on Legal Affairs published a draft report with recommendations to the Commission on Civil Law Rules on Robotics, arguing that:

> "Robotics and AI [artificial intelligence] have become one of the most prominent technological trends of our century. The fast increase of their use and development brings new and difficult challenges to our society. […] It is crucial that regulation provides predictable and sufficiently clear conditions to incentivise European innovation in the area of robotics and AI."[4]

Copyright protection of works created by artificial intelligence programs constitutes one of these new and difficult challenges that require discussion. Therefore, the first research question of this thesis is whether works co-created or independently created by artificial intelligence systems are eligible for copyright protection under *current* EU copyright law.

The discussion of this first research question will show that today's copyright regulation was not written with artificial intelligence in mind. As a consequence, application of the traditional

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[1] See the Software Directive 2009/24/EC.
[2] Butler, T. L. (1981), p. 747.
[3] Lewin, A. (2012), p. 4.
[4] European Parliament, Committee on Legal Affairs (2016), p. 20.

copyright regulation to works created by artificial intelligence arguably provides for unclear and likely unintended solutions in some cases. This warrants a discussion of the aptness of these current solutions, and furthermore of whether copyright legislation should be adjusted to better regulate works generated by artificial intelligence.

These questions are currently being raised on European Parliament and Commission level. In a resolution of February 16, 2017, the Members of the European Parliament calls upon the Commission to address whether and how the current intellectual property legislation should be altered to accommodate the advancements in artificial intelligence.[5] In light of this on-going legislative process, the second research question of this thesis is concerned with the copyright challenges that face the EU's legislative branch in the wake of artificial intelligence advancements. Namely, the second research question of this thesis is to whom, if anyone, *should* the rights to works entirely generated by artificial intelligence systems be allocated?

1.2 Structure

The rest of this first chapter aims to give a reader unfamiliar with artificial intelligence an introduction to the field as a background for the analysis that follows in the subsequent chapters.

Chapter two will present an overview of EU copyright regulation. First, the chapter includes a brief overview of the copyright framework of the EU, including a closer look at some of the directives that are addressed in the discussion of the research questions. Second, the underlying rationale for granting copyright protection will be addressed, as these arguments are essential in the analysis of both research questions. Additionally, a brief description of the main requirements for copyright protection under EU regulation will be given, as particularly one of these requirements is significant to the analysis in chapter three.

Chapter three aims to give an answer to the first research question. Namely, whether AI-generated works are eligible for copyright protection under current EU law. In this assessment, the interpretation of the originality requirement for copyright protection will be at the centre of discussion. The analysis will differentiate between four separate types of artificial intelligence-generation of works, each of which involve various degrees of human contribution to the final output.

The fourth chapter aims to answer the second research question: To whom, if anyone, *should* the rights to works created by artificial intelligence without any human contribution to the final work be allocated. As today's copyright regulation was not written with the issue of artificial intelligence in mind, it is unclear whether the current allocation of rights is the one EU legislators deem suitable. The discussion will be strictly limited to arguments concerning what is most coherent with existing European copyright rationale, principles and regulation.

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[5] European Parliament (2017), p. 9. Note that the resolution calls of the Commission to consider many areas of civil law. Intellectual property is one of the areas of law addressed.

Finally, the fifth chapter offers a conclusion to the two research questions of the thesis.

This thesis will devote a significant amount of attention to the study and analysis of relevant EU directives and CJEU jurisprudence. In addition to relevant literature, the main objectives underlying EU copyright law will also be essential to the analysis of the issues this thesis aims to address.

The issue will furthermore be assessed in light of the mentioned on-going discussions at European Parliament and Commission level. The European Parliament adopted a motion for resolution in February of 2017, calling upon the Commission to present one or more civil law proposals related to robotics and artificial intelligence.[6] The resolution recognizes intellectual property as one of the areas of law that needs to be considered in this regard. The analysis of the research questions in this thesis includes reference to the Parliament's relevant statements in the resolution. Additionally, the analysis will address the two documents on which the resolution was based; the draft report by the European Parliament's Committee on Legal Affairs and the study published by the Parliament's Policy Department C for Citizens' Rights and Constitutional Affairs.[7] The Commission has at the time of the submission of this thesis not yet addressed the Parliament's resolution.

1.3 Artificial intelligence and autonomous systems

This section aims to give a reader unfamiliar with artificial intelligence an introduction to the field. The objective is to provide the reader with a background for the analysis of the legal aspects of this technology that follows in the subsequent chapters.

Artificial intelligence ("AI") is a field of science and a set of computational technologies inspired by the ways human beings use their nervous systems and bodies to sense, learn, reason, and take action.[8] The ultimate goal of AI research is to simulate the human intelligence to the extent that programs can act and reason accurately and autonomously. A system is called autonomous when it has the ability to independently perform an assigned task without human guidance. The concept of artificial intelligence is a long-discussed topic, and to date, a universal agreement of the concept has not been reached. Yet Nils J. Nilsson has provided a definition accepted by the majority of the academic community:

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[6] European Parliament (2017).

[7] See European Parliament, Committee on Legal Affairs (2016) and European Parliament, Policy Department C for Citizens' Rights and Constitutional Affairs (2016). The first of which was also mentioned in the introduction to this thesis.

[8] Stone, P., et al. (2016), p. 4.

> "Artificial intelligence is that activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment."[9]

The field of AI was officially born in the 1950's, when researchers first began to investigate ways in which machines could simulate aspects of human intelligence. The most influential ideas came from Alan Turing, who proposed a formal model of computing. Turing's classic essay, Computing Machinery and Intelligence,[10] imagines the possibility of computers created for simulating intelligence and explores many of the fundamentals of AI, including how intelligence might be tested, and how machines might be programmed to learn automatically.[11] Heavy investment in the research and development of AI technologies followed in the next decades. However, by the 1980's, despite promise in some aspects of AI, the field still had not achieved the significant practical successes that had been promised. This caused interest in AI to drop and funding to dry up. Nilsson calls this period the "AI winter".[12]

This last decade however, AI researchers have finally achieved the success that was predicted in the 50's. Cheaper and more reliable hardware for sensing and actuation made robots easier to build, and the Internet provided the large datasets needed to train the programs. Moreover, the availability of computing power and storage enables statistical techniques to derive solutions and applications from the gathered data.[13]

While early AI was merely able to create programmes tailored to the narrow function required - so-called "weak AI" - the newly emerged - so-called "strong AI" - fosters innovative thinking and logical reasoning abilities within the machine itself. In weak AI, the machine is programmed to act human, entailing that a programmer has direct control over the machine's output. In contrast, strong AI aims to get a machine to "think" for itself. Randomness and a sense of autonomy are built into strong AI systems, causing the human connection to the output to be much more attenuated. These developments have caused AI to emerge as a profound influence on society's development. The European Parliament expresses the expected impact of AI in the resolution of February 16th 2017 to the Commission:

> "[H]umankind stands on the threshold of an era when ever more sophisticated robots, bots, androids and other manifestations of artificial intelligence ("AI") seem to be poised to unleash a new industrial revolution, which is likely to leave no stratum of society untouched."[14]

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[9] Nilsson, N. J. (2010), p. 13.
[10] Turing, A. (1950).
[11] Stone, P., et al. (2016), p. 50.
[12] Stone, P., et al. (2016), p. 51.
[13] Stone, P., et al. (2016), p. 51.
[14] European Parliament (2017), p. 1.

Once a mostly academic and non-practical field of science, twenty-first century AI enables a constellation of commercial technologies that have a substantial impact on everyday lives. Major research universities devote departments to AI studies, and technology companies such as Apple, Facebook, Alphabet, IBM, and Microsoft spend heavily to explore AI applications.[15]

The progress can be demonstrated with a few examples of the latest achievements made by autonomous systems. IBM's Watson program beat human contenders to win the Jeopardy challenge in 2011.[16] Watson has recently also been successfully applied as an instrument for medical diagnosis. Furthermore, the AlphaGo program[17] recently defeated the current human champions at the game of Go, which is known to be one of the most complex and intellectually demanding games there is.

Even more interesting from this thesis' point of view is the progress made by AI systems in the creative field. A recently published cookbook co-authored by IBM's Watson is mechanically created by definition. Watson teamed up with the Institute of Culinary Education to produce a cookbook, titled "Cognitive Cooking with Chef Watson".[18] Another example of AI-generated literature can be found in Japan, where a short novel co-written by an AI program entered a literary contest and made it past the first stage of elimination.[19] Although the novel did not go on to win the prize, it demonstrates how far AI technology has come in the creation of literary content.

Further evidence of the creative abilities of AI programs is demonstrated by the recent dreamscapes produced by Google's neural network "DeepDream". Through the use of a technique Google calls "Inceptionism", the AI is able to dream up an image when fed a picture of random noise.[20] The resulting images turned out to be visually fascinating, and suggested AI could be used for artistic purposes. Furthermore, the painter e-David is a robot able to realize a canvas autonomously without reproducing something existing, choosing his own colors.[21]

Recent projects have set out to explore completely autonomous creation of content through AI systems. In 2016, the Google Brain team launched the Magenta project, which directly addresses the question, "Can machines be creative?" The research project aims to advance the state-of-the art in music, video, image and text generation.[22] The results of this and other similar projects are yet to be determined. Nevertheless, Google's DeepDream, the Japanese novel, and Watson's cookbook prove that AI programs are already capable of creating content in the creative category, which warrants the question of whether such works are, or should be, eligible for copyright protection under EU law.

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[15] European Parliament (2017), p. 6.
[16] Ferrucci, D. A. (2012).
[17] Silver, D. (2016). See also Borowiec, S. and T. Lien (2016).
[18] Brandt, R. (2016).
[19] Schaub, M. (2016).
[20] Mordvintsev, A., C. Olah and M. Tyka (2015).
[21] Sayej, N. (2016).
[22] Google Brain Team (2017).

2 Overview of EU copyright regulation

This section will first include a brief overview of the copyright framework of the EU, including a closer look at some of the directives that will be addressed in the discussion of the research questions. Second, the underlying rationale for granting copyright protection will be addressed, as these arguments are essential to the analysis of both research questions. Additionally, this chapter briefly describes the main requirements for copyright protection under current EU regulation, as a background to the further analysis of particularly the originality requirement in chapter three.

2.1 Legal framework

The analysis included in this thesis is primarily concerned with EU copyright regulation. Therefore, this section will give a brief introduction to the copyright framework of the EU, as well as a closer look at some of the directives that are important in the legal discussion that follows in chapters two through four.

The EU's regulatory framework for copyright and neighbouring rights (acquis) consists of a set of ten directives addressed to the member states, which harmonise essential rights of authors, performers, producers and broadcasters. Many of the EU directives reflect Member States' obligations under the Berne Convention and the Rome Convention, as well as the obligations of the EU and its Member States under the World Trade Organisation "TRIPS" Agreement (1994) and the two World Intellectual Property Organisation (WIPO) Internet Treaties (1996).[23] The overall goal in the EU harmonisation efforts is to enable copyright protected goods and services to move freely within the internal market.[24]

One of the directives that will be subject to analysis is the Information Society Directive 2001/29/EC (InfoSoc). The directive was motivated by the need to provide a common European basis for the implementation of the obligations set out in the WIPO Internet Treaties, WCT and WPPT (1996). It contains a rather comprehensive regulation of the rights granted to authors and owners of related rights as well as a conclusive, although nonbinding, catalogue of limitations.[25]

A second directive that will be addressed is the Software Directive 2009/24/EC. It constitutes the protection of computer programs, entailing that the programmer of the underlying software of an AI program receives protection for the programme in itself. Other directives included in the discussion are the Database Directive 96/9/EC and the Term Directive 2006/116/EC.

[23] Namely, the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty.
[24] European Commission, "The EU copyright legislation" (2015).
[25] European Commission, "Copyright" (2016a).

2.2 Copyright law rationale

Copyright as a legal instrument serves two main functions; it must provide sufficient protection to authors and right holders, while at the same time accommodating the information society and the public's need for access to content.[26] As stated in the preamble to the WIPO Copyright Treaty (1996), European copyright regulation seeks to accommodate "the need to maintain a balance between the rights of authors and the larger public interest, particularly education, research and access to information". These considerations are also addressed in preamble 14 to the Infosoc Directive 2001/29/EC.

It is generally accepted that intellectual property rights are considered to promote and encourage cultural and technological development.[27] Essentially, the right to exclusively make use of their work provides the authors with a financial benefit to compensate him or her for the investment put into the creation of it.[28] Without copyright protection, others could free ride on the efforts of creators and thereby restrain the development of creative works. Accordingly, the lack of well-defined and properly enforced copyrights would discourage future investments in new literary, artistic and creative works.[29] These considerations are accurately stated in preamble 10 to the Infosoc Directive 2001/29/EC:

> "The investment required to produce [creative] products … is considerable. Adequate legal protection of intellectual property rights is necessary in order to guarantee the availability of such a reward and provide the opportunity for satisfactory returns on this investment."

In addition to this financial aspect it is also considered just from a moral perspective to give the rights to a creation to the author who has intellectually created it. In this way, copyright protection aims to reward creativity as well as to stimulate and encourage investment in the creative sector.[30]

Moreover, copyright is considered to have benefits from a larger societal and economic perspective. This concept is well explained in preamble 6 to the Infosoc Directive 2001/29/EC:

> "A harmonised legal framework on copyright and related rights, through increased legal certainty and while providing for a high level of protection of intellectual property, will foster substantial investment in creativity and innovation, including network infrastructure, and lead in turn to growth and increased competitiveness of European industry, both in the area of content provision and information technology and more

[26] Stamatoudi, I. and P. Torremans (2014), p. 1.
[27] As particularly emphazised in preamble 11 of the Infosoc Directive 2001/29/EC and in the preamble of the WIPO Copyright Treaty.
[28] Kur, A. and T. Dreier (2013), p. 241-242.
[29] OECD (2015), p. 217.
[30] European Commission (2016b).

generally across a wide range of industrial and cultural sectors. This will safeguard employment and encourage new job creation."

In sum, traditional copyright policy aims to maintain an economic incentive for development and expression of valuable ideas, promote scientific and literary development and prevent monopolization of the market.[31] Combined, these financial, moral and societal arguments constitute the background for today's European copyright framework.

2.3 Requirements for copyright protection

The conditions for protection under EU copyright regulation vary depending on the work of art in question, as separate directives apply to the various types of subject matter. However, recent harmonization of EU copyright law has caused certain fundamental criteria to be applicable regardless of the work's character. Due to the limited scope of this thesis, the following discussion will be based upon these common criteria.

In order to qualify for copyright protection, a work of art has to fulfil some fundamental requirements. First, the work has to be classified as a protected subject matter. There is some discussion as to whether this criterion is still in line with EU law, as the CJEU cases Murphy and Painer[32] may imply that whether a work qualifies for copyright protection requires solely that the work is original, and not that it also falls within a specific copyright-protected subject-matter.[33] However, the Berne Convention for the Protection of Literary and Artistic Works (1986) seems to imply that it is a separate requirement that the work is a production in the literary, scientific or artistic domain. However, as AI programs are capable of creating and contributing to the creation of works in the literary, scientific or artistic domain, the (possible) subject matter condition does not prevent works by AI from copyright protection. Therefore, this criterion will not be discussed further in this thesis.

Second, it is generally accepted that the Berne Convention entails that only "original" works qualify for protection.[34] EU harmonization of the originality requirement through legislature has been limited, and no EU-Directive or guideline exists that uniformly defines the originality requirement for all types of subject matter. However, through CJEU practice the understanding of the originality requirement has to a great extent been harmonized, and an EU-wide notion of originality has been adopted.[35] The directives concerning computer programs, databases and photographs[36] state that a work is considered original if it is "the authors own intellectual

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[31] Butler, T. L. (1981), p. 735.

[32] Joined Cases C-403/08 and C-429/08, Football Association Premier League v. QC Leisure and Karen Murphy v. Media Protection Services, [2011] ECR I-10909, ECJ Case 145/10, Painer v. Standard VerlagsGmBH and others, [2011] ECR I-0000. Hereafter referred to as Murphy and Painer.

[33] Rosati, E. (2013), p. 5.

[34] WIPO Intellectual Property Handbook: Policy, Law and Use (2004). Paragraph 5.171 et seq.

[35] Infopaq International v. Danske Dagblades Forening (Infopaq I), C-5/08 of 16 July 2009, [2009] ECR I-6569, Joined Cases C-403/08 and C-429/08, Murphy and Painer. These cases will be subject to analysis in section 2.4.

[36] Arts. 1 (3) of Directive 2009/22, 3 (1) of Directive 96/9 and Article 6 of Directive 2006/116.

creation". The CJEU states in the Infopaq case that this interpretation of the originality criterion applies to all types of subject matter.[37] Thus, the court constituted a uniform interpretation of originality.[38] The CJEU has further reiterated and elaborated on its understanding of the originality requirement in several subsequent cases,[39] which along with the Infopaq case will be subject to in-depth analysis in section 3.2 below.[40]

The CJEU holding in the Infopaq case implies that regardless of what kind of work an AI program creates, the work is only eligible for copyright protection if such works are original in the sense that it is the "author's own intellectual creation". The next chapter of the thesis is therefore concerned with interpreting this requirement more closely, aiming to determine whether and to what extent AI-generated works fulfil the originality requirement, thus qualifying them for copyright protection.

[37] Kur, A. and T. Dreier (2013), p. 291.

[38] Please note that the specifics of CJEU practice regarding the originality requirement is the subject of chapter 2.4.

[39] ECJ Cases C-393/09, Bezpečnostn. softwarov. asociace v. Ministerstvo kultury, [2010] ECR I-13971, paragraph 45 and Murphy, paragraph 97.

[40] Rosati, E. (2013), p. xii.

3 Are works created by artificial intelligence systems eligible for copyright protection under current EU copyright legislation?

3.1 Background

The primary objective of this chapter of the thesis is to provide an answer to the first research question, namely: Are works created by AI systems eligible for copyright protection under *current* EU copyright legislation?

The European Parliament has addressed the relevance and context of this issue several times. First, the resolution adopted by Parliament February 16, 2017, with recommendations to the Commission on Civil Law Rules on Robotics states:

> "[T]here are no [intellectual property] legal provisions that specifically apply to robotics, but … existing legal regimes and doctrines can be readily applied to robotics, although some aspects appear to call for specific consideration."[41]

In other words, the current copyright legislation is according to the Parliament partially applicable to AI-works. However, Parliament does not establish the outcome of such application. As the analysis of the research question in this chapter will demonstrate, the application of existing legal regimes and doctrines result in different outcomes depending on the type of AI-generation in question.

The final sentence of the sited statement – "some aspects appear to call for specific consideration" - implies that the Commission is encouraged to consider whether some aspects of AI call for an adjustment in regulation. This de lege ferenda question is the subject of the second research question, which is analysed in chapter four below. This third chapter is solely dedicated to determining the outcome of the application of current legislation to various types of AI-works.

Second, in the previously addressed draft report, on which the Parliament's resolution is based, the Parliament's Committee on Legal Affairs stresses that the criteria for "own intellectual creation" is determining for the outcome of the application of current copyright law, and moreover encourage the Commission to elaborate on the criteria's interpretation with regards to AI. [42] However, the report does not attempt to give a suggestion as to the correct interpretation of the criteria.

Third, a study requested by the European Parliament's Committee on Legal Affairs[43] and commissioned, supervised and published by the Policy Department C for Citizens' Rights and

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[41] European Parliament (2017), p. 9.

[42] European Parliament, Committee on Legal Affairs (2016), p. 21.

[43] European Parliament, Policy Department C for Citizens' Rights and Constitutional Affairs (2016).

Constitutional Affairs also addresses the issue.[44] The objective of the study was to evaluate and analyse, from a legal and ethical perspective, a number of future European civil law rules in robotics, including the one relating to intellectual property rights. The study, which was completed in October of 2016, stresses the question posed in the draft report:

> "Here the question that European policymakers might want to consider relates to the status of a robot's own creations. ... Can an autonomous robot be deemed the author of an intellectual work, entitling it to copyright protection?"[45]

As was the case with regards to the adopted resolution and the report, the study does not attempt to give an answer to the posed question; it merely stresses the importance of providing answers to it.

Thus, although these three recently published documents all recognize the relevance and importance of the issue of copyright to AI-generated works, no conclusion can be drawn from them as to whether current regulation implies eligibility or not. The main objective of this section of the thesis is to provide possible answers to this question.

This chapter will first provide a discussion of the originality requirement in general terms, as the requirement is significant to the discussion of whether copyright protection applies to AI-generated works. Thereafter, an analysis of whether current regulation allows for copyright protection to AI-generated works will follow. Specifically, this second discussion will differentiate between four separate types of AI-generation of works, each of which involve various degrees of human contribution to the final output.

3.2 The originality requirement

3.2.1 EU copyright directives

The originality requirement is only referred to by EU legislature in three directives: Articles 1 (3) of the Software Directive 91/250/EC, 3 (1) of the Database Directive 96/9/EC and Article 6 of the Term Directive 2006/116/EC. All three directives constitute that in order to deserve copyright protection, the work has to be original in the sense that it is the "author's own intellectual creation". The similarities in wording in the three directives imply that EU legislators meant for originality to have a common interpretation for these categories of works.

However, it can be argued that despite the similar wording, the "author's own intellectual creation" has a slightly stricter interpretation in the Term Directive 2006/116/EC, as it is stated in recital 17 in the preamble that an intellectual creation is an author's own if it reflects the

[44] Please note however, that although the report was requested by Parliament, the opinions expressed in the document are those of the authors and do not necessarily reflect the European Parliament's official position.
[45] European Parliament, Policy Department C for Citizens' Rights and Constitutional Affairs (2016), p. 6.

"author's personality". This clarification cannot be found in the preambles to the Software Directive 91/250/EC or the Database Directive 96/9/EC. Moreover, the different rationales underlying the three directives supports the argument that the originality requirement for photographs does imply a stricter test than that of the Software Directive 91/250/EC and Database Directive 96/9/EC.[46]

3.2.2 Precedent in the CJEU

3.2.2.1 The value of precedent in the CJEU system

Under EU law, there is no formal system of precedent. The lack of precedent was caused by the fear that a system of binding precedent did not align with the court's purpose, which is to be of first and last resort and whose decisions could be overcome only by amending the treaties by the agreement and ratification by all the Member States.[47]

Despite this formal rule of non-precedent, the CJEU has maintained consistency in its judgements and seldom differs from prior jurisprudence.[48] The Da Costa decision[49] is said to have initiated what is in effect a system of precedent under EU law.[50] The decision clarified that the relationship between national courts and the CJEU is multilateral, meaning that CJEU rulings have impact on all national courts of the member states, regardless of which court has referred the case. The CILFIT decision[51] further reinforced the precedent by clarifying that the CJEU rulings were to be authoritative in situations where the point of law was the same, even though the questions posed to the CJEU in earlier cases were different.[52] There are also numerous instances where CJEU has employed the terminology of precedent and reviewed earlier decisions to confirm or distinguish from past cases.[53] In conclusion, CJEU and national courts of the member states in effect relies on CJEU precedent to decide new cases. Therefore, the following section is concerned with analysis of CJEU cases on the topic of the originality.

3.2.2.2 Analysis of decisions by the CJEU[54]

The Infopaq case

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[46] van Eechoud, M. M. (2009), p. 41.
[47] Arnull, A. (1999), p. 529.
[48] Rosati, E. (2013), p. 100.
[49] Joined Cases C-28/62 and C-30/62, Da Costa en Schaake NV, Jacob Maijer NV, Hoechst-Holland NV v Netherlands Inland Revenue Administration, [1963] 00061.
[50] Craig, P. P. and G. D. Búrca (2015), p. 472.
[51] ECJ Case C-283/81, Srl CILFIT and Lanificio di Gavardo SpA v Ministry of Health [1982].
[52] Craig, P. P. and G. D. Búrca (2015), p. 499.
[53] Rosati, E. (2013), p. 101.
[54] Please note that this list of cases is not exhaustive, but reflects the scope of the thesis.

The case was concerned with whether Infopaq, a firm that by means of a data capture process drew up summaries of articles from Danish newspapers and sent them by e-mail to its customers, was obliged to obtain consent from the right holders of the articles before reproducing them in part.

The relevant statement pertaining to this discussion from CJEU concerned the interpretation of the Infosoc Directive 2001/29/EC Article 2 (a), which states that authors have the exclusive right to authorize or prohibit reproduction of their "works". CJEU held that the interpretation of "works" needed reversion to Article 2 of the Berne Convention, from which could be constituted that the protection of subject matters presupposes that it amounts to being an intellectual creation. Moreover, CJEU had to clarify the meaning of originality. By argument of harmonization and reference to Articles 1(3) of the Software Directive 91/250/EC, 3(1) of the Database Directive 96/9/EC, and 6 of the Term Directive 2006/116/EC, CJEU stated that Article 2 (a) of the Infosoc Directive 2001/29/EC entails that a work is protected by copyright only if it is original in the sense that it is it's "author's own intellectual creation".[55] Through this decision, CJEU achieved full harmonization of the originality requirement at the EU level. Thus, originality now has a uniform meaning across the directives concerning various subject matters. Namely, the originality requirement refers to the "author's own intellectual creation".

Another interesting element of the Infopaq case is that CJEU gave a lot of importance to the intellectual act of selection and arrangement of text snippets:

> "Regarding the elements of such works covered by the protection, it should be observed that they consist of words which, considered in isolation, are not as such an intellectual creation of the author who employs them. It is only through the choice, sequence and combination of those words that the author may express his creativity in an original manner and achieve a result which is an intellectual creation."[56]

The creators of the newspaper articles had thus exercised a series of creative choices that made the texts original in the sense that they were the "author's own intellectual creation".

The Painer case

In Painer[57] one of the questions referred to CJEU was whether a photo-fit based on a photograph might be published in newspapers, magazines and on the Internet without the rightholder's consent. Namely, the conferring court sought clarification as to whether the originality standard for photographs in Article 6 of the Term Directive 2006/116/EC includes portrait photographs. The court specified that relevant criteria in the assessment of whether a work is considered the "author's own intellectual creation" are whether the author was able to

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[55] Infopaq I, paragraph 37

[56] Infopaq I, paragraph 45.

[57] Painer, paragraphs 88 et seq.

"express his creative abilities in the production of the work by making free and creative choices". Furthermore, by making those various choices, the author of a portrait photograph can stamp the work created with his "personal touch". The court subsequently illustrated such creative choices:

> "In the preparation phase, the photographer can choose the background, the subject's pose and the lighting. When taking a portrait photograph, he can choose the framing, the angle of view and the atmosphere created. Finally, when selecting the snapshot, the photographer may choose from a variety of developing techniques the one he wishes to adopt or, where appropriate, use computer software."[58]

The Murphy case

The originality criterion was further clarified in the case of Murphy,[59] in which CJEU considered whether copyright could be claimed in sporting events per se. In this regard, CJEU responded negatively and clarified that an "author's own intellectual creation" involves that the process must leave room for "creative freedom for the purposes of copyright". The court concluded that since football matches are subject to rules of the game, they leave no room for such creative freedom and cannot be subject to copyright. The statement implies that a work is considered original only if it is the result of its author's creative freedom.

The decisions in Infopaq, Painer and Murphy have clarified and developed the EU concept of originality. The notion of "author's own intellectual creation", which was adopted as the standard for the originality requirement in the Infopaq case entails, according to the mentioned cases, that the author made "free and creative choices" and expressed a "personal touch" while the process must leave room for "creative freedom".[60]

3.3 Are AI-generated works eligible for copyright protection under current EU law?

3.3.1 Introductory remarks

This section aims to provide an answer to the question of whether AI-generated material can be subject to copyright protection or not. The analysis will be closely tied to the previously addressed criteria for "own intellectual creation". In addition, the rationale behind European copyright law addressed in section 2.2 above will be a significant source of argument in the analysis.

The discussion distinguishes between four cases of AI-generation of works. Namely, AI co-production, human selection of a work that has been entirely generated by AI, a work created by AI by use of brute force, and finally the case where a machine independently both creates and selects the work, without any human contribution beyond the initial programming of the AI

[58] Painer, paragraph 91.
[59] Murphy, paragraph 98.
[60] Rosati, E. (2013), p. 187.

software itself. As the following discussion will demonstrate, the first three cases of AI-generation all have relatively clear and unambitious solutions to the question of copyright protection. The respective solutions seem to reflect whether the case compares to and resembles the types of creation processes traditional copyright law currently protects.

The forth type of AI-creation is the most interesting one, as the answer to whether the output independently created and selected by an AI is eligible for protection is not clear and indisputable. Consequently, the thesis particularly aims to thoroughly analyse this case of AI-generation.

3.3.2 A work created by AI in collaboration with a human

The first question is whether a work produced by AI in collaboration with a human qualifies for copyright protection. A human in the process of creating a work can use an AI program as a tool. Provided that the work fulfils the originality requirement, it is completely clear that the human can be given copyright to the work. Were this not so, Microsoft could claim copyright to works produced on Word, Adobe in Photoshop, etc. Even if the AI were to play an important part in the creative process of the work, the minimal contribution of the human being would make it possible to apply the copyright provisions.[61] This is the case for the previously mentioned cookbook, which the artificial intelligence machine Watson participated in designing. Although Watson had put together many of the unique flavor combinations, a man had worked out the recipes from Watson's list of ingredients. In this case the man simply used the AI as a medium of his art, which does not prevent him from claiming copyright to the cookbook.

This entails that even through AI represents a new type of technology, a human's use of it in his or her creative process does not affect the copyrightability of the work. This concept is accurately described by Schafer, Komuves, Zatarain and Diver in the article "A fourth law of robotics? Copyright and the law and ethics of machine co-production":

> "[T]he computer is [in this case] a mere tool used to translate the internal creative concept or idea into an external embodiment. This leaves the central conceptual vocabulary of copyright law unaffected: we still have the dichotomy between idea and expression, and the physical threshold between the two."[62]

Thus, AI-generation used as a tool in the creative process of a human does not yield uncertainty with regards to copyright protection.

3.3.3 A work created by AI, yet selected by a human

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[61] Nevejans, N. (2016), p. 278.

[62] Schafer, B., D. Komuves, J. M. N. Zatarain and L. Diver (2015), p. 223.

The second case regards the case where the AI independently creates the work, but the human contribution lies in the selection of which of the generated works are valuable and worthy of distribution. Namely, a human made decisions as to which creations or parts of creations made by the AI should be preserved. An example of such AI-generation followed by human selection can be found in the music industry, where AI-composed music is quickly becoming a reality.[63] Thus far, the algorithms are still inaccurate and unable to evaluate the attractiveness of each piece of music produced, which entails that it will often take many tries by the AI to achieve a successful composition. This requires humans to listen through the generated material to determine which of the pieces are valuable and worthy of distribution and which are not to be preserved. The question in this case is whether the mere selection by a human gives him the rights to claim copyright to the work.

One example of a case that has strong parallels to this scenario is the famous "Monkey selfie"-case. In 2011, a macaque monkey used a camera belonging to British photographer David Slater in Indonesia to take a series of pictures, including a few self-portraits. Slater maintained that he placed the camera on a tripod in order to get the monkeys to interact with it. One of the "selfie" pictures became famous worldwide after it was published in British media. The picture was uploaded to Wikipedia without Slater's permission, which prompted him to send a removal request to Wikimedia Commons. Wikimedia refused to take down the picture and claimed that it was in the public domain because a monkey, which cannot own copyright to works, took the picture. While the monkey pressed the button, Slater made the selection of the pictures that were worthy of publication from the hundreds of pictures taken by the monkey. The question is if this enables Slater to claim copyright to the picture under the Term Directive 2006/116/EC. Please note however that the case has only been tried under U.S. copyright provisions.

This "Monkey selfie"-case has paralells to the case of an AI program creating a work which is then selected by a human. In the analysis of the outcomes of these cases the Infopaq case may give direction. The above citation from the case indicates that a selection process can determine the presence of originality: "It is only through the choice, sequence and combination of those words that the author may express his creativity in an original manner and achieve a result which is an intellectual creation". This citation demonstrates that the CJEU considers the act of selection and arrangement of text snippets to be an intellectual act relevant to the legal assesment. By the same line of argument, one can argue that there was an intellectual exercise in the selection of the hundreds of pictures by Slater, causing the requirement to an intellectual creation "reflecting his personality" in the Term Directive 2006/116/EC to be fulfilled.

Similarly, it seems most in line with the interpretation of the originality reqirement in the Infopaq case that the human's decisions as to which creations or parts of creations made by the AI should be preserved constitutes an intellectual act deeming the work original. This interpretation entails that the human who made decisions as to which creations or parts of creations made by the AI should be preserved can claim the rights to the work.

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[63] I.e. the Flow Machines research project, funded by the European Research Council (ERC) and coordinated by François Pachet (Sony CSL Paris - UMPC): http://www.flow-machines.com/

Moreover, the case of AI-generation and human selection does not differ fundamentally from cases the courts have been faced with before. The Monkey-case illustrates that mere non-human creation followed by human selection is not unprecedented, suggesting that traditional copyright law and principles can be readily applied to the case of AI-generation followed by human selection.

In conclusion, the interpretation in the Infopaq-case combined with the parallels to other cases of non-human creation implies that the rights to the work should be allocated to the human who selected it. However, note in this regard that neither this discussed question nor the parallel animal-case has been explicitly tried by the CJEU, which leaves some uncertainty as to the final outcome of such a case.

3.3.4 A work created by AI by use of brute force

Another interesting case can be illustrated by the claim of a Russian company, Qentis. It claimed to have made computer software that was able to create every possible text of ten to 400 words. By using statistical algorithms that combine individual letters, Qentis claimed to have generated and deployed 97.42 % of all texts of the given length. A "brute force" approach that generates all possible combinations of words in English will, eventually, produce every meaningful text there could be within the given range of words. The business model behind their idea was allegedly to become the world's largest copyright holder. The company stated; "As Qentis approaches 100 % of content generation, all content owners will eventually have to pay royalties to our clients or face massive lawsuits".[64] Qentis turned out to be a satirical artwork created by the Vienna-based performance artist Michael Marcovici. Nevertheless, the question raised by the scenario is still interesting from a copyright perspective, as brute force technology exists. The question that arises in such a situation is a different one to the monkey-case, as all works are produced by brute force without a subsequent selection by a human. The question is whether Qentis in this case could have claimed copyright to all the machine-created texts.

CJEU states as previously mentioned in the Infopaq case that the originality requirement is fulfilled through the author's "choice, sequence and combination of … words". In Painer CJEU states that originality depends on whether the author was able to "express his creative abilities in the production of the work by making free and creative choices". In Murphy CJEU states that the creative process must leave room for "creative freedom". These statements imply that the creative output has to be the result of at least some intentionality from the author. Since brute force technology does not rely on any choice, but rather aims to put together every combination of words without any consideration of which combinations of letters make up good texts, there is no intentionality involved in the process of creating the texts. Thus, the works produced by use of brute force does not fulfil the originality requirement in EU copyright law.

[64] Schafer, B., D. Komuves, J. M. N. Zatarain and L. Diver (2015), p. 225.

Additionally, the creative process of a brute force machine does not remotely resemble or compare to that of a human's. Arguably, this type of creative process is almost the opposite of the one copyright traditionally aims to protect, as it involves absolutely no choice or judgement by the creator. This strongly supports that current copyright regulation does not protect the works made through use of this technique.

In conclusion, it follows both from the above CJEU jurisprudence and from a larger perspective of copyright protection that works produced using only brute force are not eligible for copyright protection under current EU copyright law.

3.3.5 A work entirely generated and selected by AI

The recent developments in strong AI technology, as described in chapter one of this thesis, likely entail that we are moving into an era where machine production of creative works will become commercially viable, i.e. AI writes short news stories or produces music snippets to be used in games or commercials. Crucially for copyright, these will not only produce hundreds or even millions of different copies, but the program will select the works it sees fit. This thus removes the last important connection to human artistic creation from the equation—the human judgment that something is art or that a specific work is a successful embodiment of the artist's vision.[65] This entails that the role of the user of the AI program has been reduced to merely causing the output to be generated, by for example typing the word "compose" in a music generator program or "run program" into a text generator. In the absence of any human intervention relating to the creativeness of the output, the question is whether copyright can be claimed to such AI-creations.

Note that this section is limited to the discussion of *whether* such works can be eligeble for copyright protection, and thus does not discuss to whom such rights may belong. To whom rights should be allocated is the subject of discussion in chapter four.

The question is whether a work produced and selected by an AI program can be copyrighted under current EU regulation. One can argue that if the final work is indistinguishable from a human creation, it should have the same legal status as one created by a human, regardless of the method of production. This argument may find some legal support in the principle of non-discrimination in copyright law. This principle traditionally refers to the right of an author or right holder to start a procedure when directly or indirectly treated in a less favourable way than other artists or rights holders in the same position.[66] One may argue that this fundamental principle of copyright protection may also be given weight in other cases, i.e. whether it could also apply to the subject matter of copyright. This line of thought would entail that the principle supports that a work of art created by an AI system that is indistinguishable from one made by a human should receive protection if the work would have been protected if a human created it.

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[65] Schafer, B., D. Komuves, J. M. N. Zatarain and L. Diver (2015), p. 225.

[66] Stamatoudi, I. and Torremans, P. (2014), p. 23.

Although this is an interesting analogy, it does not yet have any support in jurisprudence or other legal sources, and therefore cannot be given any weight in this analysis of current law.

Looking to the aforementioned CJEU case law, the decisions in Infopaq, Painer and Murphy have clarified and developed the EU concept of originality. The notion of "author's own intellectual creation", which was adopted as the standard for the originality requirement in the Infopaq case, entails that the author made "free and creative choices" and expressed a "personal touch" while the process must leave room for "creative freedom" (Murphy).[67]

What can be asserted from CJEU's statements regarding the concept of originality and the notion of "author's own intellectual creation" is that the determining factor is *not the characteristics of the product* as such and whether the final work is percieved as art, but rather *the process leading up to the product*. Namely, is this process a creative one, and did the author "express his creativity" in an original manner?

The above CJEU jurisprudence arguably asserts that in order for a creation to be considered an original work under EU copyright law, one must be able to establish the existence of a consciousness in the production of it. Althrough the final product of AI-generation may lead one to believe so, the process of creation does not involve choices based on conciousness. This strongly suggests that AI-generated works are not eligible for copyright under current EU copyright law. Thus, CJEU jurisprudence seems to imply that assessment of whether copyright is awarded is based on the the process leading up to the product, and not on the final product itself.

This conclusion is also in line with the EU copyright framework in general. A cornerstone of EU copyright law is the persona of the author. For instance, Article 7.1 of the Berne Convention as well as Article 1 of the Term Directive 2006/116/EC determines the term of protection based on the death of the author.[6869] These provisions rest on a fundamental assumption that "authors" are something capable of dying - implying that an artificial entity cannot be considered the author of a work from a copyright perspective.[70]

Moreover, as mentioned earlier in chapter two of this thesis, one element of the rationale behind copyright law is that it is considered just from a moral perspective to give the rights to a creation to the author who has intellectually created it. This rationale does not apply to an AI, which suggests that neither the AI, nor persons with attachments to it, can obtain copyright protection to the works it has created under current law.

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[67] Rosati, E. (2013), p. 187.

[68] Article 7.1 of the Berne Convention: "The term of protection granted by this Convention shall be the life of the author and fifty years after his death."

[69] Article 1 of the Term Directive: "The rights of an author of a literary or artistic work within the meaning of Article 2 of the Berne Convention shall run for the life of the author and for 70 years after his death…"

[70] Clifford, R. D. (1996), p. 1683.

Arguably, the type of creative process associated with AI-generation is fundamentally different from the creative process that copyright traditionally aims to protect, because all human contribution and connection to the final work is excluded from the creative process. Moreover, the creative process of AI generation and selection does not have parallels to cases which current law traditionally applies to, as was argued for the case in section 3.3.3 above regarding generation by a non-human followed by selection by a human. The lack of parallels to existing creative processes supports that current copyright regulation does not apply to works generated and selected by AI. This thus suggests that no grounds for protection of such works can be established.

Although there are several academic papers written on copyright to AI-generated works under the American Copyright Act, not much legal literature discussing the particular issue with regards to European law is yet published. However, the author of the above-mentioned study requested by the European Parliament's Legal Affairs Committee, Natalie Nevejans, has recently published a book, in which she addresses the issue under French copyright law. Her conclusion is the same as the one asserted from the CJEU jurisprudence above, that only a natural person can be recognized as an author.[71]

Based on CJEU jurisprudence, the system of EU copyright law and its rationale, along with supporting legal literature, copyright cannot be claimed in a work generated and selected by AI under current EU law. Thus, even if it is an exemplary achievement and the work is unanimously considered to be exceptionally artistic, in the absence of a human author who has participated in the creative process in whole or in part, the work will not be afforded copyright protection under current EU regulation.[72]

3.3.6 Conclusion

Whether or not copyright can be claimed in a work generated by an AI depends on the level of human contribution to the final product. Namely, in the evaluation of copyright under current regulation, a distinction is made between AI-users who are genuine authors from users who merely push a button and do not have creative influence on the output or the selection of it.[73] In the case that a work is entirely generated by brute force or if it is both produced and selected by the AI, the current EU copyright law does not provide grounds for protection of the work. These results suggest that current copyright regulation does not apply to works produced through an entirely non-human creation process.

This conclusion is supported by the fact that protection is only given to the cases of AI-generation that have creative processes that have similarities to the creative processes traditionally protected by EU copyright law. Conversely, the AI-generation cases involving creative processes that are fundamentally different from the traditional human process of creation do not fall within

[71] Nevejans, N. (2016), p. 278.
[72] Nevejans, N. (2016), p. 278.
[73] Grimmelmann, J. (2015), p. 410.

the scope of protection under current copyright law. Thus, no grounds for protection can currently be established for works produced through an entirely non-human creation process.

The conclusion also appears to be consistent with the statement included in the introduction to this chapter. Namely, the European Parliament resolution states that "[E]xisting legal regimes and doctrines can be readily applied to robotics, although some aspects appear to call for specific consideration."[74] The statement implies that current copyright regulation in most cases can be applied to works generated by means of AI, as was done without concern in the first three cases addressed above.[75]

However, the European Parliament implies that some aspects call for "specific consideration" by the Commission. This thesis argues that one such case that requires consideration by legislators is the fourth case addressed above, namely works that are created and selected autonomously by an AI system. As concluded in section 3.3.5 above, such works are made through creative processes that are fundamentally different from the traditional human process of creation, and do not fall within the scope of protection under current copyright law. However, as today's copyright regulation was not written with AI in mind, it is unclear whether the current solution of allocating the rights to AI-works to the public domain is the one EU legislators deem best suited. Therefore, the next chapter will address whether such works created by artificial intelligence without any human contribution to the final output *should* be awarded protection, and if so, to whom the rights should be granted.

[74] European Parliament (2017), p. 9.

[75] See sections 3.3.2, 3.3.3 and 3.3.4 above.

4 To whom, if anyone, *should* the rights to works created by artificial intelligence systems without any human contribution to the final work be allocated?

4.1 Introduction

4.1.1 The issue

Thus far this thesis has established that when AI programs generate output, difficult problems arise in deciding to whom ownership rights in the output should be allocated.[76] As discussed in chapter three, applying the current authorship tests of EU copyright law provides different copyright solutions depending on the degree of human contribution to the final output. Section 3.3.5 above concludes that output generated and selected without any human interference are currently in the public domain.

This final chapter takes a de lege ferenda approach to this specific case of AI-generation: Namely, to whom, if anyone, should the rights to works created by artificial intelligence systems without any human contribution to the final work be allocated?

In the resolution to the Commission of February 2017, Parliament declared that it "calls on the Commission to support a horizontal and technologically neutral approach to intellectual property applicable to the various sectors in which robotics could be employed".[77] Based on the European Parliament's outspoken intention to achieve technology neutral European copyright legislation, the following discussion will aim to identify the solution that is most coherent with existing European copyright rationale, principles and regulation.

4.1.2 Background

The discussion of the first research question in chapter three demonstrated that today's copyright regulation was not written with the issue of artificial intelligence in mind. Therefore, it is unclear whether the current solution of rights in the public domain is the one EU legislators deem best suited, or if it is arbitrary and unintentional. This warrants a discussion of the aptness of the current solution, and furthermore of whether adjustments to current legislation are needed.

Moreover, machine creation is fundamentally different from anything copyright has ever faced, and therefore cannot without further discussion be evaluated in the same way as tools humans use in their creative process or as animals making creations at random. This fundamental difference is demonstrated by the fact that the EU is considering to create a specific legal status for robots, so that at least the most sophisticated autonomous robots could be established as

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[76] Samuelson, P. (1985), p. 1185.

[77] European Parliament (2017), p. 9.

having the status of electronic persons with specific rights and obligations.[78] AI machines constitute a fundamentally new phenomenon and provide an entirely new method of creation. This strengthens the warranty for discussion of copyright protection to works of this novel nature.

As accurately described in recital 6 to the Infosoc Directive 2001/29/EC it is in the EU's best interest to address this currently uncertain issue of machine creation and to clarify the copyright regulation on this point:

> "Without harmonisation at Community level, legislative activities at national level which have already been initiated in a number of Member States in order to respond to the technological challenges might result in significant differences in protection and thereby in restrictions on the free movement of services and products incorporating, or based on, intellectual property, leading to a refragmentation of the internal market and legislative inconsistency."

These arguments were made with regard to the developments of technology that faced society around the beginning of the 21st century, but are arguably also valid for the developments and challenges we face today with regard to artificial intelligence. Insufficient or unclear protection of AI generated works may lead Member States to independently pass legislative acts, which in turn may be a barrier to the free movement of goods and services within the Community. This is one of the main reasons why unambiguous and deliberate regulation should be put forth at Community level.

The urgency of discussing possible changes and adjustments to different aspects of existing civil law regulation is illustrated by the fact that several foreign jurisdictions, such as the US, Japan, China and South Korea, are considering, and to a certain extent have already taken, regulatory action with respect to AI in order to take account of emerging applications of such technologies.[79]

The previously mentioned European Parliament motion for resolution with recommendations to the Commission on Civil Law Rules on Robotics also emphasize that predictable and sufficiently clear conditions are crucial to incentivise European innovation in the area of robotics and AI when concluding that:

> "The European industry could benefit from an efficient, coherent and transparent approach to regulation at Union level, providing predictable and sufficiently clear conditions under which enterprises could develop applications and plan their business models on a European scale while ensuring that the Union and its Member States maintain control over the regulatory standards to be set, so as not to be forced to adopt

[78] European Parliament (2017), p. 15.
[79] European Parliament (2017), p. 3.

and live with standards set by others, that is to say the third countries which are also at the forefront of the development of robotics and AI".[80]

Based on this, it can be established that adjustment in copyright legislation at the EU-level to accommodate changes brought by AI should, and likely will, be implemented. In this regulative process, legislators have several alternatives at their disposal.[81] Specifically, the different solutions to allocation of rights to AI-generated works which will be subject to discussion in the following is: (a) Rights remain in the public domain; (b) Allocation of rights to the AI-machine; (c) Allocation of rights to the person behind the machine (the programmer); or (d) Allocation of rights to the user of the machine. The validity of and justification for these alternatives will be the subject of this final section of the thesis.

4.2 Discussion of rights allocation alternatives

(a) Rights remain in the public domain

The first alternative to be discussed is whether the rights to AI-generated works should remain in the public domain, entailing that no one owns the rights to them. This solution would be consistent with the traditionally implied assumption that authors of copyrightable works have to be human, and would entail denied copyright protection for AI-produced materials if the human input into the creation is not legally sufficient.[82]

Importantly, granting copyright privileges where none are warranted creates unjustifiable barriers to access, which is not in line with the overall goal of securing the public's access to content, particularly for purposes of education and research. Copyright monopoly also entails higher prices and reduced production, which is not in the consumer or public's interest. Therefore, one must demand that copyright privileges are granted only when this is justified.

However, as pointed out in chapter two, the law must balance the benefits that the public would derive from being able to freely use the end product against other considerations. Namely, traditional copyright policy aims to maintain an economic incentive for development and expression of valuable ideas, promote scientific and literary development and prevent monopolization of the market. Copyright availability for AI generated works would provide an incentive for their development and dissemination because the proprietary interests of investors and inventors would be guaranteed a degree of legal security not otherwise available.[83]

Namely, if no protection is granted to the works of AI, the intellectual effort or investment put towards the development of creative AI-machines will likely be limited. In essence, if their output

[80] European Parliament (2017), p. 3-4.
[81] Butler, T. L. (1981), p. 734.
[82] Butler, T. L. (1981), p. 734.
[83] Butler, T. L. (1981), p. 735.

is not copyrightable and does not yield economic benefit, it will not be as worthwhile to develop them in the first place. Moreover, a competitive market for AI products would likely be encouraged by availability of copyright protection. These important policy considerations strongly suggest that the elimination of copyright protection for AI products is not the right solution.

Additionally, granting copyright to the output may give the right holder motivation to bring the generated work into public circulation. If a flawless work has been created by use of an AI program, and the law deems the work incapable of being owned because of the lack of a human author, the user who proximately caused its creation has little incentive to go to the trouble of bringing forward a work that is in the public domain.[84] Bringing a product to market often requires risk and financial investment, as marketing and product production can be costly. If there is no financial upside to bringing the product to market or to the public, then the product will likely never find its way to the world. This result is problematic from the perspective that society generally has an interest in works being made available to the public. Innovations that are kept secret do not promote the progress of science and the useful arts, as is the case for innovations that are revealed and disseminated.[85] Therefore, reward to those who bring innovations to the market can be justified based on the rationale behind copyright law.

Albeit consistent with the traditional concept of an author as a person, denying protection is inconsistent with the historically flexible interpretation and application of copyright law followed by technological advancement. AI-products are the result of technological development, which supports that AI-generated works should be deemed within the historically flexible scope of copyright laws.[86]

Finally, it will often be difficult, if not impossible, to discern whether a program or a human generated a particular work. Thus, enforceability problems would be particularly acute if rights are allocated in the public domain.[87]

Based on these arguments against leaving the rights to AI-generated works in the public domain, the solution that seems most in line with copyright principles and rationale is allocation of the rights to someone. The question that follows is to whom.

(b) Allocation of rights to the AI-machine

The law as it is currently configured cannot vest copyright to an AI-generated work to the AI itself, because the AI-machine has no legal personhood and thus cannot own rights.[88] However,

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[84] Samuelson, P. (1985), p. 1227.
[85] Samuelson, P. (1985), p. 1227.
[86] Butler, T. L. (1981), p. 735.
[87] Samuelson, P. (1985), p. 1208.
[88] Bridy, A. (2012), p. 21.

the EU Commission is currently considering whether this should be the case, as a motion for resolution adopted by Parliament sets out the following:

> "Calls on the Commission, when carrying out an impact assessment of its future legislative instrument, to explore, analyse and consider the implications of all possible legal solutions, such as:
>
> …
>
> f) creating a specific legal status for robots in the long run, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons responsible for making good any damage they may cause, and possibly applying electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently."[89]

The following discussion will therefore not dismiss the possibility of copyright to AI machines on the grounds that they are not currently legal entities, as this may soon be the case. The question is however, assuming that AI-machines in theory could be granted the rights to their own work, if this is a good solution of the rights allocation issue.

First, the whole purpose of the intellectual property system is to grant rights to creators to induce them to innovate. Based on this rationale, it does not make sense to allocate intellectual property rights to machines, simply because they do not need to be given incentives to generate output.[90] Granting copyright privileges where none are warranted creates unjustifiable barriers to access, which strongly suggests that even if it was possible to grant rights to AI-machines directly, this is not a good solution.[91]

Second, some practical hurdles also suggest that rights should not be allocated to the machine itself. Computers are by themselves unable to perform several tasks that a copyright holder must be able to perform to be eligible for protection, for example to sue an alleged infringer of its work or of transferring rights to others (e.g. renewal rights, licensing arrangements).[92] As long as computers cannot think and act like humans, they are dependent on human instruction and assistance to fulfil the obligations of a right holder, which suggests that rights allocation to a machine does not constitute a good solution.

Third, although legal interests have been recognized in trusts and corporations, these interests are based on the essentially human nature of the endeavour, for example evidenced by shareholder participation. Namely, the "legal person" status of a corporation reflects a need for society to recognize and facilitate a method for efficiently organizing human physical and intellectual effort to achieve maximum return on monetary and human capital investment. Public policy

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[89] European Parliament (2017), p. 16.
[90] Samuelson, P. (1985), p. 1199.
[91] Acosta, R. (2012), p. 6.
[92] Glasser, D. (2001), paragraph 31.

considerations support the existence of trusts and corporations, but these arguments relating to legal persons do not apply to AI-machines.[93]

In conclusion, the rationale behind copyright law combined with the impracticality of AI ownership of copyrights decisively suggests that the rights to AI-generated works should not be allocated to the AI itself.

(c) Allocation of rights to the person behind the machine (the programmer)

Programmers are responsible for the creation of the AI software. The question is whether it is justified to attribute to the programmer rights to all the AI's output.

One argument in this regard is that without the programmer's creativity in building the machine, the output might never have been brought into existence. If the output produced by a particular AI is of excellent quality, it may be fair to attribute at least part of the excellence in the output to the programmer. Moreover, creating an excellent generator program is intellectually demanding, time-consuming and expensive for the programmer.[94] As noted in chapter two regarding the rationale behind copyright law, the effort that is put into creation of a copyrightable work is considered to be among the interests copyright law intends to protect. The effort and investment made by the programmer to develop the AI-machine suggests that the rights to the AI's output should be awarded to the programmer.

However, what gets programmed directly is just general information and principles, not unlike what teachers instil in their pupils.[95] What the output of the machine might be however, is not predictable by the programmer. Granting rights to the programmer to all output created by the AI would in many ways mean rewarding him or her for works he did not creatively contribute to. Importantly, the programmer creates the potentiality for the creation of the output, but not its actuality.[96] Awarding rights to a person who merely creates a potentiality for, but not the actuality of a work would be a significant break from traditional copyright principle, which strongly suggests that the programmer should not be given the rights to the output of the AI-machine he initially programmed.

Additionally, enforceability will likely be a problem by allocating ownership rights exclusively to the programmer. The output will be in the hands of or under the control of someone other than the programmer, typically the user who has bought the rights to the program. In this case, the user has a strong interest in not reporting back to the programmer that a new piece of property has been created in which the programmer has rights. It will often be difficult to determine whether the machine the programmer created produced a particular output or not. This suggests that significant impracticalities are tied to awarding rights to the programmer.

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[93] Butler, T. L. (1981), p. 739-740.
[94] Samuelson, P. (1985), p. 1205.
[95] Haugeland, J. (1989), p. 12.
[96] Samuelson, P. (1985), p. 1209.

While it may be tempting to collapse the distance between the programmer and the output of generative code, doing so would ignore both the mechanic origin of AI-works and the work's great attenuation to human authorship and creativity.[97] Thus, based on the lacking justification for allocating rights to the programmer and the impracticability that would follow from such an arrangement, the programmer should not be given the rights to the output created by the AI he or she initially programmed. Notably, the programmer will not be left without rights: The Software Directive 2009/24/EC constitutes the protection of computer programs, entailing that the programmer can claim rights to the AI-software in itself.

(d) Allocation of rights to the user of the machine

The next alternative is to allocate the rights to the user of the machine. The question is if user-authorship can be justified when the role of the user of the AI program has been reduced to merely causing the output to be generated, by for example typing the word "compose" in a music generator program or "text" into a text generator. Namely, the same program can be run repeatedly with identical inputs to generate different works.[98] In this case the user's instructions are so brief or general that the user's contributions do not qualify for authorship under traditional authorship standards as concluded in section 3.3 above. Can it nonetheless be justified to allocate rights in the output to the user?

To answer this, one must look for guidance and parallels in the underlying principles and existing regulation of copyright law. According to Article 2(3) of the Software Directive 91/250/EEC, the employer shall exclusively be entitled to exercise all economic rights in an employee's computer program, where a program is created in the execution of the employee's duties or where the employee merely follows instructions given by the employer. The regulation shows that legislators have found that the best solution in the case where a work is created by an employee acting as such, is to allocate the copyright to the person or entity who through the employment was responsible for causing a creative work to be brought into the world, regardless of whether they were directly involved in the creative effort.[99]

Similarly, although the user of an AI-program has not contributed to the work creatively, the user is the person who most immediately caused the work to be brought into being. Based in this, it can be argued that one who uses a generator program in some sense has "employed" the computer and its programs for his creative endeavours. By this line of argument, similar considerations to those that underlie the employment-rule support allocation of rights in AI-generated works to users, regardless of the extent of their creative input.

However, no directives other than the Software Directive 91/250/EEC include this employment rule, and the question of employees' copyrighted works in general is left for each member state to decide. In some countries, such as in the Netherlands and the United Kingdom, national

[97] Bridy, A. (2012), p. 25.
[98] Grimmelmann, J. (2015), p. 412.
[99] Samuelson, P. (1985), p. 1203.

copyright acts regulates employees' copyright. In other countries, such as Germany, France and the Nordic countries, a transfer from the employee to the employer follows from general principles of law. This suggests that the above analogy has somewhat limited weight.

As mentioned under (a), granting copyright to the user may give him or her motivation to bring the work into public circulation. Society generally has an interest in works being made available to the public. Innovations that are kept secret do not promote the progress of science and the useful arts as much as innovations that are revealed and disseminated.[100] Users of AI programs are in much the same position as traditional authors in the sense that they are in the best position to take the initial steps to bring a work into the marketplace. Recognizing the user as the owner of AI-generated works would in this way seem to be consistent with the fundamental purposes underlying EU intellectual property law, because it has more potential to advance the pace of innovation than would be the case if no one was granted rights.[101]

Furthermore, it is probable that denying copyright protection to AI-generated works would lead users to claim that they themselves authored work produced by an AI program. It would be very difficult for a court to decide whether the human contributed to the work to the extent that the creation deserves protection under current copyright law or if the work was entirely AI-generated. Therefore, giving rights to the user is not only the most practicable solution, but also the one least likely to lead to litigation. These considerations also support allocating the rights to AI-generated works to the user.

Another argument that supports allocation to the user is that he from an economic standpoint is the one who has invested in the AI and thus deserves the right to its output. Copyright rationale is partly founded on the idea that the right to exclusively make use of a created work provides the authors with a financial benefit to compensate him or her for the investment put into the creation of it. Similarly, the user of the software has invested in the rights to use the AI, either by purchase, lease, or license.[102] This also provides the programmer with some reward for the value of the AI he has created.

Although it is arguably unappealing to say that the act of merely tapping a button is an act of authorship justifying copyright for the user, parallels to the employment rule, considerations of innovation advancement, practicability and economic compensation to the user are all strong arguments that support allocation of the rights to the output of the AI to the person who used it when the work in question was generated.[103]

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[100] Samuelson, P. (1985), p. 1227.
[101] Samuelson, P. (1985), p. 1227.
[102] Samuelson, P. (1985), p. 1203.
[103] Grimmelmann, J. (2015), p. 412.

5 Conclusion

In the intersection between complex technology and law, difficult regulatory questions often arise. In the wake of advancements in artificial intelligence, that is proceeding more quickly than any advancement before it, the EU legislation is faced with urgent challenges across many areas of civil law. One of the areas of regulation that the Commission has been requested by the European Parliament to consider adjustments to is intellectual property law. In light of this on-going legislative process, the overall perspective of this thesis has been to address the copyright challenges that face the EU's legislative branch following the artificial intelligence advancements.

The first research question of this this thesis is whether AI-generated works are eligible for copyright protection under *current* law. The discussion of this question in chapter three concludes that the application of current copyright law to the four types of AI creation provides for suitable solutions that are aligned with the EU copyright regulation as a whole in three of the four cases. Thus, current law seems to be well suited to deal with most of the changes brought by the advancements in artificial intelligence we have seen so far. The only case of inconsistency to the copyright system arises in the application of current law to works created by AI without any human contribution to the final work. In this case, the thesis argues that current legislation is unsatisfying.

Thus, EU's legislative branch needs to consider if this warrants an adjustment to the current regulation. The thesis' second research question is whether works created entirely by artificial intelligence systems without any human contribution to the final work *should* be protected by copyright, and if so, to whom the rights should be allocated. Chapter four analysed four different allocation alternatives, including allocation in the public domain. Based on the European Parliament's outspoken intention to achieve a coherent and technology neutral European copyright legislation, this thesis ultimately concludes that there are strong arguments in favour of allocation to the person who used the machine when it created the output in question.

The main arguments for this allocation alternative is that granting rights to the user may cause the product or information to reach the public, which is one of the important underlying ideas behind granting copyrights, and furthermore that allocation of rights to the user of a programme has some parallels to existing copyright legislation in the employment rule in Article 2(3) of the Software Directive 91/250/EEC. Finally, this solution is least likely to lead to litigation and also provides the user with financial compensation for investing in the AI, which aligns with the rationale behind copyright addressed in chapter two.

In conclusion, artificial intelligence undeniably brings challenges and difficult discussions to copyright regulation. However, the conclusions of this thesis suggest that it is possible to overcome these challenges and maintain a coherent copyright regulation by making adjustments to the current framework.

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