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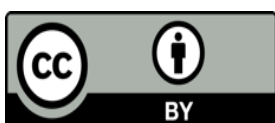
AI Music Outputs: Challenges to the Copyright Legal Framework

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2022

Acknowledgements: This research is part of the reCreating Europe project, which has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 870626. This Report corresponds to deliverable D.3.5 in Task 3.2. (“The Growing Role of AI machines as Producers of Literary and Artistic Works: Challenges to Human Authorship”) of Work Package 3 (“Authors and Performers”) of the reCreating Europe project. The research for this report was concluded in January 2022. The authors wish to thank Thomas Margoni, Peter Mezei and Sanne Vrijenhoek for their comments. All errors remain ours.

Suggested citation: Oleksandr Bulayenko, João Pedro Quintais, Daniel Gervais and Joost Poort, “AI Music Outputs: Challenges to the Copyright Legal Framework”, reCreating Europe Report (February 2022)



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Acronyms

AAAI	Association for the Advancement of Artificial Intelligence
AG	Advocate General (CJEU)
AI	artificial intelligence
AIPPI	Association for the Protection of Intellectual Property
AI-HLEG	EU AI High-Level Expert Group
API	application programming interface
CC	Creative Commons
CEO	chief executive officer
CFO	chief financial officer
CJEU	Court of Justice of the European Union
CMO	collective management organisation
CSPLA	Conseil Supérieur de la Propriété Littéraire et Artistique (France)
DDSP	Differentiable Digital Signal Processing
EBC	European Broadcasting Union
EC	European Commission
ERC	European Research Council
EU	European Union
EUIPO	European Union Intellectual Property Office
EULA	End User License Agreement
EP	European Parliament
EPRS	European Parliamentary Research Service
FAQ	frequently asked question
GPT	Generative Pre-trained Transformer
GUI	graphic user interface
IEEE	Institute of Electrical and Electronics Engineers
IP	intellectual property
IPO	Intellectual Property Office
ISMIR	International Society for Music Information Retrieval
JRC	Joint Research Centre (European Commission)

JURI	EP Committee on Legal Affairs
ML	machine learning
MFN	Most-Favoured Nation
MPI	Max Planck Institute for Innovation and Competition
NIME	International Conference on New Interfaces for Musical Expression
OECD	Organisation for Economic Co-operation and Development
R&D	research and development
TRIPS	Agreement on Trade Related Aspects of Intellectual Property Rights
TTS	text-to-speech
UKIPO	United Kingdom Intellectual Property Office
UNICRI	United Nations Interregional Crime and Justice Research Institute
US/USA	United States of America
UvA-IViR	University of Amsterdam-Institute for Information Law
WIPO	World Intellectual Property Organization
WCT	WIPO Copyright Treaty
WPPT	WIPO Performances and Phonograms Treaty
WTO	World Trade Organization

EXECUTIVE SUMMARY¹

This Report examines the application of EU copyright and related rights law to outputs generated by or with the assistance of artificial intelligence (AI) systems, tools or techniques (AI outputs), with a focus on outputs in the musical domain.

The Report's main research question is: How can and should EU copyright and related rights law protect AI musical outputs? This question is broken down into the following main objectives of this Report: (i) analysing the protection of AI outputs under EU copyright and related rights law; (ii) examining the attribution of authorship and ownership to (natural and legal) persons involved in the creation or production of AI outputs; (iii) proposing interpretative guidelines and policy recommendations on increasing legal certainty regarding the protection, authorship, and ownership of copyright and related rights over AI outputs, especially music outputs.

The methodology of this Report consists of doctrinal legal research and empirical research. The doctrinal legal research includes an extensive literature review and analysis of primary sources, legal scholarship, empirical literature on AI relevant to our research, literature and published interviews with artists, engineers and managers of AI projects in the music sector. The scope of our legal analysis is limited to EU copyright law, interpreted in light of international law. In addition, we have carried out empirical research in the form of case studies and interviews with experts on the legal, technological, and business aspects of AI music outputs.

The Report comprises five chapters. The introduction sets out the problem, research question and methodology (1). This is followed by a basic explanation of the technology and EU policy background to examine our research question (2). The subsequent chapter discusses copyright protection, authorship and initial ownership of AI outputs (3). The analysis includes a theoretical framework to assess such outputs under EU law, and develops different practical scenarios based on our case studies and empirical work. The analysis continues with an

¹ This Report (D.3.5.) is a deliverable in Task 3.2. ("The Growing Role of AI machines as Producers of Literary and Artistic Works: Challenges to Human Authorship") of Work Package 3 ("Authors and Performers"). The research for this report was concluded in January 2022. The authors wish to thank Thomas Margoni, Peter Mezei and Sanne Vrijenhoek for their comments. All errors. remain ours.

examination of the protection of AI musical outputs by related rights under EU law, focusing on performers, phonogram producers and broadcasters; a reference is made to sui generis regimes, namely those of “computer-generated works” in some countries in Europe (Ireland and UK) (4). The Report ends with a summary of the preceding analysis regarding copyright and related rights, and a set of policy recommendations to reduce legal uncertainty in this area and for further research (5).

1. INTRODUCTION²

The legal debate surrounding the intellectual property (IP) protection of Artificial Intelligence (AI) outputs is not entirely new. Discussions on authorship and inventorship by computers date back more than half a century.³ The interface between AI and IP has more recently generated a high level of research and policy activity evidenced by the growing body of literature on this topic that relates to copyright law.⁴ This is due in part to the fact that AI technology has spilled over into the creative industries, making the use of AI systems for cultural production more common and a discussion of the legal implications of such use more pressing.⁵ Today, AI systems are used to generate all types of literary and artistic content, including translations, news articles, poetry, scripts, music, videos, novels, photos, paintings,

² This section uses and develops upon previous work by some of the authors of this report in P Bernt Hugenholtz and others, 'Trends and Developments in Artificial Intelligence: Challenges to the Intellectual Property Rights Framework' (IViR and JIP 2020) Final Report for the European Commission.

³ Friedrich Karl Fromm, 'Der Apparat Als Geistiger Schöpfer' [1964] *Gewerblicher Rechtsschutz und Urheberrecht* 304; Karl F Jr Milde, 'Can a Computer Be and Author or an Inventor' (1969) 51 *Journal of the Patent Office Society* 378; Stephen Hewitt, 'Protection of Works Created by the Use of Computers' (1983) 133 *New Law Journal* 235; Timothy L Butler, 'Can a Computer Be an Author - Copyright Aspects of Artificial Intelligence' (1982) 4 *Hastings Communications and Entertainment Law Journal* 707; Pamela Samuelson, 'Allocating Ownership Rights in Computer-Generated Works' in Andrew Ruymann (ed), *Symposium cosponsored by University of Pittsburgh Law Review and The Software En on The future of software protection* (University of Pittsburgh Press 1986).

⁴ See, for a recent literature review, Maria Iglesias, Sheron Shamuilia and Amanda Anderberg, 'Intellectual Property and Artificial Intelligence: A Literature Review' (JRC 2021) <<https://data.europa.eu/doi/10.2760/8600>> accessed 9 March 2021. For some leading references on copyright law, see: Bruce E Boyden, 'Emergent Works' (2016) 39 *The Columbia Journal of Law & the Arts* 377; James Grimmelman, 'There's No Such Thing as a Computer-Authored Work — And It's a Good Thing, Too' (2016) 39 *Columbia Journal of Law & the Arts* 403; Annemarie Bridy, 'Coding Creativity: Copyright and the Artificially Intelligent Author' (2012) 5 *Stanford Technology Law Review* 1; Carys J Craig and Ian R Kerr, 'The Death of the AI Author' (2021) 52 *Ottawa Law Review* 31; Jean-Marc Deltorn and Franck Macrez, 'Authorship in the Age of Machine Learning and Artificial Intelligence' (2018) 2018–10 <<https://www.ssrn.com/abstract=3261329>> accessed 12 February 2021; Robert C Denicola, 'Ex Machina: Copyright Protection for Computer-Generated Works' (2016) 69 *Rutgers University Law Review* 251; Daniel Gervais, 'The Machine as Author' (2020) 105 *Iowa Law Review* 2053; Jane C Ginsburg and Luke Ali Budiardjo, 'Authors and Machines' (2018) 34 *Berkeley Technology Law Journal* 343; Grimmelman; Andres Guadamuz, 'Do Androids Dream of Electric Copyright? Comparative Analysis of Originality in Artificial Intelligence Generated Works' (2017) 2 *Intellectual Property Quarterly* 169; Ana Ramalho, 'Will Robots Rule the (Artistic) World? A Proposed Model for the Legal Status of Creations by Artificial Intelligence Systems' (2017) 21 *Journal of Internet Law*; Sam Ricketson, 'The 1992 Horace S. Manges Lecture - People or Machines: The Bern Convention and the Changing Concept of Authorship' (1991) 16 *Columbia-VLA Journal of Law & the Arts* 1. For some leading references on patent law, see Hugenholtz and others (n 2) 19.

⁵ See in this respect recent editorials in specialised IP reviews: Daniel Gervais, 'Is Intellectual Property Law Ready for Artificial Intelligence?' (2020) 69 *GRUR International* 117; Jane C Ginsburg, 'People Not Machines: Authorship and What It Means in the Berne Convention' (2018) 49 *International Review of Intellectual Property and Competition Law* 131; Gerald Spindler, 'Copyright Law and Artificial Intelligence' (2019) 50 *International Review of Intellectual Property and Competition Law* 1049..

etc.⁶ In the musical sector in particular, these systems have been used to create content of different levels of complexity, genres, and styles,⁷ with various degrees of human involvement. At the same time, there is policy momentum in the EU to regulate AI technology in general, and its use in the context of specific areas of the law, such as copyright.⁸

Despite the rapid increase in the use of AI, there remains significant legal uncertainty about the application of EU copyright and related rights law to outputs generated by or with the assistance of AI systems, tools or techniques (AI outputs).⁹ Considering this uncertainty, we set out to examine the following research question: How can and should EU copyright and related rights law protect AI music outputs?¹⁰

In answering this research question, the main objectives of this report are the following:

- (i) To analyse the protection of AI outputs under EU copyright and related rights law;

⁶ See, e.g., ‘Google Translate’ <<https://translate.google.com/>> accessed 10 February 2022 (translation); ‘DeepL Translator’ <<https://www.DeepL.com/translator>> accessed 10 February 2022 (translation); ‘MuseNet’ (*OpenAI*, 25 April 2019) <<https://openai.com/blog/musenet/>> accessed 10 February 2022 (music generation); ‘InferKit Demo’ <<https://app.inferkit.com/demo>> accessed 10 February 2022 (text generation); ‘The Next Rembrandt’ (*The Next Rembrandt*) <<https://www.nextrembrandt.com>> accessed 10 February 2022 (artistic portrait); Christie’s, ‘Is Artificial Intelligence Set to Become Art’s next Medium?’ <<https://www.christies.com/features/A-collaboration-between-two-artists-one-human-one-a-machine-9332-1.aspx>> accessed 10 February 2022; ‘Image GPT’ (*OpenAI*, 17 June 2020) <<https://openai.com/blog/image-gpt/>> accessed 10 February 2022; Annalee Newitz, ‘An AI Wrote All of David Hasselhoff’s Lines in This Bizarre Short Film’ (*Ars Technica*, 25 April 2017) <<https://arstechnica.com/gaming/2017/04/an-ai-wrote-all-of-david-hasselhoffs-lines-in-this-demented-short-film/>> accessed 10 February 2022. Additional examples of AI outputs susceptible of copyright protection can be found throughout this report.

⁷ Mark Perry and Thomas Margoni, ‘From Music Tracks to Google Maps: Who Owns Computer-Generated Works?’ (2010) 26 *Computer Law & Security Review* 621; Jared Vasconcellos Grubow, ‘O.K. Computer: The Devolution of Human Creativity and Granting Musical Copyrights to Artificially Intelligent Joint Authors’ (2018) 40 *Cardozo Law Review* 387; François Pachet, Pierre Roy and Benoit Carré, ‘Assisted Music Creation with Flow Machines: Towards New Categories of New’, *Handbook of Artificial Intelligence for Music* (Springer 2021) <<http://arxiv.org/abs/2006.09232>> accessed 12 February 2021; Jean-Pierre Briot and François Pachet, ‘Music Generation by Deep Learning - Challenges and Directions’ (2020) 32 *Neural Computing and Applications* 981; Rebecca Fiebrink, Dan Trueman and Perry R Cook, ‘A Meta-Instrument for Interactive, On-the-Fly Machine Learning’ (2009); Keith Muscutt and David Cope, ‘Composing with Algorithms: An Interview with David Cope’ (2007) 31 *Computer Music Journal* 10; Bob LT Sturm, Joao Felipe Santos and Iryna Korshunova, ‘Folk Music Style Modelling by Recurrent Neural Networks with Long Short Term Memory Units’ (2015); Rebecca Fiebrink and Baptiste Caramiaux, ‘The Machine Learning Algorithm as Creative Musical Tool’, *The Oxford Handbook of Algorithmic Music* (OUP 2018) <<http://arxiv.org/abs/1611.00379>> accessed 18 February 2021.

⁸ See 2.3 below.

⁹ N.B. although scholarship and policy documents sometimes draw a distinction between AI-assisted vs generated output, in this Report, we use the terms interchangeably. For illustrations of different uses, see e.g. discussion in Hugenholtz and others (n 2); WIPO, ‘Revised Issues Paper on Intellectual Property Policy and Artificial Intelligence’ (2020) WIPO/IP/AI/2/GE/20/1 REV.

¹⁰ Except where explicitly stated otherwise or is apparent from the text, ‘AI outputs’ in the present study refers to outputs in musical domain.

- (ii) To examine the attribution of authorship and ownership to (natural and legal) persons involved in the creation or production of AI outputs;
- (iii) To formulate interpretative guidelines and policy recommendations on increasing legal certainty regarding the protection, authorship, and ownership of copyright and/or related rights over AI outputs, especially musical outputs.

Our research does not start from a blank slate. In addition to a growing body of scholarship and policy materials on the topic, our analysis builds on recent work by some of the authors of this report.¹¹ The focus of our research is on what we term “music” or “musical AI outputs, meaning any such output that relates to music or musical content and is susceptible of protection by copyright and/or related rights, such as musical compositions, lyrics, performances, phonograms (sound recordings), and broadcasts (webcasts) of the same.

We have selected the lens of the music sector for different reasons, which can be grouped in two buckets. First, music has historically been a driving force for the development of copyright law as it adjusts to innovative technologies. Indeed, it has often been the “canary in the coalmine” when it comes to the impact of new technologies on copyright law and policy. Conclusions on the protection of AI music outputs could therefore have a high significance for the broader field of copyright law and policy.

Second, the EU copyright *acquis* is arguably the most developed in relation to the protection and exploitation of musical subject matter: copyright protection of musical works; related rights protection for performances, phonograms and broadcasts; collective licensing mechanisms, including multi-territorial licensing of online rights in musical works, mechanisms of statutory remuneration rights, mandatory collective management, etc.¹² This allows for a more comprehensive “stress test” of the legal framework through case studies and hypotheticals. It also allows us to examine the application and use of a wide variety of legal protection mechanisms, many of which are also relevant for other creative domains. There are already numerous examples of diverse AI projects and businesses creating music

¹¹ Hugenholtz and others (n 2); Gervais, ‘Is Intellectual Property Law Ready for Artificial Intelligence?’ (n 5); Gervais, ‘The Machine as Author’ (n 4); Daniel Gervais, ‘The Human Cause’ in Ryan Abbott (ed), *Research Handbook on Intellectual Property and Artificial Intelligence* (Edward Elgar 2022) <<https://papers.ssrn.com/abstract=3857844>> accessed 31 August 2021.

¹² Oleksandr Bulayenko and others, *Study on Emerging Issues on Collective Licensing Practices in the Digital Environment* (Ecorys/IViR Study for the European Commission, SMART 2018/0069 2021) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3970490>.

outputs, as well as some observable legal practice(s) as it relates to the attribution of authorship, ownership, exercise and exploitation of AI outputs. AI projects and businesses in other creative domains employ identical or similar practices.

Our focus on the copyright protection of AI music outputs means not only that other protected subject matter (e.g., audio-visual content) is relegated to the background, but also that some topics at the intersection of AI and copyright law are excluded from our analysis. Such topics outside study's scope include: (i) the protection of AI systems as such; (ii) the legal protection of inputs to an AI system, such as in the case of text and data mining (except to the extent necessary to discuss issues related with AI outputs, such as derivative works¹³); (iii) the use of AI systems for purposes *other than* the production of musical outputs, including copyright enforcement,¹⁴ recommender systems¹⁵, business intelligence, prediction of commercial success ("hits making")¹⁶ and the like.

To the extent possible, this report employs a technologically neutral approach when discussing the legal protection of AI outputs. We clarify below our working definition of AI and our basic understanding of the technology relevant to assess AI music outputs.¹⁷ Beyond that, our analysis echoes the call of policy makers for a technologically neutral approach, thereby attempting to avoid obsolescence associated with the fast pace of technological developments in this field.¹⁸

The methodology of this report consists of doctrinal legal research and empirical research through interviews and case studies. The doctrinal legal research includes an extensive literature review and analysis of primary sources, legal scholarship, empirical literature on AI relevant for our research, literature and published interviews with artists, engineers and

¹³ See 3.1.5 below.

¹⁴ UNICRI/EUIPO study on artificial intelligence and intellectual property crime, forthcoming 2022.

¹⁵ Quentin Villermet and others, 'Follow the Guides: Disentangling Human and Algorithmic Curation in Online Music Consumption' [2021] Fifteenth ACM Conference on Recommender Systems 380. For a general definition, see Art. 2(o) Proposed DSA: 'recommender system' means a fully or partially automated system used by an online platform to suggest in its online interface specific information to recipients of the service, including as a result of a search initiated by the recipient or otherwise determining the relative order or prominence of information displayed.

¹⁶ Alexandra Bensamoun, Joëlle Farchy and Paul-François Schira, 'Mission Intelligence Artificielle et Culture' (CSPLA 2020) Rapport final 19.

¹⁷ See 2.1 and 2.2 below.

¹⁸ EP, Resolution of 20 October 2020 on intellectual property rights for the development of artificial intelligence technologies (2020/2015(INI)), P9_TA(2020)0277 paras 7 and 15.

managers of AI projects in the music sector. The scope of our legal analysis is delimited to EU copyright law, interpreted in light of international law. It means that the analysis covers the EU copyright *acquis*, which is mainly comprised of directives, and its interpretation by the Court of Justice of the EU (CJEU). The most relevant instruments in this respect are the InfoSoc Directive, the Database Directive, the Term Directive, the Computer Programs Directive, the Enforcement Directive, and the Copyright in the Digital Single Market (CDSM) Directive.¹⁹ The relevant international legal framework includes the Berne Convention, the Rome Convention, the TRIPS Agreement, the WIPO Copyright Treaty (WCT), and the WIPO Performances and Phonograms Treaty (WPPT).²⁰

In addition, we have carried out empirical research in the form of case studies and interviews with experts on the legal, technological, and business aspects of AI music outputs.

Several cases of AI music creation were identified and studied for the purpose of examining attribution of authorship and/or ownership in practice. The scenarios developed in section 3.2 below relied on the analysis of contracts (e.g., terms and conditions of use of AI music services) and public statements on authorship and/or ownership (e.g., websites of AI service providers, published interviews), including statements by artists and managers of AI music service providers knowledgeable about specific or possible creative choices made when using or deploying the AI tools or systems they provide. Our scenarios and cases (Annex 1) were

¹⁹ Respectively: Directive (EU) 2019/790 of the European Parliament and of the Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC [2019] OJ L 130/92 (InfoSoc Directive); Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases [1996] OJ L 77/20 (Database Directive); Directive 2006/116/EC of the European Parliament and of the Council of 12 December 2006 on the term of protection of copyright and certain related rights (codified version) [2006] OJ L 372/12, as amended by Directive 2011/77/EU of the European Parliament and the Council of 27 September 2011 amending Directive 2006/116/EC on the term of protection of copyright and certain related rights [2011], OJ L 265/1 (Term Directive); Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs (codified version) [2009] OJ L 111/16 (Computer Programs Directive); Directive 2004/48/EC of the European Parliament and of the Council of 29 April 2004 on the enforcement of intellectual property rights [2004], OJ L 195/16; Corrigenda in OJ 2004 L 195/16 and OJ 2007 L 204/27 (Enforcement Directive); Directive (EU) 2019/790 of the European Parliament and of the Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC [2019] OJ L 130/92 (CDSM Directive).

²⁰ Berne Convention for the Protection of Literary and Artistic Works, opened for signature Sept. 9, 1886, 828 U.N.T.S. 221 (Berne Convention); International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organisations (Rome Convention) Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, 1869 U.N.T.S.299 (TRIPS Agreement); WIPO Copyright Treaty, Dec. 20, 1996, 2186 U.N.T.S. 121 (WCT); WIPO Performances and Phonograms Treaty, 1996 O.J. (L 89) (WPPT).

selected based on literature review, expert interviews and web search, considering the availability of information on authorship.

The consulted experts were identified and selected based on their knowledge through research team's acquaintances in the field, literature review, case studies, LinkedIn Premium and interview process. The research team approached experts via email or LinkedIn to identify suitable dates for a meeting in person or via video-conferencing tools (Zoom or MS Teams). On average, an interview lasted for 60 minutes. Most interviews were carried out by two interviewers, and a few by one. All the interviews were conducted under conditions of confidentiality of information provided. Names of the consulted experts and their organisations / projects are listed in Annex 2 for the purpose of transparency. Some of the experts contributed to the study by responding in writing to the questionnaire (Annex 3).

This Report consists of five chapters. After this introduction (Chapter 1), Chapter 2 sets out the basic technology and EU policy background to examine our research question. Chapter 3 then discusses the issue of protection of AI music outputs by EU copyright and related rights law, as works and other subject matter. This chapter also includes an analysis of authorship and initial ownership of AI outputs susceptible of copyright and related rights protection, including different practical scenarios based on our case studies and empirical work. Chapter 4 follows up with an analysis of the protection of AI music outputs by related rights under EU law, focusing on performers, phonogram producers and broadcasters. The chapter further includes a discussion on sui generis regimes, namely those of "computer-generated works" in some countries in Europe (Ireland and UK) and around the world. Finally, Chapter 5 provides a summary of the preceding analysis and advances policy recommendations to reduce legal uncertainty in this area.

2. TECHNICAL AND POLICY BACKGROUND

This Chapter provides a brief technical and policy background to frame and carry out the subsequent legal analysis. It first provides a description and explanation of AI systems (1.1). It is followed by an explanation of the concept of “AI output”, which guides our subsequent analysis (1.2). Finally, the Chapter closes by providing the necessary background regarding recent legal policy developments in the EU on the intersection of copyright and AI, with a focus on the protection of AI outputs by copyright law (1.3.).

2.1. ARTIFICIAL INTELLIGENCE SYSTEMS

This section provides a brief description and definition of AI *systems*.²¹ Our aim is to offer a basic understanding of the operation of these systems, with a focus on the production of outputs and the degree of human contribution therein. This description further enables differentiation between AI systems and other technologies used in music content creation.

It is a commonplace in the literature on AI to state that there is no universally accepted definition of “artificial intelligence”.²² In broad terms, AI can be defined as “computer-based systems that are developed to mimic human behaviour”²³ or a “discipline of computer science that is aimed at developing machines and systems that can carry out tasks considered to require human intelligence, with limited or no human intervention.”²⁴ But the term is both contested and dynamic. Contested, insofar as it is difficult to establish a consensus as to the exact scope of a definition, which covers different disciplines, methods, and techniques.²⁵ Dynamic, to the extent that the meaning of the term is fluid over time, meaning that a

²¹ For a more detailed discussion, on which this subsection builds upon, see Hugenholtz and others (n 2) 21–27.

²² Ryan Calo, ‘Artificial Intelligence Policy: A Primer and Roadmap’ (2017) 51 UC Davis Law Review 399, 404; WIPO, ‘WIPO Technology Trends 2019: Artificial Intelligence’. For a reference work on AI, see Stuart J Russell and Peter Norvig (eds), *Artificial Intelligence: A Modern Approach* (3rd ed, Prentice Hall 2010). For introductions to AI and Machine learning, Wolfgang Ertel, *Introduction to Artificial Intelligence* (2nd ed., Springer 2017); Miroslav Kubat, *An Introduction to Machine Learning* (Springer 2015).

²³ Josef Drexler and others, ‘Technical Aspects of Artificial Intelligence: An Understanding from an Intellectual Property Law Perspective’ (MPI 2019) MPI Research Paper No. 19-13.

²⁴ WIPO, ‘Revised Issues Paper on Intellectual Property Policy and Artificial Intelligence’ (n 9) 3.

²⁵ See, e.g., the multiple examples of overlapping and conflicting definitions in Sofia Samoili and others, ‘AI Watch: Defining Artificial Intelligence 2.0’ (JRC 2021) <<https://data.europa.eu/doi/10.2760/019901>> accessed 10 February 2022.

particular technique may qualify as AI at one point but not later in time; likewise, future methods and techniques yet to be developed can be included in the definition.

Considering that our research addresses the legal status of AI outputs under EU law, it is appropriate to adopt as a working definition that used by the EU legislature. As a preliminary step, however, it is important to understand how the EU legislature has come to define the term. In this respect, the first crucial document is the Commission's 2018 Communication on "Artificial Intelligence for Europe", which advances the following definition:

Artificial intelligence (AI) refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals. AI-based systems can be purely software-based, acting in the virtual world (e.g. voice assistants, image analysis software, search engines, speech and face recognition systems) or AI can be embedded in hardware devices (e.g. advanced robots, autonomous cars, drones or Internet of Things applications).²⁶

This definition was then further elaborated the AI High Level Expert Group (AI-HLEG)²⁷, which draws a distinction between *AI systems* (our focus in this Report) and AI as a discipline, in the following way:

Artificial intelligence (AI) systems are software (and possibly also hardware) systems designed by humans that, given a complex goal, act in the physical or digital dimension by perceiving their environment through data acquisition, interpreting the collected structured or unstructured data, reasoning on the knowledge, or processing the information, derived from this data and deciding the best action(s) to take to achieve the given goal. AI systems can either use symbolic

²⁶ Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions: Artificial Intelligence for Europe. Brussels, 25.4.2018, COM(2018) 237 final, p.1. <https://ec.europa.eu/transparency/regdoc/rep/1/2018/EN/COM-2018-237-F1-EN-MAIN-PART-1.PDF>

(adding: "We are using AI on a daily basis, e.g. to translate languages, generate subtitles in videos or to block email spam. Many AI technologies require data to improve their performance. Once they perform well, they can help improve and automate decision making in the same domain. For example, an AI system will be trained and then used to spot cyber-attacks on the basis of data from the concerned network or system").

²⁷ 'High-Level Expert Group on Artificial Intelligence' (European Commission, 27 September 2021) <<https://web.archive.org/web/20211002104453/https://digital-strategy.ec.europa.eu/en/policies/expert-group-ai>> accessed 20 December 2021.

rules or learn a numeric model, and they can also adapt their behaviour by analysing how the environment is affected by their previous actions. As a scientific discipline, AI includes several approaches and techniques, such as machine learning (of which deep learning and reinforcement learning are specific examples), machine reasoning (which includes planning, scheduling, knowledge representation and reasoning, search, and optimisation), and robotics (which includes control, perception, sensors and actuators, as well as the integration of all other techniques into cyber-physical systems). (emphasis added)²⁸

This AI-HLEG definition is supported by a relevant statement to the effect that “[h]umans design AI systems directly, but they may also use AI techniques to optimise their design”.²⁹

Following on this preliminary work, the 2021 proposal for an “AI Act”³⁰ settles on a broad definition of “AI Systems” as “software that is developed with one or more of the techniques and approaches listed in Annex I and can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with”.³¹ For our purposes, the type of output that we are interested in is “content” that seems capable of attracting copyright and/or related rights protection.

Annex I of the AI Act then lists various techniques and approaches, including:³² (i) different types of machine learning (supervised, unsupervised and reinforcement) using a variety of different methods (e.g., deep learning); (ii) logic- and knowledge-based approaches³³; (iii) statistical approaches, Bayesian estimation, search and optimization methods.

²⁸ AI-HLEG, ‘A Definition of AI: Main Capabilities and Disciplines’ (2019) 6 <<https://digital-strategy.ec.europa.eu/en/library/definition-artificial-intelligence-main-capabilities-and-scientific-disciplines>>.

²⁹ AI-HLEG (n 28) 6.

³⁰ Proposal for a Regulation of the European Parliament and of the Council Laying down harmonized rules on Artificial Intelligence (Artificial Intelligence Act) and amending certain Union Legislative Acts COM/2021/206 final (hereafter AI Act proposal).

³¹ Art. 3(1) AI Act proposal.

³² Annex I AI Act proposal.

³³ These include “knowledge representation, inductive (logic) programming, knowledge bases, inference and deductive engines, (symbolic) reasoning and expert systems”. See Annex I AI Act proposal.

In addition to this broad and open-ended (non-exhaustive) definition of AI systems, the AI Act proposal states that the Commission is empowered to amend the “list of techniques and approaches listed in Annex I, in order to update that list to market and technological developments on the basis of characteristics that are similar to the techniques and approaches listed therein.”³⁴ This is a nod to the fluid and dynamic nature of the term and allows for the possibility of updating its scope.

In this Report, we adopt the AI Act’s broad definition of AI systems. This definition, it is noted, is consistent with the findings of our interviews, which indicate that individuals and projects working on the production of AI music outputs often use AI systems relying on a combination of types, methods and approaches, ranging from machine learning to logic- and knowledge-based approaches, from statistical to symbolic approaches.³⁵ On this point, it is worth noting that our interviews showed that as companies attempt to remain relevant and develop competitive products, they are rapidly exploring and acquiring new technologies permitting them to excel, including different types of AI technologies. For that reason, public statements about the use or non-use of AI technologies might quickly change or become outdated.³⁶

Still, current research suggests that machine learning is the most widely used or dominant subfield or branch of AI.³⁷ Our desk research and interviews with experts confirm this, at least insofar as machine learning techniques and methods are regularly used in the production of AI musical outputs, even if in combination with other methods. As such, a few additional remarks in this respect are justified.

³⁴ Art. 4 AI Act proposal.

³⁵ Symbolic AI is also often referred to as “good old-fashioned AI”. It covers systems relying on “the organisation of abstract symbols using logical rules” to “build detailed and human-understandable decision structures to translate real-world complexity and help machines arrive at human-like decisions”. See Calo (n 22) 404–405; OECD, *Artificial Intelligence in Society* (OECD 2019) <https://www.oecd-ilibrary.org/science-and-technology/artificial-intelligence-in-society_eedfee77-en> accessed 10 February 2022. NB many of the techniques within the symbolic AI category are also referred to as “reasoning” techniques. See AI-HLEG (n 28) 3.

³⁶ Transcripts of the interviews with Tom FitzGerald, CFO at Xhail, 13 May 2019, and Mick Kiely, CEO and Founder of Xhail, 1 August 2019, in Martin Clancy, ‘Reflections on the Financial and Ethical Implications of Music Generated by Artificial Intelligence’ (Thesis, Trinity College Dublin School of Creative Arts Discipline of Music 2021) 467 and 482 <<http://www.tara.tcd.ie/handle/2262/94880>> accessed 13 August 2021.

³⁷ [EC, Artificial Intelligence for Europe, COM(2018)237 final, p.10]. “Machine learning is the dominant AI technique disclosed in patents and is included in more than one-third of all identified inventions (134,777 patent documents). Filings of machine learning-related patent have grown annually...”, WIPO, ‘WIPO Technology Trends 2019’ (n 22) 14.

Machine learning can be defined as “the branch of AI that is focused on developing systems that learn from data” through “an automated process of identifying patterns in available data and then applying the knowledge to new data”.³⁸ In these systems, during an initial “measurement” stage, the input data is first processed and transformed into a dataset. In a subsequent “learning” stage the data is turned into a model that “summarizes the patterns in the training data” while making generalizations.³⁹ Using different terminology, this process can be described as including the subsequent stages of data gathering, data pre-processing, training, testing, and validating.

As recognised in the AI Act’s definition, the model can be trained under different learning paradigms – supervised, unsupervised or reinforced – and although it can “take many forms”, it “is typically represented as a set of weights or parameters”.⁴⁰ “Supervised learning” is currently the prevalent paradigm. It consists of typically human labelling of the training data “to tell the model whether the prediction made during the optimisation process was right or wrong”.⁴¹ “Unsupervised learning” occurs when the “model is confronted with unlabelled data and ultimately trained to identify similarities, parallels and/or differences in data.”⁴² Crucial distinctions from supervised learning are the absence of labelled datasets that are complete and clean, as well as the absence of pre-defined output variables. As a result, unsupervised learning requires “more extensive human interpretation of the output”.⁴³ Finally, “reinforced learning” occurs when the system is “free to make its decisions, over time, and at each decision we provide it with a reward signal that tells it whether it was a good or a bad decision”; the objective of the system “is to maximize the positive reward received”.⁴⁴

³⁸ See Drexel and others (n 23). For a detailed explanation of the components and operation of a machine learning system see id. pp. 4–10. An important characteristic of these systems is therefore their “capacity... to improve... performance at a task over time”, Calo (n 22) 405.

³⁹ Solon Barocas, Moritz Hardt and Arvind Narayanan, *Fairness and Machine Learning: Limitations and Opportunities* (fairmlbook.org 2021) 15.

⁴⁰ Barocas, Hardt and Narayanan (n 39) 15. On the training methods see also Drexel and others (n 23) 7–8..

⁴¹ Drexel and others (n 23) 13. “Supervised learning is the prevalent method for constructing classifiers from observed data.”, Barocas, Hardt and Narayanan (n 39) 37. In essence, the AI system is given examples of past “input-output behavior” to make generalizations from, and apply to future different cases, AI-HLEG (n 28) 3–4.

⁴² Drexel and others (n 23) 13.

⁴³ Drexel and others (n 23) 8. Importantly, at time of writing, there is a push in the field of AI towards increasing use of unsupervised learning.

⁴⁴ AI-HLEG (n 28) 4.

The system therefore learns and optimises through interaction with the environment.⁴⁵ As a result, at the time of writing, reinforced learning appears to allow the highest level of freedom for the AI system in defining the path to achieve its goal.⁴⁶

Within machine learning, research suggests that most AI outputs capable of copyright protection currently result (at least partially) from the application of neural networks and deep learning methods. Of course, it is important to note this state of affairs might change with the development of current techniques and emergence of new one. Neural networks are a type of model used in the AI system.⁴⁷ The structure of this model “consists of layers of neurons connected by weights” and “imitates the functioning of a human brain.”⁴⁸ In simple terms, these networks update weights in a predetermined infrastructure between inputs and outputs.⁴⁹

Machine learning systems that use more complex architectures with larger neural networks (containing numerous layers) are considered “deep” neural networks or “deep learning” systems.⁵⁰ These deep learning systems are said to lead to a higher degree of accuracy “with less need of human guidance”⁵¹ and are currently the “biggest and fastest growing technique in AI”.⁵²

⁴⁵ A well-known example of this method is the training of DeepMind’s AlphaGo Zero algorithm to learn and master the game of Go. See David Silver, Demis Hassabis, ‘AlphaGo Zero: Starting from scratch’ (*Deepmind*, 18 October 2017) </blog/article/alphago-zero-starting-scratch> accessed 29 June 2020; David Silver and others, ‘Mastering the Game of Go with Deep Neural Networks and Tree Search’ (2016) 529 *Nature* 484.

⁴⁶ For a basic description and explanation of “reinforcement learning”, see Ertel (n 22) 289–311.

⁴⁷ For a basic description and explanation of “neural networks”, see Ertel (n 22) 245–287.

⁴⁸ Drexler and others (n 23) 12.

⁴⁹ OECD (n 35) 28. The AI-HLEG provides a good explanation: “A neural network has as input the data coming from the sensors (in our example, the picture of the floor) and as output the interpretation of the picture (in our example, whether the floor is clean or not). During the analysis of the examples (the network’s training phase), the connections’ weights are adjusted to match as much as possible what the available examples say (that is, to minimize the error between the expected output and the output computed by the network). At the end of the training phase, a testing phase of the behaviour of the neural network over examples never seen before checks that the task has been learnt well”, AI-HLEG (n 28) 4.

⁵⁰ OECD (n 35) ch 1; AI-HLEG (n 28). Note however the lack of consensus as to the required scale or complexity scale to achieve this status.

⁵¹ WIPO, ‘WIPO Technology Trends 2019’ (n 22) 4.

⁵² “The machine learning techniques revolutionizing AI are deep learning and neural networks, and these are the fastest growing AI techniques in terms of patent filings: deep learning showed an impressive average annual growth rate of 175 percent from 2013 to 2016, reaching 2,399 patent filings in 2016; and neural networks grew at a rate of 46 percent over the same period, with 6,506 patent filings in 2016.”, WIPO, ‘WIPO Technology Trends 2019’ (n 22) 3, 14, 32, 39, 41.

2.2. ARTIFICIAL INTELLIGENCE OUTPUTS

Since the point of attachment for our legal analysis is the outcome of a process of an AI system – the AI output – it is important at this stage to draw certain conceptual and terminological clarifications. In the context of IP, some scholars make a distinction between “direct outputs” and “applications” resulting from an AI system, arguing that they give rise to “distinct legal issues”.⁵³ Direct outputs may refer to predictions, recommendations (e.g., for a “daily mix” playlist on Spotify), correlations, clustering, etc. “Applications” are outputs that can “be put into practical use”, such as in the area of IP subject matter.⁵⁴ Still, in the area of copyright, this distinction is difficult to draw and not always helpful.

In this area, AI applications include, to name but a few, paintings, such as “The Next Rembrandt”⁵⁵ or “The Portrait of Edmond Belamy”⁵⁶; text produced by the GPT-2⁵⁷ and GPT-3 text generator from Open AI⁵⁸, translations by the DeepL translator⁵⁹; and musical compositions such as the “emotional soundtrack music” composed by AIVA⁶⁰ or the tracks

⁵³ Drexel and others (n 23) 9. NB that this is a distinct use than AI “application fields” (i.e., “different fields, areas or disciplines where AI techniques or functional applications may find application, such as transportation, agriculture or life and medical sciences.”) and AI “functional applications” (e.g., speech and computer vision), as used in WIPO, ‘WIPO Technology Trends 2019’ (n 22) 13 and 24.

⁵⁴ Drexel and others (n 23) 9.

⁵⁵ The Next Rembrandt, <https://www.nextrembrandt.com/>. See also Microsoft News, “Blurring the Lines Between Art, Technology and Emotion: The Next Rembrandt” (13 April 2016), <https://news.microsoft.com/europe/features/next-rembrandt/>

⁵⁶ “Portrait of Edmond Belamy (detail) created by GAN (Generative Adversarial Network)...”; “This portrait, however, is not the product of a human mind. It was created by an artificial intelligence, an algorithm defined by that algebraic formula with its many parentheses. And when it went under the hammer in the Prints & Multiples sale at Christie’s on 23-25 October, Portrait of Edmond Belamy sold for an incredible \$432,500, signalling the arrival of AI art on the world auction stage.”, Christie’s (n 6).

⁵⁷ See Open AI, GPT-2: 1.5B Release (5 November 2019), <https://openai.com/blog/gpt-2-1-5b-release/>. See also James Vincent, ‘OpenAI Has Published the Text-Generating AI It Said Was Too Dangerous to Share’ (*The Verge*, 7 November 2019) <<https://www.theverge.com/2019/11/7/20953040/openai-text-generation-ai-gpt-2-full-model-release-1-5b-parameters>> accessed 15 July 2020.

⁵⁸ On GPT-3, see Tom B Brown and others, ‘Language Models Are Few-Shot Learners’ [2020] arXiv:2005.14165 [cs] <<http://arxiv.org/abs/2005.14165>> accessed 11 February 2022.; and OpenAI. “OpenAI Licenses GPT-3 Technology to Microsoft.” OpenAI (blog), September 22, 2020. <https://openai.com/blog/openai-licenses-gpt-3-technology-to-microsoft/>. For criticism, Gary Marcus and Ernest Davis, ‘GPT-3, Bloviator: OpenAI’s Language Generator Has No Idea What It’s Talking about’ (*MIT Technology Review*, 22 August 2020) <<https://www.technologyreview.com/2020/08/22/1007539/gpt3-openai-language-generator-artificial-intelligence-ai-opinion/>> accessed 11 February 2022.

⁵⁹ ‘DeepL Translator’ (n 6).

⁶⁰ AIVA, <https://www.aiva.ai/>.

produced in the course of the “AI Song Contest”, to name a few.⁶¹ Many further examples in the musical area are advanced later in this report (see 3.2).

What varies is the “required degree of human contribution” for each application.⁶² This view is consistent with technical descriptions of the “lifecycle” of AI systems, e.g., from the OECD, which identify a number of human interventions and contributions at different stages: planning and designing (e.g., defining requirements and objectives, prototyping), collecting and processing data (e.g., developing a dataset), and modelling (e.g., development of models or algorithms); “verification and validation” (e.g., performance tests and calibration); “deployment” (e.g., piloting and compatibility with external software); and “operation and monitoring” (e.g., assessment and correction of outputs for consistency with objectives).⁶³

Many of the AI musical outputs under consideration in our report fall under the heading of “applications” or “productions.” As noted above (2.1), they are perhaps most aptly described as “content”, as exemplified in the definition of AI systems in the AI Act proposal. In any case, these outputs denote some level of human contribution at different stages of the AI system lifecycle.

But this does not mean that such intervention or contribution is always material to the protection of the output by copyright and related rights law. Rather, it merely highlights that the focus of the legal inquiry under copyright law is on assessing the level of human contribution to (or intervention in) the lifecycle of an AI system, and the extent to which it is sufficiently connected to the AI output to attract copyright protection.⁶⁴ To be sure, assessing the legally relevant level of human involvement is a complex question depending both on applicable law and on a case-by-case assessment of factual circumstances,⁶⁵ which may not “provide a straightforward answer at all times.”⁶⁶

⁶¹ VPRO, AI Song Contest, FAQ, <https://www.vprobroadcast.com/titles/ai-songcontest.html>.

⁶² Drexler and others (n 23) 9.

⁶³ In this paragraph we rely on the technical description of the “AI System Lifecycle” in OECD (n 35) ch 1.

⁶⁴ See 3.1 below.

⁶⁵ Denicola (n 4) 284-286 (referring to the distinction between AI-assisted and AI-generated outputs as “an obviously difficult, indeed indeterminate, and ultimately pointless endeavor. At the very least it demands a detailed inquiry into the nature of the interaction between the user and the computer and a sophisticated understanding of the functioning and capabilities of the software program.”).

⁶⁶ Ramalho (n 4) 21–22.

2.3. EU POLICY BACKGROUND

This section briefly describes recent legal policy developments in the EU on the intersection of copyright and AI, with a focus on the protection of AI outputs by copyright law.⁶⁷ At the EU institutional level, there has been significant and wide-ranging policy work on the regulation of AI, namely from the Commission and the European Parliament, including their associated research services.⁶⁸

Most policy initiatives and research do not directly touch copyright protection of AI outputs. For instance, the Commission in the last years has published several Communications on the topic of AI preceding the AI Act proposal. These include communications on “Artificial Intelligence for Europe”⁶⁹, a “Coordinated Plan on Artificial Intelligence”⁷⁰, “Building Trust in Human-Centric Artificial Intelligence”⁷¹, the “European Strategy for Data”⁷², and the “White Paper on AI: a European approach to excellence and trust”.⁷³ The Commission also set up the AI-HLEG, which has developed important groundwork in this area.⁷⁴ Still, these

⁶⁷ For a discussion of recent developments and issues at the intersection of AI and patent law, see Hugenholtz and others (n 2) 97–115.

⁶⁸ See, for a recent overview, Jędrzej Niklas and Lina Dencik, ‘European Artificial Intelligence Policy: Mapping the Institutional Landscape’ (DATAJUSTICE 2020) Working Paper DATAJUSTICE project. For a gateway to the multiple EC initiatives in this area, European Commission, Strategy, Shaping Europe’s digital future, Policies, “Artificial intelligence”, <https://ec.europa.eu/digital-single-market/en/artificial-intelligence>. Regarding the work of research services associated with the EP and EC – e.g., the EPRS and the JRC – such work is not detailed in this section but is referred to throughout the text, where directly relevant. Among the most relevant recent work in this respect, see Iglesias, Shamuilia and Anderberg (n 4); Ronan Hamon, Henrik Junklewitz and Ignacio Sanchez, ‘Robustness and Explainability of Artificial Intelligence: From Technical to Policy Solutions’ (JRC 2020) <https://op.europa.eu/publication/manifestation_identifier/PUB_KJNA30040ENN> accessed 11 February 2022; Samoili and others (n 25).

⁶⁹ EC, ‘Artificial Intelligence for Europe’, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, COM (2018) 237 Final, 25 April 2018.

⁷⁰ EC, ‘Coordinated plan on Artificial Intelligence’, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, COM (2018) 795 Final, 7 December 2018.

⁷¹ EC, ‘Building Trust in Human-Centric Artificial Intelligence’, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, COM (2019) 168 final, 8 April 2019.

⁷² EC, European strategy for data, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Study Guidelines 2020, COM (2020) 66 final, 19 February 2020.

⁷³ EC, ‘White paper On Artificial Intelligence – A European approach to excellence and trust’, COM (2020) 65 final, 19 February 2020.

⁷⁴ On which see European Commission, Strategy, Shaping Europe’s digital future, Policies, “High Level Expert Group on Artificial Intelligence”, <https://ec.europa.eu/digital-single-market/en/high-level-expert-group-artificial-intelligence>. See also the 2018 Communication on “Artificial Intelligence for Europe”, as it calls for reflection on the interactions between AI and IP rights “from the perspective of both intellectual property offices and users,

communications either do not discuss IP at all or contain only indirect references to it, none of which is directly relevant to this report.⁷⁵ The AI Act proposal also makes no reference to copyright protection of AI outputs.

The European Parliament (EP) has also been active in this area. In February 2017, a Resolution with recommendations on “Civil Law Rules on Robotics” called on the Commission to support a horizontal and technologically neutral approach to IP that could be applied to the various sectors in which robotics could be employed.⁷⁶ In this context, an Explanatory Statement on “Civil Law Rules on Robotics” by the EP’s Committee on Legal Affairs (JURI) proposes (inter alia) “the elaboration of criteria for ‘own intellectual creation’ for copyrightable works produced by computers or robots”.⁷⁷

In February 2019, the EP passed a Resolution on a “comprehensive European industrial policy on artificial intelligence and robotics”. This resolution renewed the earlier call to the Commission to “support a horizontal and technologically neutral approach to intellectual property applicable to the various sectors in which robotics could be employed” and underscored the “need to monitor the relevance and efficiency of rules on intellectual property rights to govern the development of AI.”⁷⁸

with a view to fostering innovation and legal certainty in a balanced way”. It adds that the use of “AI to create works can have implications on intellectual property, with questions arising for instance on patentability, copyright and right ownership”. EC, ‘Artificial Intelligence for Europe’, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, COM (2018) 237 Final, 25 April 2018. p. 15 (fn. 52). Beyond that, the most relevant initiatives for our purposes are the following: EC, ‘Trends and Developments in Artificial Intelligence – Challenges to the Intellectual Property Rights Framework’, Shaping Europe’s digital future, *SMART 2018/0052*, March 2019 (“Call for Tender”); and EC, CNECT/2020/OP/0009 — Study on Copyright and New technologies: Copyright Data Management and Artificial Intelligence — Smart 2019/0038.

⁷⁵ The Communication on “An European Strategy for Data” does however discuss possible legislative intervention in the area of IP: “evaluating the IPR framework with a view to further enhance data access and use (including a possible revision of the Database Directive⁴¹ and a possible clarification of the application of the Trade Secrets Protection Directive⁴² as an enabling framework)”. See EC, European strategy for data, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Study Guidelines 2020, COM (2020) 66 final, 19 February 2020, p. 13.

⁷⁶ EP, Resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)), paras 136-137 (Interoperability, access to code and intellectual property rights).

⁷⁷ EP, JURI, Report with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)), 27 January 2017, ‘Explanatory Statement’, p. 28. Intellectual property rights, data protection and data ownership (elaborating also on the need to come forward ‘with a balanced approach to intellectual property rights when applied to hardware and software standards and codes that protect innovation and at the same time foster innovation’).

⁷⁸ EP, ‘Resolution on a comprehensive European industrial policy on artificial intelligence and robotics’, (2018/2088 (INI)), 12 February 2019.

Then, in October 2020, the EP adopted a Resolution on “intellectual property rights for the development of artificial intelligence technologies”.⁷⁹ Regarding AI outputs, the resolution

[t]akes the view that technical creations generated by AI technology must be protected under the IPR legal framework in order to encourage investment in this form of creation and improve legal certainty for citizens, businesses and, since they are among the main users of AI technologies for the time being, inventors; considers that works autonomously produced by artificial agents and robots might not be eligible for copyright protection, in order to observe the principle of originality, which is linked to a natural person, and since the concept of ‘intellectual creation’ addresses the author’s personality; calls on the Commission to support a horizontal, evidence-based and technologically neutral approach to common, uniform copyright provisions applicable to AI-generated works in the Union, if it is considered that such works could be eligible for copyright protection; recommends that ownership of rights, if any, should only be assigned to natural or legal persons that created the work lawfully and only if authorisation has been granted by the copyright holder if copyright-protected material is being used, unless copyright exceptions or limitations apply; stresses the importance of facilitating access to data and data sharing, open standards and open source technology, while encouraging investment and boosting innovation.⁸⁰

We will return to some of the points and themes of this passage throughout this report. Finally, in November 2021, in its Resolution on and "Intellectual Property Plan", the EP underlined that “the lack of harmonisation of rules on authorship and copyright ownership can lead to divergent national solutions for AI-assisted works”.⁸¹

⁷⁹ EP, Resolution of 20 October 2020 on intellectual property rights for the development of artificial intelligence technologies (2020/2015(INI)), P9_TA-PROV(2020)0277. See also the preceding Draft Report on intellectual property rights for the development of artificial intelligence technologies (2020/2015(INI)), Committee on Legal Affairs of the EP, (Rapporteur: Stéphane Séjourné), 24.4.2020.

⁸⁰ EP, Resolution of 20 October 2020 on intellectual property rights for the development of artificial intelligence technologies (2020/2015(INI)), para. 15.

⁸¹ European Parliament resolution of 11 November 2021 on an intellectual property action plan to support the EU’s recovery and resilience (2021/2007(INI)), P9_TA(2021)0453, para. 45.

3. PROTECTION OF AI OUTPUT BY COPYRIGHT

This chapter deals with the requirements for protection for AI musical outputs under EU law. The chapter addresses the key question of whether and to what extent an AI musical output is protected by copyright (authors' rights) under EU law, as interpreted by CJEU and considering the relevant international norms.

This chapter starts with a discussion of the requirements for protection of copyright works under International and EU law (3.1). This comprises an examination of the copyright protection of AI music outputs under a four-step test that builds on our prior research on this topic.⁸² The chapter then proceeds to an assessment of rules on the attribution of authorship as regards AI music outputs (3.2). We develop three analytical scenarios for the attribution of authorship in this context, illustrating them with case studies arising from our empirical and desk research. The chapter concludes with a normative reflection on the previous analysis and the role of copyright protection for AI outputs (3.3).

3.1. REQUIREMENTS FOR PROTECTION OF WORKS IN INTERNATIONAL AND EU LAW

This section describes the requirements for the protection of works in international and EU law, and the application of such requirements to AI outputs.⁸³ Based on an analysis of international and EU law, including the case-law of the CJEU, it is possible to identify a four-step test for the assessment of copyright protection of subject matter as a “work”. This test can be used to assess whether AI output qualifies as a work from the perspective of EU law. The four interrelated criteria that subject matter such as an AI output should meet to qualify as a copyright-protected “work” are as follows: (1) a “production in the literary, scientific or artistic domain”; (2) the product of human intellectual effort; (3) the result of creative choices; (4) which choices are “expressed” in the output.

⁸² Hugenholtz and others (n 2).

⁸³ For this analysis, we build on our prior research on the topic in Hugenholtz and others (n 2); P Bernt Hugenholtz and João Pedro Quintais, ‘Copyright and Artificial Creation: Does EU Copyright Law Protect AI-Assisted Output?’ [2021] IIC - International Review of Intellectual Property and Competition Law <<https://doi.org/10.1007/s40319-021-01115-0>> accessed 11 October 2021.

3.1.1. PRODUCTION IN THE LITERARY, SCIENTIFIC, OR ARTISTIC DOMAIN

International copyright law provides some guidance as to the requirements for the protection of works that is of significance to the legal qualification of AI outputs. Art. 2(1) Berne Convention is particularly relevant as it contains a broad definition of “literary and artistic works”:

The expression “literary and artistic works” shall include *every production in the literary, scientific and artistic domain, whatever may be the mode or form of its expression, such as* books, pamphlets and other writings; lectures, addresses, sermons and other works of the same nature; dramatic or dramatico-musical works; choreographic works and entertainments in dumb show; musical compositions with or without words; cinematographic works to which are assimilated works expressed by a process analogous to cinematography; works of drawing, painting, architecture, sculpture, engraving and lithography; photographic works to which are assimilated works expressed by a process analogous to photography; works of applied art; illustrations, maps, plans, sketches and three-dimensional works relative to geography, topography, architecture or science. (emphasis added)

As noted in the provision and emphasized by Masouyé in relation to the “scientific” domain, what matters is not the substantive content of the subject matter but its form:⁸⁴

The scientific work is protected by copyright not because of the scientific character of its contents: a medical textbook, a treatise on physics, a documentary on interplanetary space are protected not because they deal with medicine, physics, or the surface of the moon, but because they are books and films. The content of the work is never a condition of protection. In speaking of a domain not only

⁸⁴ Claude Masouyé, *Guide to the Berne Convention for the Protection of Literary and Artistic Works (Paris Act, 1971)*, vol 615(E) (WIPO 1978) 12.

literary and artistic, but also scientific, the Convention encompasses scientific works which are protected by reason of the form they assume.

Art. 2(1) Berne Convention is incorporated by reference in both the TRIPS Agreement and the WCT.⁸⁵ It is also indirectly integrated into the EU legal order.⁸⁶ The broad open clause allows for new types of subject matter to qualify as “works” beyond those listed as examples in the Berne provision.

The requirement that an output must be a “production in the literary, scientific or artistic domain” in order to qualify as a work amounts in essence to a domain test. While this test is intuitively understandable, it is also the case that it is not required explicitly in the statutory texts of EU copyright law, nor has it been explicitly relied upon in the case law of the CJEU in this area.⁸⁷ As such, it is an open question whether such a requirement exists in EU copyright law, other than indirectly through its incorporation via the Berne Convention.

Nevertheless, there is little doubt that AI music output of the type discussed here, such as musical compositions and lyrics produced with the aid of AI systems, meets this requirement.⁸⁸

3.1.2. HUMAN INTELLECTUAL EFFORT

For our purposes, we refer to “human intellectual effort” as the requirement of “human” creativity inherent to the originality standard. In international law, Art. 2(6) Berne Convention makes clear that copyright protection “shall operate for the benefit of the author and his successors in title”. Although the concept of “author” is not defined, the Convention’s *droit d’auteur* roots, “its text and historical context strongly suggest that ‘author’ and ‘authorship’ for purposes of the Convention refer to the natural person who created the work”, i.e., a

⁸⁵ See Art. 9.1 TRIPS and Art. 3 WCT.

⁸⁶ See Case C-277/10 *Martin Lukan v Petrus van der Let* (2012) ECLI:EU:C:2012:65 (*Lukan*), para. 59, and Case C-310/17 *Levola Hengelo BV v Smilde Foods BV* (2018) ECLI:EU:C:2018:899 (*Levola Hengelo*), para. 38. NB all EU MS are members of the Berne Union, and the EU is bound by the TRIPS and WCT.

⁸⁷ See *Hugenholtz and Quintais* (n 83), noting that the Court could have relied on the domain text in *Premier League* and *Levola Hengelo* but chose not to do so.

⁸⁸ See similarly *Hugenholtz and Quintais* (n 83).

human author.⁸⁹ This conclusion is supported by a reading of international human rights law, namely the UDHR and ICESCR, which clearly link the concept of authorship to human authors, including the protection of the moral and material interests associated with scientific, literary or artistic productions.⁹⁰

The upshot is that the Berne Convention only obliges Contracting States to protect works of human authorship.⁹¹ In other words, only AI outputs that meet the requirement of *human* originality – as it is interpreted regionally and nationally – *must* be protected by copyright under the obligations arising from international law.

Naturally, this raises the question of whether a country may protect AI outputs as works under national (or regional) law even absent the requirement of human creativity? Furthermore, should it decide to do so, would such works benefit from the regime of protection afforded under the Berne Convention, the TRIPS Agreement and the WCT? The answer to this question is particularly important for the application of international treaty obligations on national treatment, reciprocity, and minimum standards of protection. For example, different thresholds of originality could result in some situations of non-protection of music content by copyright in one country and protection of the same content in another country. If a work is protected under copyright law, it is likely that national treatment obligations contained in Berne, the TRIPS Agreement and the WCT would apply.⁹² If a *sui generis* right was used instead, which could do away entirely with the originality requirement, then it may be

⁸⁹ Sam Ricketson, *The Berne Convention for the Protection of Literary and Artistic Works: 1886-1986* (Kluwer 1987) 158, 159, 894, 902 and 903; Ricketson, 'The 1992 Horace S. Manges Lecture - People or Machines' (n 4). IViR study and sources cited therein. Among the multiple references to "author" in the Convention see Art. 6bis on moral rights. The case of Art. 14bis Berne Convention dealing with cinematographic works is different, because it refers to a "maker".

⁹⁰ As regards international law, it has been noted that Art. 27(2) Universal Declaration on Human Rights (UDHR) and Art. 17(1)(c) International Covenant on Economic, Social and Cultural Rights (ICESCR) provide a supporting argument to this conclusion, insofar as link the concept of authorship under international human rights to human authors. See Hugenholtz and others (n 2). See also International Covenant on Economic, Social and Cultural Rights, adopted by the United Nations General Assembly on 16 December 1966, Resolution 2200A (XXI). Committee on Economic, Social and Cultural Rights, General Comment 17, The right of everyone to benefit from the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he or she is the author (Art. 15, para. 1(c), of the Covenant), 12 January 2006, UN Doc. No. E/C.12/GC/17.

⁹¹ Jane C Ginsburg, 'People Not Machines: Authorship and What It Means in the Berne Convention' (2018) 49 IIC - International Review of Intellectual Property and Competition Law 131, 135.

⁹² For example, as it would to the *kleine Munze* works under German copyright law, see Jaap H Spoor, 'Protecting Expert Systems, in Particular Expert System Knowledge: A Challenge for Lawyers' (1992) 14 European Intellectual Property Review 9.

possible that reciprocity rules could be applied without violating international treaty obligations.⁹³

In EU law, the requirement of human intellectual effort results mostly from the CJEU case law on the concept of originality, discussed in greater detail below (at 3.1.3). Here, it is important to mention the following. The concept of originality is premised on the notion of human authorship that reflects human creative choices. This concept is illustrated in the CJEU cases *Painer* and *Cofemel*, which refer respectively to the need for a “personal touch” in the creative process and to the “personality” of the author being reflected in a work as “an expression of his free and creative choices”.⁹⁴ More explicitly in her Opinion in *Painer*, AG Trstenjak stated:

According to the first sentence of Article 6 of Directive 93/98 and of Directive 2006/116 [Term Directive], only human creations are therefore protected, which can also include those for which the person employs a technical aid, such as a camera.⁹⁵

Considering the above, it can be concluded that the qualification of subject matter as a protected “work” in EU law requires human intellectual effort and authorship. This requirement has been described as the “anthropocentric focus” of EU law on (human) authorship.⁹⁶

The result of such a requirement of human intellectual effort is the exclusion of copyright protection for subject matter that does not involve sufficient human intervention. It is the case, for instance, of natural occurrences and, for our purposes, wholly AI-generated outputs without any pertinent human intervention. It is not necessarily the case, however, of output produced with the aid or assistance of a machine or AI system.⁹⁷ This is not only recognised

⁹³ Although it has been argued that while copyright treaties would not apply, the Paris Convention for the Protection of Industrial Property might, see Herman Cohen Jehoram, ‘Two Fashionable Mistakes’ (2000) 22 European Intellectual Property Review 103. This is not a matter on which this report expresses an opinion. It merely notes that state practice when introducing new sui generis rights, including in the United States, would argue against such an interpretation, George Wei, ‘Telephone Directories and Databases: The Policy at the Helm of Copyright Law and a Tale of Two Cities’ (2004) 3 Intellectual Property Quarterly 316, 365.

⁹⁴ *Painer* 92, *Cofemel* 30.

⁹⁵ AG Opinion *Painer*, para. 121.

⁹⁶ Hugenholtz and others (n 2) 69; Péter Mezei, ‘From Leonardo to the Next Rembrandt – The Need for AI-Pessimism in the Age of Algorithms’ (2021) 2 UFITA 387, 393 and 403.

⁹⁷ Jane C Ginsburg and Luke Ali Budiardjo, ‘Authors and Machines’ (2019) 34 Berkeley Technology Law Journal 343, 1074; Hugenholtz and Quintais (n 83).

in the types of examples provided in Art. 2(1) Berne Convention, such as photographic works and cinematographic works, but it also follows from the development of this area of law in parallel with technology. The use of increasingly sophisticated technological tools and instruments for the creation of protected works is a feature of the development of copyright law. In EU law, *Painer* brings this point across clearly, as it deals precisely with the case of a work – a photo – created with the aid of a machine (a photographic device).

As discussed in sections 2.1 and 2.2 above, AI systems used to produce output that is susceptible of copyright protection involve at some stage of the process human intellectual effort. Examples include building and labelling training data sets, designing algorithms, designing the model architecture, tweaking weights and parameters, editing output, etc. If that is the case, then most AI outputs of the type examined here will meet this second requirement. The question then arises whether the human intellectual effort identified in the process is sufficiently creative *vis-à-vis* the output to meet the originality threshold.

3.1.3. ORIGINALITY AND “FREE AND CREATIVE CHOICES”

3.1.3.1. IN GENERAL

The Berne Convention refers to “original works” and implicitly advances a requirement of originality.⁹⁸ Although it is not expressly defined, it is commonly understood that the Convention’s definition of “work” entails a requirement of *human* creativity.⁹⁹ As noted, the imposition of an originality requirement does not preclude that a work is expressed with the assistance or aid of a machine or software.¹⁰⁰

What constitutes a work of authorship is mostly not harmonized in EU legislative texts. The only explicit exceptions to this are computer programs, photographs, databases, and arguably works of visual art.¹⁰¹ For these categories, the legal provisions at issue condition protection

⁹⁸ On the (implicit) requirement of originality in international copyright law, see for example Daniel Gervais, ‘The Protection of Databases’ (2007) 82 Chicago-Kent Law Review 1109.

⁹⁹ Goldstein/Hugenholtz, 4th ed., p. 176

¹⁰⁰ See *supra* at 3.1.2.

¹⁰¹ Art. 1(3) Computer Programs Directive; Art. 3(1) Database Directive; Art. 6 Term Directive; Art. 14 CDSM Directive (on works of visual art in the public domain).

on the requirement that the work is original in the sense of expressing the “author’s own intellectual creation”.

Until 2009, it was accepted that outside the specific subject matter covered by the rules on computer programs, photographs and original databases, Member States were free to determine the concept of work [of authorship].¹⁰² After 2009, the CJEU seized on the legislative language mentioned in earlier specific subject matter Directives to gradually harmonize the concept of work of authorship, extending it to all types of works. This judicial harmonization process played out in several cases spanning several types of subject matter: *Infopaq*; *Football Dataco*; *SAS Institute*; *Premier League*; *Levola Hengelo*; *Funke Medien*; *Cofemel*; and *Brompton Bicycle*.¹⁰³

In general terms, it emerges from these cases that subject matter may be protected by copyright if it is original in the sense that it is “the author’s own intellectual creation”, meaning in addition that the author must make personal creative choices that are expressed in the subject matter.¹⁰⁴ The application of this test by the Court has led to a somewhat low threshold for originality, which enables the protection of a broad array of subject matter, possibly including that resulting from any minimally original selection and arrangement thereof. Conversely, protection has only been explicitly rejected by the Court thus far in relation to individual words (*Infopaq*), sporting events as such (*Premier League*), and the taste of food in *Levola Hengelo* (at least at the current state of technology).

As argued elsewhere, these exclusions can be understood as flowing from the originality test.¹⁰⁵ By requiring that “the author was able to express his creative abilities in the production of the work by making free and creative choices”,¹⁰⁶ the originality test makes it

¹⁰² Commission Staff Working Paper on the review of copyright, SEC(2004)995, p. 14.

¹⁰³ CJEU, 16 July 2009, case C-05/08, ECLI:EU:C:2009:465, *Infopaq International (Infopaq)*; CJEU, 1 March 2012, case C-604/10, EU:C:2012:115, *Football Dataco*; CJEU, 12 May 2012, case C-406/10, EU:C:2010:259, *SAS Institute*; CJEU, 4 October 2011, Joined Cases C-403/08 and C-429/08, ECLI:EU:C:2011:631, *Football Association Premier League and Others (Premier League)*; CJEU, 13 November 2018, case C-310/17, ECLI:EU:C:2018:899, *Levola Hengelo (Levola Hengelo)*; CJEU, 29 July 2019, case C-469/17, ECLI:EU:C:2019:623, *Funke Medien (Funke Medien)*; CJEU, 12 September 2019, case C-683/17, ECLI:EU:C:2019:721, *Cofemel (Cofemel)*; CJEU, 11 June 2020, case C-833/18, ECLI:EU:C:2020:461, *Brompton Bicycle (Brompton Bicycle)*.

¹⁰⁴ See e.g., CJEU, *Levola Hengelo*, para. 36, and CJEU, *Cofemel*, para. 29.

¹⁰⁵ Hugenholtz and others (n 2).

¹⁰⁶ CJEU, *Funke Medien*, para. 19; CJEU, 1 December 2011, case C-145/10, ECLI:EU:C:2011:798, *Painer (Painer)*, paras 87-88.

necessary to identify the parameters of the creative choices. These parameters can be configured as a series of external constraints on the assessment of originality: rule-based, technical, functional, and informational.¹⁰⁷ The existence of such constraints reduces the author's margin for creative freedom, sometimes below the originality threshold.

The originality requirement implies making specific choices out of multiple possible choices within the creative space left available by external constraints. That said, it is unlikely that systematic and exhaustive use of "all" possible options within a creative space constitutes a "free and creative choice" for the purpose of attracting copyright protection. For example, the development of computation capacities and AI technologies enables exhaustive creation of all (or most) possible expressions in some artistic fields and/or techniques. The smaller the finite number of musical notes, the easier it is to calculate and make all their possible variations. For example, "All the Music" project claims to have exhausted several of such mathematically possible datasets (major octave - length 12; minor octave - length 12; chromatic octave - length 10; major/minor 13 pitches - length 10)¹⁰⁸ and made them all available to the public.¹⁰⁹ Constantly increasing technological capabilities will enable the calculation and publication of all possible variations in multiple other fields of cultural expression.

Relatedly, it is important to note that the Court's case law on originality and creativity does not imply a judgment of aesthetic merit. The point is clear, for instance, from *Cofemel*, where the Court states that:

the circumstance that a design may generate an aesthetic effect, does not in itself, make it possible to determine whether that design constitutes and intellectual creation reflecting the freedom of choice and personality of the author, thereby meeting the requirement of originality.¹¹⁰

¹⁰⁷ Hugenholtz and others (n 2).

¹⁰⁸ 'FAQs' (*All the Music*) <<http://allthemusic.info/faqs/>> accessed 10 August 2021.

¹⁰⁹ 'Files for Allthemusicllc-Datasets' (*Internet Archive*) <<https://archive.org/download/allthemusicllc-datasets>> accessed 11 August 2021.

¹¹⁰ *Cofemel*, 54.

Indeed, the recognition of copyright protection is independent of artistic merits or commercial success. Hence, it is immaterial for purposes of copyright protection whether an AI musical output is uninteresting, soulless, raw, or even unpleasant to some ears. It is further irrelevant for these purposes whether or not there is a market for a work. Commercially unsuccessful pieces of content are protected by copyright if they meet the originality requirement. For the same reason, whether some expression is considered a piece of art, beautiful or having commercial value does not necessarily mean it is protected by copyright. The test is its originality, not its perceived artistic merit, which in any event is likely to vary on both time and space.

An interesting example of the grey area at the intersection of copyright and art can be drawn from our case studies. According to Benoit Carré, a French pop artist known as SKYGGE who worked with Sony CSL's Flow Machine AI system for music creation: "Mafia Love is the last song that Flow Machines composed with me [in 2018]. All the songs of 'Hello World' [album] were done, but I needed a special one, a 100% AI composed song."¹¹¹ While from the artist's perspective, in comparison to the work done on other musical pieces created with Flow Machines, Carré did less work, from a legal perspective, the described creative process,¹¹² involving multiple choices (selection, cutting, copying, pasting and editing of "very few generated notes") leading to the creation of "Mafia Love", seems to satisfy the threshold for copyright protection. "Mafia Love" is registered in the repertoire of French CMO SACEM, with Benoit Carré as the only author.¹¹³

As noted above at 3.1.2, the Court's case law on originality draws a connection to Art. 2(1) Berne Convention, leading to the conclusion that works of authorship in EU law require human authorship. Consequently, non-original AI output, i.e., the output lacking sufficient human creative effort expressing the exercise of free and creative choices and bearing the

¹¹¹ '100 % AI : Mafia Love (Or The Oyster Shell)' (SKYGGE) <<https://www.skygge.fr/100-ia-mafia-love-ou-la-coquille-dhuitre/>> accessed 31 August 2021.

¹¹² '100 % AI : Mafia Love (Or The Oyster Shell)' (n 111).

¹¹³ SACEM repertoire, 'MAFIA LOVE, Code ISWC : T-704.112.795-3' (18 February 2021) <https://repertoire.sacem.fr/detail-oeuvre/Xxy3H4_Cqu3lenp4fDevTOGHv6ZzCqi7HNssXDw_rJU=/MAFIA%20LOVE?query=Mafia%20Love%20&filters=titles#searchBtn> accessed 18 February 2021.

personal stamp of its human creator, does not qualify as a copyright-protected work under EU copyright law.

From our survey of the literature, most experts and practitioners agree with this conclusion. This understanding is illustrated among others by a 2021 literature review by the Joint Research Centre of the European Commission,¹¹⁴ by the thirty reports of the AIPPI's National Groups and Independent Members (including that of 15 EU Member States) on their respective current laws and practices about the subsistence of copyright in artificially generated works,¹¹⁵ and by the responses of fifty-seven surveyed experts in technology policy, IP, public policy/administration, economics and software in a 2020 study by Hristov.¹¹⁶ Similarly, the aforementioned 2020 EP Resolution on IP rights for the development of AI technologies stated that “works autonomously produced by artificial agents and robots might not be eligible for copyright protection, in order to observe the principle of originality, which is linked to a natural person, and since the concept of ‘intellectual creation’ addresses the author’s personality”.¹¹⁷

Further precision is important here. Even outside the external constraints to creativity identified by the Court, many human interventions in the creative process leading to an AI output will not reflect “free and creative choices” required from the perspective of copyright originality. In this respect, a distinction can be made between authors (i.e., persons making free and creative choices) and persons making only organisational, technical and/or other contributions to the creative process, which are not sufficient for acquiring the authorship status. For instance, as we explore below, a legal distinction has been drawn in some national laws (e.g., Ireland and UK) between creating vs undertaking “the arrangements necessary for the creation of the work”.¹¹⁸

In conclusion, from the perspective of EU law, where an output does not reflect the author’s free and creative choices, that output is – from the perspective of *copyright* – in the public

¹¹⁴ Iglesias, Shamuilia and Anderberg (n 4) 14.

¹¹⁵ ‘Browse AIPPI Resolutions and Thousands of Other Documents’ (AIPPI, 2019) <<https://aippi.soutron.net/Portal/Default/en-GB/Search/SimpleSearch>> accessed 12 September 2021.

¹¹⁶ Kalin Hristov, ‘Artificial Intelligence and the Copyright Survey’ (2020) 16 Journal of Science Policy & Governance 1, 11–13 and 16.

¹¹⁷ EP, Resolution of 20 October 2020 on intellectual property rights for the development of artificial intelligence technologies (2020/2015(INI)), P9_TA(2020)0277 para 15.

¹¹⁸ See 4.4. on the regime for the protection of computer-generated works

domain.¹¹⁹ (As we discuss in Chapter 4, however, the same output might benefit from related rights protection.) The key legal issue regarding content produced or generated by AI systems and involving some human input is the determination of the threshold of human intervention or contribution required to attract copyright protection.¹²⁰ In particular, within the space allowed by external constraints, how does that human intervention or contribution translate into “free and creative choices” vis-à-vis the output? To make this assessment, it is useful to draw on CJEU case law on the concept of originality and the different stages of the creative process.

3.1.3.2. THE ITERATIVE CREATIVE PROCESS

The guiding CJEU case on how to understand machine aided creativity in relation to the standard of originality is *Painer*. As noted by Hugenholtz et al., in this judgment the Court identifies three broad phases of the creative process: preparation, execution, and finalisation.¹²¹ As stated by the Court, when creating a work with the aid of a machine, a portrait photographer

...can make free and creative choices in several ways and at various points in its production.

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

¹¹⁹ NB also an Australian case regarding phone directories, where a court decided that their almost entirely automated compilation and production, with any human contribution being too anterior, incidental and/or ministerial (editorial changes, corrections, etc.), did not attract copyright protection despite the applicant’s listing of hundreds of names of persons involved in the production process *Telstra Corp Ltd v Phone Directories Co Pty Ltd* (2011) 90 IPR 1; Sam Ricketson, ‘The Need for Human Authorship - Australian Developments: Telstra Corp Ltd v Phone Directories Co Pty Ltd’ (2012) 34 European Intellectual Property Review 54.

¹²⁰ Josef Drexler and others, *Artificial Intelligence and Intellectual Property Law Position Statement of the Max Planck Institute for Innovation and Competition of 9 April 2021 on the Current Debate Artificial Intelligence and Intellectual Property Law Position Statement of the Max Planck Institute for Innovation and Competition of 9 April 2021 on the Current Debate* (2021) 21.

¹²¹ Hugenholtz and others (n 2) 7, 37, 73 and 79.

techniques the one he wishes to adopt or, where appropriate, use computer software.¹²²

Inspired by *Painer* and some scholarship in this area, we have in previous research adjusted this analytical model to assess AI outputs by identifying three *iterative* stages of the creative process when using an AI system: “conception”, “execution”, and “redaction”.¹²³ In general terms, conception would involve “creating and elaborating the design or plan of a work”, execution would involve the conversion of that “design or plan into what could be considered (rough) draft versions of the final work”, and “redaction” would consist of “processing and reworking the draft versions... into a finalised cultural product ready to be delivered to a publisher or other intermediary, or directly to the market”.¹²⁴ A finding of free and creative choices in any of these stages could lead to a finding of originality in the output.

This approach maps well to the basic definition of AI systems used herein (and in the AI Act proposal), in particular to machine learning systems. Let us exemplify with AI music outputs.

The “conception” stage of an AI musical output could comprise the selection and preparation of the training data (e.g., pre-existing sound recordings of a certain genre), the design and choice of the type and method of AI system to be used (e.g., some AI systems do not require any training data for producing some musical outputs¹²⁵), the definition of the aims or goals of the system qua the output (e.g., a song in the style of artist X in the genre Y), etc. The conception stage is predominantly characterised by human choices, such as the type, features and objectives of the input data and AI system(s) used to produce an output. The AI system itself is but an external constraint – a configurable production tool – with no creative role per se.¹²⁶

In 2016, artist Benoit Carré (aka “SKYGGE”) created a song “Daddy's car” Sony SCL’s tool “Flow Composer, using a corpus of 45 Beatles songs (from the latest period, considered usually as the richest and most singular in the recording history of the Beatles). Flow

¹²² *Painer*, 90-91 (our emphasis; paragraph numbers omitted).

¹²³ See Hugenholtz and others (n 2).

¹²⁴ Hugenholtz and Quintais (n 83).

¹²⁵ Christian J Steinmetz and Joshua D Reiss, ‘Randomized Overdrive Neural Networks’ [2021] arXiv:2010.04237 [cs, eess] <<http://arxiv.org/abs/2010.04237>> accessed 16 February 2022.

¹²⁶ Hugenholtz and Quintais (n 83).

Composer was used to generate the lead sheet, while the lyrics and most of the orchestration were done manually, by SKYGGE.”¹²⁷ In the same year, artist Olivier Marguerit (aka “O”) composed a song entitled *Azerty*.¹²⁸ “Verses were generated by Flow Composer trained on a mix of *God Only Knows* by The Beach Boys, *Sea Song* by Robert Wyatt and *The Sicilian Clan* by Ennio Morricone.”.¹²⁹

The “execution” stage of an AI musical output encompasses much of what happens within the operation logic of an AI system and the generation of the output. In complex machine learning models, relying on deep neural networks, the human intervention of developers is much more limited than in traditional non-AI machine aided creative processes during the “execution” stage. In fact, depending on the type of system (supervised, unsupervised, reinforced), that human intervention may be so limited as to make any discernible link to the output difficult to establish or, from the developer’s perspective, difficult to concretely explain. From the user’s perspective, this “black-box” nature of AI systems lends them an aura of autonomy and/or agency, giving rise to the notion that the AI system itself has created the output. To be sure, as noted by Craig and Kerr, there is much to criticise in this misleading “anthropomorphic framing” of the “AI as an author” from the ontological perspective.¹³⁰ But that framing is also inaccurate from the technical and legal perspective. As shown above, a technical characterisation of AI systems clarifies that they are not autonomous creative agents in a way that meets current copyright law’s authorship requirement. Furthermore, from a legal standpoint, what matters is human intellectual creativity, meaning that the focus of the analysis should be on the role and imprimatur of the human using the machine.¹³¹ Still, it is undeniable that in the context of machine learning systems, there is reduced space for human intervention and contribution in the execution stage that can qualify as “free and creative choices”.

¹²⁷ ‘Daddy’s Car: A Song Composed with Artificial Intelligence - in the Style of the Beatles’ (*YouTube*, 19 September 2016) <https://www.youtube.com/watch?v=LSHZ_b05W7o> accessed 20 December 2021.

¹²⁸ ‘O: Azerty | AI-Composed Music’ (*YouTube*, 29 December 2016) <<https://www.youtube.com/watch?v=v69KcJBrpuo>> accessed 20 December 2021.

¹²⁹ Pachet, Roy and Carré (n 7) 13 and 15.

¹³⁰ Craig and Kerr (n 4).

¹³¹ See above at 2.1, 2.2, and 3.1.2.

Finally, the “redaction” stage of an AI music output could include editing and post-production of the output, whether it is a musical composition or lyrics, usually incorporated in a sound recording. In this respect, our research shows that when AI systems are used to produce musical outputs ultimately aimed at a public audience, it is often the case that users of the system engage in “redaction” activities before the publication of the final output.¹³² When that is the case, there is ample space for free and creative choices that might lead to the qualification of the output as protected by copyright. If there are no or few redaction activities, that space is naturally limited, and the qualification of the output as “original” from the copyright perspective will depend on a finding of free and creative choices in the “execution” and especially “conception” stages.

Abstracting from the examples above, it is particularly interesting to reflect on the qualification of AI output generated following a minimal effort by deployers when interacting with a system made available online by a service provider. This is the case of text, image or sound/music “generators”, such as deep learning natural language processor GPT-3, where a deployer may simply “push a button” to generate output either without or with negligible tweaking of parameters, or following the mere insertion of a (textual) prompt. The current version of GPT-3 is mostly made available as an API, and its functionality is described as follows

Given any text prompt like a phrase or a sentence, GPT-3 returns a text completion in natural language. Developers can “program” GPT-3 by showing it just a few examples or “prompts.” We’ve designed the API to be both simple for anyone to use but also flexible enough to make machine learning teams more productive.¹³³

For our purposes, the question that arises is how to qualify the output resulting from such application built on the GPT-3 API, where the deployer merely inserts a simple text prompt in

¹³² For example, see the descriptions of the creative process of Taryn Southern with Amper’s Score (at 3.2.2.1) and Benoît Carré with Sony CSL’s Flow Machine on “Mafia Love” (at 3.1.3.1).

¹³³ OpenAI and Ashley Pilipiszyn, ‘GPT-3 Powers the Next Generation of Apps’ (*OpenAI*, 25 March 2021) <<https://openai.com/blog/gpt-3-apps/>> accessed 20 December 2021. The current use of the GPT-3 model appears to be limited to Microsoft, following an exclusive licensing deal. As a result, all other commercial providers may only derive outputs from the underlying model using the API. See Karen Hao, ‘OpenAI Is Giving Microsoft Exclusive Access to Its GPT-3 Language Model’ (*MIT Technology Review*, 23 September 2020) <<https://www.technologyreview.com/2020/09/23/1008729/openai-is-giving-microsoft-exclusive-access-to-its-gpt-3-language-model/>> accessed 20 December 2021.

a third-party application, which returns a (usually larger) text completion. This question may apply mutatis mutandis to other generator models, the output of which is sound or images. Let us illustrate this with a simple example from the text generator “inferkit”. After accessing the website <https://app.inferkit.com/demo>, we introduced the 10-word prompt:¹³⁴

AI is a musician and its songs deserve copyright protection.

We then pressed the button “generate text” twice in succession, which generated the following text return

Instead of portraying the historical majesty of the various Goan churches, Pancho Vladic took us back to a simpler time. He sang four of his compositions and we listened. He spoke, he posed. We shot him and made videos.

Pancho Vladic was well into his 80s and, from my vantage point, the older man was a cross between a sexy jazz icon and an inspiration. I was a photojournalist in India so I had no idea what to say to him. I said what I did: "Mr Vladic, I just want to thank you for everything you've done for Goa. You helped bring Goa on to the international...

Obviously, this passage is far from promising from the standpoint of the literary quality of even coherence (as regards the initial prompt), even if Pancho Vladic appears to be an intriguing character. But it is sufficient to ask the question: is this excerpt as a whole original in the sense of EU copyright law?

The initial prompt is 10 words long (just below the *Infopaq* threshold) and hardly demonstrative of free and creative choices per se. The remaining portions of the text are generated in quick succession by selecting the option “generate text” twice. The only conception behind the whole exercise was to illustrate a particular legal argument in this report. The execution of the return text was carried out and generated by a system built by a third party unrelated to the user of the system. There was no redaction activity other than copying the text to the clipboard, pasting it in this report, selecting the text and then again selecting the “quote” formatting style in the word processor. In our view, applying the above

¹³⁴ This test was carried out on 5 November 2021 by João Pedro Quintais.

legal analysis to this example, it should be concluded that this passage does not meet the threshold of originality in EU law.

A related but trickier example is how to qualify situations where the user's intervention in the redaction stage is mostly limited to the selection of different outputs generated by the AI system. The case is most obvious for automated translation tools like Google Translate or DeepL. In examining this fact pattern in previous research, we have drawn an analogy to past discussions on conceptual art and the potential copyright protection of "ready-made" objects.¹³⁵ In particular, we have described Kummer's "presentation theory", to the effect that the locus of the relevant free and creative choice would be in the act of selecting a pre-existing artifact and presenting it as a work of art.¹³⁶ Within scholarship, the presentation theory is controversial, although some authors support it.¹³⁷ However, it is unclear whether the presentation theory sufficiently aligns with the Court's case law on originality. This is especially so after the *Cofemel* judgment explicitly rejects "aesthetic effect" as a determinative factor to reflect "the freedom of choice and personality" of the author by itself.¹³⁸

To be sure, individual choices in the form of selection at the redaction stage can certainly contribute to a finding of originality. However, the type of minimal choices by users of an AI system set out in our examples above on text generators and automatic translators will struggle to meet the EU standard of originality.

Finally, it is important to highlight that the three-stages process discussed above is merely an analytical device inspired by CJEU case law to aid in the legal assessment of the originality vis-à-vis AI outputs. This has three important and interrelated implications.

First, although it is presented as a static model from descriptive purposes, it is in fact – as pointed at from the outset – a dynamic and iterative model. This is particularly important in the context of AI systems. For instance, machine learning may involve numerous iterations between the conception, execution and output levels, especially during the training process.

¹³⁵ Hugenholtz and others (n 2).

¹³⁶ Hugenholtz and others (n 2), citing Max Kummer, *Das urheberrechtlich schützbares Werk* (Stämpfli 1968) 193ff.

¹³⁷ Anne Lauber-Rönsberg and Sven Hetmank, 'The Concept of Authorship and Inventorship under Pressure: Does Artificial Intelligence Shift Paradigms?' (2019) 14 *Journal of Intellectual Property Law & Practice* 570.

¹³⁸ *Cofemel*, para. 54.

In another example, a direct output of a model might be reconceptualised by a human and subject to alterations that might qualify as “execution” and/or “redaction” activities before its publication as for instance a sound recording.

Second, the complex nature and wide variety of AI outputs mean that their qualification as “original” from a copyright law standpoint will – at least for borderline cases – require a case-by-case assessment.

Third, because of the above-described characteristics of AI systems and outputs, in particular their opacity or “black-box” quality, the assessment of “originality” will require information that is not always readily available. The result is that questions of originality – as well as authorship and ownership – will *prima facie* be governed by the operation of legal presumptions. In such a context and in the absence of additional transparency measures, the proper substantive assessment of originality along the lines described above will require a reverse engineering of the human interventions or contributions in the use of the AI system leading to a certain output. In practice, this will not be an easy or scalable task.

3.1.4. EXPRESSED IN THE OUTPUT

The fourth requirement for the assessment of copyright protection of subject matter as a “work” is that the human free and creative choices are “expressed” in the output. This requirement means that (i) the output should be a perceptible expression (ii) of the author’s free and creative choices. Behind this simple formulation lies significant complexity. To understand it, it is useful to briefly examine the relevant CJEU case law.

As a departure point, the Court often emphasized the need for an author to express his creativity as a requisite for copyright protection. Starting with *Infopaq*, the Court stated that “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.”¹³⁹ The same point is emphasized in *BSA*, when the Court states in the negative that “the components of a graphic user interface do not permit the author to *express his creativity*

¹³⁹ *Infopaq*, para. 45 (our emphasis).

in an original manner and achieve a result which is an intellectual creation of that author.”¹⁴⁰

In *Painer*, the Court notes that the author must be "able to express his creative abilities in the production of the work by making free and creative choices"¹⁴¹, a point that is again confirmed in *Funke Medien*.¹⁴²

In addition, as from *Levola Hengelo*, the Court adds that “for there to be a ‘work’ as referred to in Directive 2001/29” [InfoSoc Directive], the subject matter protected by copyright must be expressed in a manner which makes it identifiable with sufficient precision and objectivity, even though that expression is not necessarily in permanent form.”¹⁴³ The Court mostly justified this requirement on the need for legal certainty for the different stakeholders involved, including the need to avoid any “element of subjectivity” when identifying protected subject matter, so that this “must be capable of being expressed in a precise and objective manner”.¹⁴⁴ This conclusion is confirmed in the subsequent judgements *Cofemel* and *Brompton Bicycle*.¹⁴⁵

As argued in previous research, the Court appears to derive from this case law the need for “a causal link between an author's creative act (the exercising of their creative freedom) and the expression thereof in the form of the produced work”, which would require “not only human agency or intervention, but also some degree of authorial intent.”¹⁴⁶ The question then becomes what degree of authorial intent is required? In that respect, the above-cited judgements do not require that the author conceives of all the details of the work to be expressed prior to its expression. As such, “general authorial intent... while leaving room for unintended expressive features is probably sufficient to meet this requirement.”¹⁴⁷

In applying this requirement to AI outputs, the main challenge lies with reconciling the “black-box” quality of AI systems of the machine learning type with the intent of the person that conceives of a work using this technology. For instance, as noted by Mezei, “a significant

¹⁴⁰ *BSA*, para 50

¹⁴¹ *Painer*, para 89.

¹⁴² *Funke Medien*, para 20 (“only something which is the expression of the author’s own intellectual creation may be classified as a ‘work’ within the meaning of Directive 2001/29”).

¹⁴³ *Levola Hengelo*, para. 40.

¹⁴⁴ *Levola Hengelo*, para. 41.

¹⁴⁵ *Cofemel*, para. 32 and *Brompton Bicycle*, para. 25.

¹⁴⁶ Hugenholtz and Quintais (n 83).

¹⁴⁷ Hugenholtz and Quintais (n 83). (and literature cited therein).

amount of output might be generated by the machine with no causal connection between the original human developer and the final output”.¹⁴⁸ In other words, the mediation of the creative act by an AI system creates a disconnect between the conception of the work by AI developers and users, on the one hand, with the often difficult to precisely predict output, on the other hand. But in practice this challenge may be easier to overcome than it is apparent. First, because even where not precisely predicted (or predictable) the output in question may still be within the scope of the author's general intent. Second, because many outputs will be subject to authorial intervention at the redaction stage (especially by users of the system), and that intervention may be sufficient to bring the output within the scope of general authorial intent, provided it expresses the author's free and creative choices.¹⁴⁹

3.1.5. SECONDARY (OR DERIVATIVE) WORKS

Art. 2(3) Berne Convention provides that “[t]ranslations, adaptations, arrangements of music and other alterations of a literary or artistic work shall be protected as *original* works without prejudice to the copyright in the *original* work” (emphasis added). In this provision, the Convention first refers to the “original” works in the sense of a condition for copyright protection of content and then to the “original” work as a pre-existing work that was adapted.¹⁵⁰ For analytical purposes, it is possible to refer to the works concerned as “primary” and “secondary” (also known as “derivative”) works. As regards music content in particular, it is also relevant to underscore that Art. 2(3) Berne Convention refers specifically to “arrangement of music”, generally understood as “[t]he adaptation of a composition for voices or instruments for which it was not originally written”.¹⁵¹ Arts 12 and 14 Berne Convention provide rightsholders with the right of authorising adaptations, arrangements and other alterations of their works.

¹⁴⁸ Mezei (n 96) 392.

¹⁴⁹ See Hugenholtz and Quintais (n 83).

¹⁵⁰ Thomas Margoni, ‘The Digitisation of Cultural Heritage: Originality, Derivative Works and (Non) Original Photographs’ (2014) 18 <<http://dx.doi.org/10.2139/ssrn.2573104>>.

¹⁵¹ ‘Arrangement, n.’ <<https://www.oed.com/view/Entry/10968>> accessed 15 December 2021.

The legal question of whether AI-produced musical works qualify as derivative works could be important not only for determining the legality of their creators' actions but also for the protection of these works under copyright law.

In EU law, with the exception of databases and computer programs,¹⁵² the question of adaptations is unharmonized and left to the national laws of Member States.¹⁵³ At least in some Member States' laws, when a secondary work is created (i) without authorisation of the primary work's rightsholder and (ii) without reliance on an exception or limitation, these facts do not affect the determination of the secondary work's authorship and/or ownership.¹⁵⁴ In contrast, in a 2020 Resolution, the EP suggested making copyright protection of AI output conditional on the lawful use of copyrighted content in the input.¹⁵⁵

Still, the question arises whether an original AI musical output qualifies as a secondary (i.e., derivative) work in relation to the primary musical works used as input to the AI system (e.g., in the training dataset)?

In response, it can be said that the mere use of works in the creative process involving AI systems does not lead to an affirmative answer. As observed by Gervais:

In a deep learning context, the computer does not derive in that sense; instead, it finds correlations and patterns to use as a matrix for its own production. These productions are not, therefore derivative works.¹⁵⁶

The same conclusion was reached by Iglesias et al.:

¹⁵² Art. 5(b) Database Directive and Art. 4(1)(b) Computer Program Directive.

¹⁵³ Case C-419/13 Art & Allposters International BV (2015) ECLI:EU:C:2015:27 (*Allposters*). For national approaches to adaptations in France, Germany, Italy, Netherlands, Poland, Spain and UK see Margoni (n 150).

¹⁵⁴ Thomas Margoni, 'Artificial Intelligence, Machine Learning and EU Copyright Law: Who Owns AI?' (2018) 9 <<http://dx.doi.org/10.2139/ssrn.3299523>>; Perry and Margoni (n 7) 626.

¹⁵⁵ "if it is considered that [AI-generated] works could be eligible for copyright protection; recommends that ownership of rights, if any, should only be assigned to natural or legal persons that created the work lawfully and only if authorisation has been granted by the copyright holder if copyright-protected material is being used, unless copyright exceptions or limitations apply", EP, Resolution of 20 October 2020 on intellectual property rights for the development of artificial intelligence technologies (2020/2015(INI)), P9_TA(2020)0277 para 15.

¹⁵⁶ Gervais, 'The Machine as Author' (n 4) 2097.

In cases where individual works or subject-matter are not per se reproduced (i.e. where only information about those is included), one could in principle conclude that the final results should not be considered as a derivative.¹⁵⁷

These assessments appear to be correct in a context in which AI systems process the data of hundreds or thousands of pre-existing works, as might occur in a deep learning scenario. By contrast, it could be argued that if an AI system is trained on and processes a reasonably small set of identifiable works and produces an output similar to those works, then the output could possibly cross into “derivative work” territory. But even then, it is unclear whether the generation of an output involves a reproduction of work in the legal sense or, as it appears more accurate, the use of data from works used at the input stage to find correlations and patterns that are then used to produce an output. If that is the case, then perhaps the correct legal question is not about the qualification as a derivative work but rather whether an AI output that resembles a pre-existing work is infringing upon that work.¹⁵⁸

In any event, this question is unresolved at present and the outcome of court cases may well vary among member States since, as noted, the legal status of adaptations is unharmonized in EU law. Take for example a case where an AI output reproduces parts of copyright-protected works used as input for its creation. The secondary work does not need to reproduce the primary work in its entirety, it is sufficient that the elements that made the primary work original (i.e., copyrightable) are present in the secondary work.¹⁵⁹ Though it might (also) be a derivative work, this scenario would most likely be litigated as potential infringement of the reproduction right analysis. Conversely, the reproduction of either ideas or unoriginal elements has no copyright significance. One approach to avoid copyright infringement in this context is for instance to complement AI music generation systems with a copy-checker tool.¹⁶⁰ Yet, in practice, it is difficult for either human or machine to distinguish with precision between original and non-original elements, with the potential result that the

¹⁵⁷ Iglesias, Shamuilia and Anderberg (n 4) 9.

¹⁵⁸ For an examination of several possible scenarios, see Daniel Gervais, ‘AI Derivatives: The Application to the Derivative Work Right to Literary and Artistic Productions of AI Machines’ (2022) 53 Seton Hall Law Review.

¹⁵⁹ For a US law perspective, Daniel Gervais, ‘The Derivative Right, or Why Copyright Law Protects Foxes Better than Hedgehogs’ (2013) 15 Vanderbilt Journal of Entertainment and Technology Law 785, 808.

¹⁶⁰ See NVIDIA, AI with the Heart of a Composer - Aiva, Season 1 Episode 1, I AM AI Docuseries (Containing Extracts of Interviews with AIVA’s CEO and Founder) (2017) n 02:50 <<https://www.youtube.com/watch?v=CPh0bKcXgLo>> accessed 31 August 2021. NVIDIA n 02:50.

use of such tools could lead to unjustified over-blocking (false positives) or under-blocking (false negatives) of outputs produced by or with the assistance of the AI systems.

3.2. ATTRIBUTION OF AUTHORSHIP: A STUDY OF CASES OF CURRENT PRACTICES

Everyone is concerned by creativity and, hence, copyright. With a relatively low threshold of “originality” (see 3.1), it is easy to become the author of a copyright work. Computer technologies in general and AI in particular make it even easier for people to become authors of elaborate pieces of art without necessarily exercising a high degree of skill and effort. Yet, what has become more complex, is an answer to the legal question of attribution of authorship when AI systems are involved in the creative process.¹⁶¹

Building on the previous analysis of criteria for protection of AI-assisted outputs as works, this section examines the attribution of authorship and ownership to different (natural and legal) persons involved in the production and dissemination of AI outputs. In particular, it scrutinises the question of what (legal or natural) persons involved in the production of an AI (musical) output are attributed authorship and/or ownership in practice?

EU copyright law only partially regulates authorship in the Computer Programs Directive and the Term Directive.¹⁶² For the purposes of our analysis, it can be said that many issues of authorship, in particular joint and co-authorship, are mostly dealt with in the national laws of Member States. As a rule, national laws tend to follow the principle that the author is the individual creator of the work. Where *creative* contributions to a work are not severable and there is a common design for its creation, then the typical legal solution is that individual contributors qualify as co-authors of a joint work.¹⁶³ For the purpose of attributing authorship, only creative contributions vis-à-vis the work are relevant.¹⁶⁴ This is crucial for the

¹⁶¹ For a diversity of opinions of many non-lawyers on the question of attribution of authorship/ownership over AI outputs see survey responses of 281 respondents from around the world (94% of which stated not to relate to legal services; 34,5% work in the sphere of AI, and 34,5% had an experience of music composing), Munir Makhmutov, Selina Varouqa and Joseph Brown, ‘Survey on Copyright Laws about Music Generated by Artificial Intelligence’, *IEEE* (2020).

¹⁶² See Art. 2(1) Computer Programs Directive and Art. 2(1) Term Directive.

¹⁶³ Hugenholtz and Quintais (n 83); Hugenholtz and others (n 2).

¹⁶⁴ Hugenholtz and Quintais (n 83), noting that “[s]ome national laws in the EU provide for special rules of authorship allocation in the case of works created following the design and under the supervision of the author”.

analysis of certain scenarios below, since it requires a common design between different parties involved in the process of creation of an output (e.g., developer and user) for the attribution of authorship.¹⁶⁵

Another important aspect of the legal puzzle is that international and EU law contain rules on presumptions of authorship and ownership for purposes of enforcement, which are mirrored in national laws. For instance, Art. 15(1) Berne Convention states that in order for the author to be recognised as such “it shall be sufficient for his name to appear on the work in the usual manner”. Art. 5 Enforcement Directive, on “presumption of authorship or ownership” states that for the purposes of applying the measures, procedures and remedies provided for in that Directive, it is sufficient for the author of a work to be regarded as such “for his/her name to appear on the work in the usual manner”.

For copyright purposes, authorship is entirely a matter of law. The grant of copyright rights is automatic upon the fulfilment of the conditions set out in the law. Yet, attribution of authorship to different persons involved in the AI creative process is fact-dependent and therefore may be difficult to assess without knowledge of the relevant facts. In this case-by-case assessment, the persons developing and/or using specific AI tools are well-positioned to make informed decisions on authorship, considering the choices made in the creative process.

For the purposes of our analysis, we make a distinction between “developers” and “users”. The term “developers” refers to software developers of AI systems or tools. The term “user” refers to the persons using and deploying AI systems in the creative process to produce an output that may qualify as a copyright-protected work. Much of the literature and contractual agreements (or terms of use) of providers of AI systems for musical production, refers to “users” to mean, depending on the context, commercial users, end-users and consumers of AI systems. In theory, attribution of authorship in AI-assisted outputs that qualify as “works” could follow one of the following general scenarios:

- AI developer and user are the same person and the author.¹⁶⁶
- AI user as the author.
- AI developer as the author.
- AI user and developer as joint authors.

¹⁶⁵ See Hugenholtz and Quintais (n 83).

¹⁶⁶ Ginsburg and Budiardjo (n 4).

Developers of IT systems and tools, whose creative choices are aimed solely at the creation of computer programs and not at the creation of specific works with the computer program, are not authors of the works created by users of the IT tools.¹⁶⁷ Indeed, while one can understand why a developer in such a scenario might want rights to commercially valuable output, one wonders whether they would accept liability if the user used their computer program to infringe third party rights or create libellous material. Moreover, Senftleben and Buijtelaar argue that it is not possible to allocate authorship of the work to the developer in rule-based and machine learning AI systems, even if the developer defines the AI system's goal, provides the AI system with training data and reviews the generated outcome.¹⁶⁸ It is, of course, possible that the developers of AI systems, alone and/or jointly with musicians, use these systems for creating specific musical works. Importantly, as we explain below, when AI systems are proposed as a service, users of that service (often individuals) have fewer possibilities for making free and creative choices as compared to situations where the role of developers and user is played by the same person.

The assignment of labels, “developer” or “user”, in some cases paves the way to a legal qualification about authorship. It requires an understanding of case-specific circumstances related to the role played and choices made by the persons involved. In line with the recommendations of prior research,¹⁶⁹ our analysis focuses on specific cases and contractual terms regarding attribution of authorship and ownership in the production of AI-assisted outputs.

There are multiple projects and businesses that rely on AI technologies for creating musical content (Mezei advanced existence of the “AI creative industry”¹⁷⁰). These undertakings dealt to various extents with copyright issues, notably with those of attribution of authorship, ownership and exercise of rights. Of course, grant of copyright is a matter of statutory law. Yet, it is for the private parties involved and having the factual knowledge about the involvement and roles of all persons participating in the creative process to designate authors

¹⁶⁷ On the related topic of copyright protection of machine learning models, see Begoña Gonzalez Otero, ‘Machine Learning Models Under the Copyright Microscope: Is EU Copyright Fit for Purpose?’ (2021) 70 GRUR International 1043.

¹⁶⁸ Martin Senftleben and Laurens Buijtelaar, ‘Robot Creativity an Incentive-Based Neighbouring Rights Approach’ (2020) 42 European Intellectual Property Review 797, 803.

¹⁶⁹ Hugenholtz and others (n 2) 118.

¹⁷⁰ Mezei (n 96) 390.

and/or rightsholders. The case studies were used to examine how multiple actors in the music industry dealt with different questions related to AI output. Finally, because “work” and “authorship” are two sides of the same coin, many of the examples provided below are also good illustrations of the application of the originality-creativity test developed above (at 3.1) to determine the protected “work” status of AI music output.

Against this background, we develop and examine two specific scenarios below. Scenario 1 relates to the attribution of authorship when AI developers and users are the same persons (3.2.1). Scenario 2 refers to the attribution of authorship when AI music creation systems are offered to users as a service (3.2.2).

3.2.1. SCENARIO 1: ATTRIBUTION OF AUTHORSHIP WHEN AI DEVELOPERS AND USERS ARE THE SAME PERSONS

In some cases, the same persons involved in the development of AI tools are also deploying these tools for music creation. At first sight, such situations leave little space for variations in the attribution of authorship. Still, different approaches can be observed in practice. In this scenario, we highlight the cases of Endel, AIVA, Evoke Music, Emily Howell, Melomics and folkrrnn.

Endel

The leading business and legal case of openly designating developers of AI tools (i.e., developers of computer programs) as authors of music created with such tools is that of a distribution and publishing deal between Warner Music Group’s Arts Music division and Endel, a German music tech start-up, for the creation of twenty “algorithm-powered albums”.¹⁷¹ The albums, including 600 tracks, are marketed as soothing and productivity-boosting soundscapes, including themes “Sleep”, “Focus”, “Relax” and “On-the-Go”. Endel’s press release described these albums as “the first ‘app-as-an-artist’ releases featured on Apple Music and iTunes” and explained that “[t]he musical phrases are composed by Dmitry

¹⁷¹ ‘Endel to Release 20 Algorithm-Powered Albums to Help You Sleep, Focus & Relax’ (*Endel, Press Release*, 22 January 2019) <<https://www.dropbox.com/s/57hxhszi0bmaf4r/Endel-PressRelease-20MusicAlbums.pdf>> accessed 9 August 2021.

Evgrafov, and Endel's algorithm-powered technology changes the composition on the fly depending on various personal inputs, like weather, location, and heart-rate".¹⁷²

Yet, in an interview with Rolling Stone magazine, Endel's co-founders provided further insights into the project. First, Dmitry Evgrafov, Lead Sound Designer and Co-Founder of Endel, explained the technical process of album creation as "all made just by pressing one button", and then Oleg Stavitsky, CEO and Co-Founder, told that algorithmic creation of music presented some unique legal challenges for the teams of Warner and Endel.¹⁷³ According to him: "We had to hire a copyright lawyer to answer all these questions they were asking, like, 'Who's going to collect the mechanical royalties for you' and 'Whose names do we put on the copyright,' [...] We are a collective of designers and sound engineers. We didn't know these terms! We ended up putting in all the names of the *software engineers as the songwriters*." (emphasis added).¹⁷⁴ In a separate interview, Oleg Stavitsky told *THE VERGE MAGAZINE* that the team decided to indicate all (at that time, six) employees of Endel as the songwriters for all ordered 600 tracks of the project: "I have songwriting credits [...] even though I don't know how to write a song".¹⁷⁵ The Verge further reported that "[t]here was minimal human involvement outside of chopping up the audio and mastering it for streaming. Endel even hired a third-party company to write the track titles".¹⁷⁶

Overall, on-demand creation of music for third parties, like the described deal with Warner, is not the core business and purpose of Endel, which is working on a system where its "soundscaping" audio is individualised in real-time to the listener's environment (e.g., weather, location) and biometric indicators (e.g., heart rate, body temperature).¹⁷⁷ Endel's

¹⁷² Ibid.

¹⁷³ Amy X Wang, 'Warner Music Group Signs an Algorithm to a Record Deal' (*Rolling Stone*, 25 March 2019) <<https://webcache.googleusercontent.com/search?q=cache:i6DPtwff-UgJ:https://www.rollingstone.com/pro/news/warner-music-group-endel-algorithm-record-deal-811327/+&cd=3&hl=fr&ct=clnk&gl=fr>> accessed 9 August 2021.

¹⁷⁴ Ibid. (emphasis added).

¹⁷⁵ Dani Deahl, 'We've Been Warned about AI and Music for over 50 Years, but No One's Prepared' (*The Verge*, 17 April 2019) <<https://www.theverge.com/2019/4/17/18299563/ai-algorithm-music-law-copyright-human>> accessed 9 August 2021.

¹⁷⁶ Dani Deahl, 'Warner Music Signed an Algorithm to a Record Deal — What Happens Next?' (*The Verge*, 27 March 2019) <<https://www.theverge.com/2019/3/27/18283084/warner-music-algorithm-signed-ambient-music-endel>> accessed 9 August 2021.

¹⁷⁷ Aia Haruvi and others, 'Measuring and Modeling the Effect of Audio on Human Focus in Everyday Environments Using Brain-Computer Interface Technology' (2022) 15 *Frontiers in Computational Neuroscience* <<https://www.frontiersin.org/article/10.3389/fncom.2021.760561>> accessed 17 February 2022.

business model is built on the concept of being able to offer a highly personalised, real-time, and unique musical experience, which is different from streaming pre-recorded tracks. Endel claims ownership over such real-time created music.¹⁷⁸ When creating the music for Warner, Endel's team members could have been involved at various stages of the creative process, from the selection of input data to the final editing. Since there was no specific environment and biometric data of Endel's soundscaping services providing input for automatised music generation, the team probably had to make some choices as to the input data and/or parameters of music generation. Such choices reinforce the authorship claim of Endel's team.

AIVA

AIVA is an online service for AI music creation, currently offering its services under the motto of "Artificial Intelligence composing emotional soundtrack music".¹⁷⁹ In 2017, the Ministry of Culture of Luxembourg commissioned AIVA Technologies, domiciled in this EU Member State and running AIVA service, to create a musical opening for the National Day celebrations (23 June) and the Duke's birthday. This public procurement of cultural production created much dissatisfaction in the Luxembourgish authors' community. On 12 May 2017, the Luxembourgish Federation of Authors and Composers (FLAC) addressed an open letter to the Minister of Culture, criticising the decision to commission the creation of the musical work to AI instead of a physical person.¹⁸⁰ The conflict between the FLAC and AIVA Technologies was settled following a meeting between the organisations on 15 June 2017.¹⁸¹ Still dissatisfied with the ministerial reaction to the FLAC's open letter, the Advisory Committee of

¹⁷⁸ 'General terms and conditions for Endel app, Version: 1.2' (*Endel*, 7 October 2020) <<https://endel.zendesk.com/hc/fr/articles/360003558200-General-terms-and-conditions-for-Endel-app>> accessed 7 September 2021.

¹⁷⁹ 'AIVA - The Artificial Intelligence Composing Emotional Soundtrack Music' (*AIVA*) <<https://www.aiva.ai/>> accessed 28 August 2021.

¹⁸⁰ Board of Directors, 'Open Letter of the Luxembourgish Federation of Authors and Composers to the Minister of Culture' (12 May 2017) <<https://flac.lu/site/articles/detail/lettre-ouverte-a-monsieur-le-ministre-de-la-culture>>.

¹⁸¹ 'Meeting Flac-AIVA' (*Flac*, 18 June 2017) <<https://flac.lu/site/articles/detail/meeting-flac-aiva>> accessed 28 August 2021.

Rightsholders of SACEM Luxembourg¹⁸², addressed its requests to the Ministry of Culture.¹⁸³ It notably requested the Ministry to rectify its statement that the algorithm of AIVA Technologies is a member of the collective rights management organisation (CMO). The ministerial communication was based on the following slogan employed by AIVA Technologies regarding AIVA: “I am the world’s first virtual artist recognized by an author’s rights society”.¹⁸⁴ The statement of AI being recognised as an author of musical work, similarly to human composers, was relayed in media¹⁸⁵ as well as in legal literature,¹⁸⁶ drawing considerable attention to the AIVA service. “AIVA is the first virtual artist that is recognized by SACEM” was also the project description submitted by AIVA Technologies for the EU Horizon 2020 funding.¹⁸⁷ Indeed, “AIVA” is mentioned in SACEM’s repertoire as a “composer” of “SYMPHONIC OVERTURE IN A MINOR OP 23 AIVA”,¹⁸⁸ the piece that was created for the concert of the Philharmonic Orchestra of Luxembourg on 23 June 2017¹⁸⁹. “AIVA” is indicated

¹⁸² SACEM Luxembourg was created and is controlled by SACEM, the French CMO. Art. 1 and 5 of the ‘Statutes of SACEM Luxembourg’.

¹⁸³ David Laborier, ‘Reaction of the Advisory Committee of Rightholders of SACEM Luxembourg to the Position Statement of the Ministry of Culture of 15 May 2017 with Regard to the Open Letter of the Federation of Luxembourgish Authors and Composers of 12 May 2017’ (17 May 2017).

¹⁸⁴ Laborier (n 183) 1.

¹⁸⁵ Suchi Rudra, ‘An AI Completes an Unfinished Composition 115 Years After Composer’s Death’ (VICE, 17 June 2019) <<https://www.vice.com/en/article/neckqm/an-ai-completes-an-unfinished-composition-115-years-after-composers-death>> accessed 5 March 2021; Ed Lauder, ‘Aiva Is the First AI to Officially Be Recognised as a Composer’ (AI Business, 10 March 2017) <https://www.aibusiness.com/document.asp?doc_id=760181> accessed 28 August 2021; Alexis Zema, ‘Une intelligence artificielle compose une oeuvre musicale à partir d’une partition inachevée de Dvořák’ (Le Figaro, 18 June 2019) <<https://www.lefigaro.fr/secteur/high-tech/une-intelligence-artificielle-compose-une-oeuvre-musicale-a-partir-d-une-partition-inachevee-de-dvorak-20190618>> accessed 28 August 2021; ‘Aiva’ (2017) 1 Age of Robots 88, 89.

¹⁸⁶ Enrico Bonadio and Luke McDonagh, ‘Artificial Intelligence as Producer and Consumer of Copyright Works Evaluating the Consequences of Algorithmic Creativity’ (2020) 2 Intellectual Property Quarterly 112, 112; Hristov (n 116) 4; Iony Randrianirina, ‘Plaidoyer Pour Un Nouveau Droit de Propriété Intellectuelle Sur Les Productions Générées Par Intelligence Artificielle’ (2021) 2 Recueil Dalloz 91, 92; Guillem Querzola, ‘AIVA, premier compositeur de musique artificiel(le) ?’ (2017) 139 Revue Lamy Droit de l’immatériel 3.

¹⁸⁷ ‘AI That Composes Complex Instrumental Music for Movies, Games, Advertising and Other Types of Digital Media’ (European Commission, Horizon 2020, CORDIS) <<https://cordis.europa.eu/project/id/876982>> accessed 21 November 2021.

¹⁸⁸ ‘SYMPHONIC OVERTURE IN A MINOR OP 23 AIVA’ (SACEM - Répertoire des Œuvres) <https://repertoire.sacem.fr/detail-oeuvre/9ZaDSpysbTdNkH1X_oQsmyEnAWIAAGc-clbf8H9vi0E=/SYMPHONIC%20OVERTURE%20IN%20A%20MINOR%20OP%2023%20AIVA?query=23,aiva&filters=titles,parties#searchBtn> accessed 28 August 2021.

¹⁸⁹ AIVA, AIVA - ‘Letz Make It Happen’, Op. 23 (2017) <<https://www.youtube.com/watch?v=H6Z2n7BhMPY>> accessed 28 August 2021.

as a “composer” in the declaration form (“bulletin de déclaration”) of 14 April 2017, by which the musical piece was registered with SACEM.¹⁹⁰

Despite that, the Advisory Committee of Rightholders of SACEM Luxembourg clarified in its letter to the Ministry of Culture that the algorithm is not a member of SACEM, and that a physical person, a team member of AIVA Technologies, is declaring works *under the pseudonym* of “AIVA”.¹⁹¹ It was also reported that a member of the AIVA Technologies team is a member of the CMO.¹⁹² AIVA Technologies’ Founder and CEO explained to the Luxembourgish newspaper that: “Our website indicates that AIVA is recognised by SACEM because of the registration of its works. Of course, our AI does not yet have a banking account and cannot sign by hand, thus a physical person is its tutor while waiting for its legal emancipation”.¹⁹³ The disputed slogan, “I am the world's first virtual artist recognized by an author's rights society”, is currently not used on AIVA’s website.¹⁹⁴ As a matter of principle, it is also important to observe that the registration of musical pieces with a CMO is not, as such, absolute confirmation of the grant of rights according to copyright law, since CMOs do not undertake a fact-specific examination of originality for the purpose of registering works in their repertoires.¹⁹⁵

Today, numerous musical compositions are registered in SACEM’s repertoire with “AIVA” indicated as a “composer” (IPI ¹⁹⁶: 802028682).¹⁹⁷ For example, AIVA is indicated as “composer” of “Ode to Dubai”, a musical piece composed by AIVA,¹⁹⁸ dedicated to the city of Dubai, and presented there in May 2018 at international IT events.¹⁹⁹ “AIVA Music” (IPI:

¹⁹⁰ Reproduced in Thierry Hick, ‘Le projet Aiva toujours dans la tourmente: «Une question d’interprétation»’ (*Luxemburger Wort*, 17 May 2017) <<https://www.wort.lu/fr/culture/le-projet-aiva-toujours-dans-la-tourmente-une-question-d-interpretation-591c09e1a5e74263e13bfa9a>> accessed 28 August 2021.

¹⁹¹ Laborier (n 183) 1.

¹⁹² Hick (n 190).

¹⁹³ Translated from French. Thierry Hick and Marie-Laure Rolland, ‘Prise de position de la Sacem: Le projet Aiva continue d’alimenter la chronique’ (*Luxemburger Wort*, 18 May 2017) <<https://www.wort.lu/de/kultur/prise-de-position-de-la-sacem-le-projet-aiva-continue-d-alimenter-la-chronique-591daa5fa5e74263e13bfcea>> accessed 28 August 2021; NVIDIA (n 160) 04:58.

¹⁹⁴ ‘AIVA - The Artificial Intelligence Composing Emotional Soundtrack Music’ (n 179).

¹⁹⁵ Josée-Anne Bénazéra and Valérie Barthez, ‘La Preuve de l’originalité’ (CSPLA 2020) Rapport de mission 80–81.

¹⁹⁶ Interested Party Information (IPI) is an international system of unique identifiers of physical and legal persons an interest in works.

¹⁹⁷ ‘Répertoire des œuvres’ (SACEM) <<https://repertoire.sacem.fr/>> accessed 5 March 2021. ‘Répertoire des œuvres’.

¹⁹⁸ ‘Our Creations: Some Examples of AI-Generated Music Composed by AIVA’ (AIVA) <<https://www.aiva.ai/creations>> accessed 12 April 2021.

¹⁹⁹ Adelle Geronimo, ‘World’s First AI Composed Song to Debut in Dubai’ *Reseller Middle East* (1 May 2018).

848166800) and “AIVA Technologies” (IPI: 834867204), with the same registered postal address in Luxembourg, are mentioned among rightsholders of some compositions as “publisher”.²⁰⁰ It seems that in many cases, when AIVA is not indicated as author/composer of musical works, and when physical persons authors unaffiliated with AIVA Technologies are mentioned as authors/composers (e.g., such music authors as Maikel Dinza Hechavarria, Xavier Glat, Stephan Notari, and Frederic Tanari), then AIVA Music and/or AIVA Technologies are indicated as publishers.

Given the number of compositions associated with AIVA in SACEM’s repertoire, not all music created with AIVA by numerous online users of the system is systematically registered with the CMO. In multiple cases when music was created by AIVA Technologies’ team using AIVA, “AIVA” (individual’s pseudonym or band name) was registered as an *author* with the CMO. In such a latter scenario, the AIVA Technologies’ team members could have been making choices at various stages of the creative process. According to AIVA’s developer, humans participate in the creative process at two levels: first, in the programming (i.e., selection of parameters for creating specific music and training of models) and second, in the orchestration.²⁰¹

Evoke Music

Evoke Music is a Japanese start-up offering its users a catalogue of music generated by an AI system based on a user’s or end-user’s searched keywords and historical research data of popular online content.²⁰² Evoke Music states that its catalogue is “not created by traditional music creators; it is created with an artificial intelligence-powered songwriting assistant, Amadeus Code.”²⁰³ It further affirms that “the copyright is owned and managed by Amadeus Code Inc., the same team creating Evoke Music.”²⁰⁴ According to Art. 7.1 of the Business

²⁰⁰ ‘Répertoire des œuvres’ (n 197).

²⁰¹ D Z., ‘Un Humain Est Toujours Nécessaire’ *Le Soir* (7 June 2018) 18.

²⁰² ‘Evoke Music’ (*Evoke Music*) <<https://evokemusic.ai/>> accessed 18 September 2021; ‘What Is the Difference between Evoke Music and Other Production Music Catalogs?’ (*Evoke Music*, 13 October 2020) <<https://support.evokemusic.ai/en/support/solutions/articles/44001785152-what-is-the-difference-between-evoked-music-and-other-production-music-catalogs->> accessed 18 September 2021.

²⁰³ ‘What Is the Difference between Evoke Music and Other Production Music Catalogs?’ (n 202).

²⁰⁴ ‘About Copyright & License’ (*Evoke Music*, 20 February 2020) <<https://support.evokemusic.ai/en/support/solutions/articles/44001780394-about-copyright-license>> accessed 18 September 2021.

Subscription Music License of Amadeus Code company: “[the company] holds all copyrights and neighboring rights in and to the music catalogue and is the sole rights holder in respect of the Music Pieces.”.²⁰⁵ As the service’s users are offered a catalogue of music already made with the assistance of or generated by the AI system, the choices relevant for music creation, if any, were made by the Amadeus Code / Evoke Music team of developers.

One of the consulted stakeholders in our interviews reported that a software developer leaving an AI music creation project had made a claim to some music created with the AI tool he was working on. The claim was denied, and the dispute was settled internally. The company’s policy is not to accept any of such claims from developers.²⁰⁶

While developers of the above-mentioned commercial companies using their in-house AI systems to produce musical outputs claim authorship and ownership, the approach of publicly funded projects appears different. This difference in approach, likely motivated by the different nature of the funding underlying the projects, is noteworthy because there is no indication of significant substantive or factual differences in the choices made by AI developers that are also users regarding the musical outputs produced in these projects.

Emily Howell

Emily Howell is a computer program for algorithmic music creation made during the 1990s by David Cope, developer, musician and professor at the University of California in Santa Cruz, USA.²⁰⁷ The program consists of an interactive interface that allows both musical and language communication. It used as input source database only the output of a previous composing program of David Cope, Experiments in Musical Intelligence (Emmy).²⁰⁸ Around 11000 works were created with Emmy.²⁰⁹ David Cope *attributed the creation of several*

²⁰⁵ ‘Business Subscription Music License’ (*Evoke Music*, 27 January 2020) <<https://evokemusic.ai/license/business>> accessed 18 September 2021.

²⁰⁶ The company continues with the project.

²⁰⁷ ‘EMILY HOWELL’ (*David Cope*) <<http://artsites.ucsc.edu/faculty/cope/Emily-howell.htm>> accessed 12 August 2021.

²⁰⁸ David Cope, *Computer Models of Musical Creativity* (MIT Press 2005).

²⁰⁹ Muscutt and Cope (n 7) 19; ‘5000 Works in Bach Style’ (*David Cope*) <<http://artsites.ucsc.edu/faculty/cope/5000.html>> accessed 12 August 2021.

*compositions to the computer program, Emily Howell.*²¹⁰ On Spotify, the credits of the album “Classical Music Composed by Computer: Experiments in Musical Intelligence”, produced by Centaur Records, Inc. in 1997, state that it was written by “Computer Generated Composition” and David Cope.²¹¹ Yet, David Cope was making multiple choices, including on the input data, setting parameters and curating generated content, to obtain the musical results he considered satisfactory. It is possible that despite automation, the program remained just a tool in the hands of the human creator, as David Cope consistently explained the role of software.²¹²

Melomics

Melomics is a computational system for automatic composition.²¹³ It includes two computer clusters, Iamus and Melomics109, dedicated to contemporary classical and popular music, respectively. This project, partially funded by the Spanish Research Programme, was developed in 2012 under the leadership of Francisco José Vico Vela, Professor at the University of Malaga, Spain. Melomics developers could have been making choices at various stages of the creative process, from the selection of input data and setting of parameters to the final editing. *Billions of compositions generated through the project*²¹⁴ *were made available under the public domain Creative Commons license (CC0)*²¹⁵. This license is used to place in the public domain copyright-protected works and/or to create legal certainty about the public domain status of content where there are doubts, so that nobody could make authorship or ownership claims.²¹⁶

²¹⁰‘EMILY HOWELL’ (n 207); ‘Bibliography: Page 2’ (David Cope)

<http://artsites.ucsc.edu/faculty/cope/bibliography_page_2.htm> accessed 12 August 2021.

²¹¹Computer Generated Composition and David Cope, ‘Album: Classical Music Composed by Computer: Experiments in Musical Intelligence’ (1997) <<https://open.spotify.com/album/2K1s5O6IOpYDAG7hV1X5lf>> accessed 4 March 2021.

²¹² Muscutt and Cope (n 7) 13, 18 and 19.

²¹³ Universidad de Málaga, Research Group in Biomimetics (GEB), ‘MELOMICS’ (MELOMICS)

<<http://www.geb.uma.es/melomics/melomics.html>> accessed 8 March 2021; Carlos Sánchez Quintana and others, ‘Melomics: A Case-Study of AI in Spain’ (2013) 34 AI Magazine 99; Philip Ball, ‘Algorithmic Rapture’ (2012) 488 Nature 458.

²¹⁴ Bianca Bosker, ‘Life As Francisco Vico, Creator Of The Incredible Computer-Composer Iamus’ (HuffPost, 6 December 2017) <https://www.huffpost.com/entry/francisco-vico-iamus-melomics_n_2457374> accessed 20 September 2021.

²¹⁵ ‘CC0 1.0 Universal’ (Creative Commons) <<https://creativecommons.org/share-your-work/public-domain/cc0/>> accessed 11 August 2021.

²¹⁶ ‘CC0’ (Creative Commons) <<https://creativecommons.org/share-your-work/public-domain/cc0/>> accessed 10 October 2021.

folk-rnn

folk-rnn is a free online tool for the generation of folk-style music with a long short-term memory neural network, resulting from a public research project.²¹⁷ folk-rnn models were trained on ABC transcripts of folk tunes from Ireland and the UK. It is a non-commercial public research project funded by the UK Arts and Humanities Research Council grant.²¹⁸ The project lead-creator, Bob Sturm, has been since 2018 Associate Professor in Sweden and is now the PI of the MUSAiC project funded by the European Research Council (ERC) grant (2020-2025).²¹⁹ The developer of the system, who also used it for creating multiple compositions himself, does not attribute to himself authorship for musical pieces generated by folk-rnn without any subsequent human modifications. He indicated his name as a composer only when he had made changes to the piece generated by folk-rnn through the notation in the composition's credits ("by Bob L. Sturm + folk-rnn", etc.).²²⁰

Different approaches to claiming authorship are observed concerning developers deploying their AI systems for music creation. While the functionality of the AI systems and choices made by developers-users are case-specific, it seems plausible that the approaches to claiming authorship are influenced by the commercial or non-commercial nature of the AI music projects. Still, once works are created, copyright authorship is a matter of law, not of fact-independent interest-driven decisions of individuals or organisations.

3.2.2. SCENARIO 2: ATTRIBUTION OF AUTHORSHIP WHEN AI MUSIC CREATION SYSTEMS ARE OFFERED TO USERS AS A SERVICE

²¹⁷ 'About Folk RNN' (folkRNN) <<https://folkrrnn.org/>> accessed 11 August 2021; Sturm, Santos and Korshunova (n 7); Bob LT Sturm and others, 'Music Transcription Modelling and Composition Using Deep Learning' [2016] arXiv:1604.08723 [cs] <<http://arxiv.org/abs/1604.08723>> accessed 19 September 2021.

²¹⁸ 'About Folk RNN' (n 217).

²¹⁹ 'Music at the Frontiers of Artificial Creativity and Criticism' (MUSAiC) <<https://musaiclab.wordpress.com/>> accessed 18 September 2021.

²²⁰ Bob LT Sturm and others, 'Machine Learning Research That Matters for Music Creation: A Case Study' (2019) 48 Journal of New Music Research 36, 38 and 40–42; 'Tunes from the Ai Frontiers - YouTube' <https://www.youtube.com/channel/UCN9_7-VmGWle1Bl_CUV8kWA/videos> accessed 16 February 2022.

Scenario 2 considers practices of claiming authorship in the cases when AI music creation systems are offered to users as a service. The legal qualification for attribution of authorship is more challenging when multiple persons playing different roles are making choices at various stages of the creative process. When AI systems are proposed as a service, users (often individual end-users) have fewer possibilities for making free and creative choices than developers-users (described in scenario 1 above). Several online AI music creation services offer their users similar options for expressing their creativity by defining different parameters of the desired output (e.g., musical style, duration, pacing, key signature) and often also offering some functionality for postproduction editing. The users might not be able to express their choices at some important stages of the creative process, most notably that of the selection of input data.

3.2.2.1. CASES

Several online AI music creation services are claiming authorship and/or ownership in the output. We examine below the cases of AIVA, Boomy, Xhail, Score, Soundraw and ecret music, AlgoTunes, FlowMachines, Orb Producer, JukeBox and MuseNet, and folk-rnn.

AIVA

The End User License Agreement (EULA) of AIVA extends to cover “a score of music generated for Licensee by AIVA”,²²¹ including “compositions that have not been modified or curated” by users.²²² The EULA requires users of Free Plan subscription to credit AIVA when using music, and the following attribution is suggested: “Soundtrack composed by AIVA (Artificial Intelligence Virtual Artist): <https://www.aiva.ai>”.²²³ Under the Pro Plan, AIVA “assigns, grants and conveys all copyrights” to the users subscribed to its services.²²⁴ Naturally, in order to be

²²¹ Sec. 1 of the ‘AIVA End User License Agreement’ <<https://www.aiva.ai/legal/1>> accessed 27 August 2021.

²²² Sec. 6 of the ‘AIVA End User License Agreement’ (n 221).

²²³ ‘I Don’t Understand the Terms of License’ (AIVA *Helpdesk*) <<https://aiva.crisp.help/en/article/i-dont-understand-the-terms-of-license-1wqvh5v/>> accessed 27 August 2021.

²²⁴ Sec. 3 of the ‘AIVA End User License Agreement’ (n 221); ‘FAQ: Who Owns the Copyright of the Music Created with AIVA?’ (AIVA, 4 October 2019) <<https://aiva.crisp.help/en/article/who-owns-the-copyright-of-the-music-created-with-aiva-139mpug/>> accessed 21 February 2021.

able to transfer copyright ownership to users, the company must be the owner of that copyright in the first place. The terms of the EULA are not explicit on the question of authorship, but they imply AIVA Technologies' ownership over compositions created with AIVA even where users – which have no intervention on the input data – were not involved at the final stages of the creative process involving curation and modification of the output generated by the system.

Boomy

Boomy is a US-based company offering online AI music creation services.²²⁵ Its Founder and CEO spoke on 5 February 2020 at the event organised by the US Copyright Office and WIPO on AI and music creation. He stated that Boomy asserts copyright and that it follows “best practices of now” by designating *developers (team thereof) as authors*.²²⁶ According to him, during the 6 months preceding the event, “about 350 000 original works” were created with Boomy’s service.²²⁷ Sec. I(1) of the Boomy EULA states: “In consideration of free use of Boomy, any arrangement [...], composition, and/or musical work accessed or created through the use of the Boomy platform, shall be the property of Boomy Corporation as a work-made-for-hire.”²²⁸ Sec. III of the EULA clarifies that the Agreement is governed by the laws and the courts of California, affirming the application of the US doctrine of “works made for hire” permitting to consider the organisation employing creators, ordering or commissioning the creation of works as the *author*.²²⁹

While Boomy claims authorship and retains ownership, the user is granted a license to use the song produced for several purposes, provided that he credits boomy.com for any commercial use. The licence granted to the user includes synchronisation rights, sharing on

²²⁵ ‘Welcome to the Instant Music Revolution’ (Boomy) <<https://boomy.com/about>> accessed 27 August 2021.

²²⁶ U.S. Copyright Office and WIPO, *Copyright in the Age of A.I.: Session 6 - AI and Creating Music* (2020) <<https://www.youtube.com/watch?v=JIRC00IL4KI>> accessed 4 March 2021. U.S. Copyright Office and WIPO.

²²⁷ U.S. Copyright Office and WIPO (n 226).

²²⁸ ‘Boomy End User License Agreement’ <<https://boomy.com/eula>> accessed 27 August 2021.

²²⁹ Shlomit Yanisky-Ravid and Luis Antonio Velez-Hernandez, ‘Copyrightability of Artworks Produced by Creative Robots and Originality: The Formality-Objective Model’ (2018) 19 Minnesota Journal of Law, Science & Technology 1; Kalin Hristov, ‘Artificial Intelligence and the Copyright Dilemma’ (2017) 57 IDEA 431; Bridy (n 4); Russ Pearlman, ‘Recognizing Artificial Intelligence (AI) as Authors and Inventors Under U.S. Intellectual Property Law’ (2018) 24 Richmond Journal of Law & Technology i.

social media and use for non-commercial purposes. For the modification of the songs, remixing, creation of derivative works and making available on streaming services, the EULA requires the purchase of the song through the transfer of copyright ownership from Boomy. Sec. II(1) of the EULA, governing ownership, states that: “Once a song is saved, the user has the option to purchase one hundred (100%) percent of that song’s ownership for a fee. The user is granted full ownership of the song, which allows the user to copyright that song in the user’s name at www.copyright.gov” [website of the US Copyright Office].

For the Boomy’s developers to be authors or co-authors of musical works created with Boomy services used by third persons, it would be necessary under EU copyright law that these works resulted from the developers’ free and creative choices not aimed at the creation of the AI system merely as a computer programming tool, but also at the creation of specific musical works. To reinforce the claim to authorship, the company, differently from all other AI services examined in our research, mobilises the US doctrine of works made for hire.

Xhail

Xhail presents itself as an “automatic music generating platform” that is generating “rights-cleared music performed by professional musicians”.²³⁰ Created in Ireland, Xhail company expanded its registered presence to the USA, for business development reasons and to attract new investors,²³¹ as well as to Sweden.²³² Mick Kiely, Irish musician, Founder and CEO of Xhail, stated in an interview that “XHail can produce new copyright music”, and that while AI technologies are used in music creation at Xhail it is not “computer generated music”.²³³ Tom FitzGerald, Chief Financial Officer (CFO) at Xhail, further explained in an interview that “the stems [i.e., full-length single instrument performances in different genres recorded and submitted to Xhail by artists²³⁴] create track, that track is then copyrighted and that unique

²³⁰ ‘About’ (XHAIL) <<https://xhail.com/about/>> accessed 27 August 2021. For a case study of Xhail, see Clancy (n 36) 295–324.

²³¹ For more on the reasons for the US expansion, see the transcripts of the interviews with Mick Kiely, CEO and Founder, and Tom FitzGerald, CFO, of Xhail referred below.

²³² ‘Xhail Completes Shares Issues, Closes Acquisition and Registers New Name’ (Xhail, 30 July 2020) <<https://xhail.com/press-releases/xhail-completes-shares-issues-closes-acquisition-and-registers-new-name/>> accessed 7 December 2021.

²³³ Transcript of the interview with Mick Kiely, CEO and Founder of Xhail, 1 August 2019, in Clancy (n 36) 477.

²³⁴ ‘Apply to Be an Artist’ (XHAIL) <<https://xhail.com/apply-to-be-an-artist/>> accessed 27 August 2021.

copyright is owned by us, but licensed in perpetuity to the buyer”, later adding that “The writer of the track is XHail essentially”.²³⁵ Users of Xhail services could be making various free and creative choices, including at the stage of stem selection for the input. The larger the variety of choices that could be made by service’s users at different stages of the creative process, the more challenging it could be for the company and/or its developers to claim authorship (i.e., to be writers and/or composers) of musical works. Xhail’s practice is to claim ownership over music created with its service and then license it, including to the users. Ownership, unlike authorship, can be transferred by contract.

Score

Score is a tool for music creation using AI Composer technology developed by Amper, acquired by Shutterstock, both US companies. According to Sec. 2 of its Terms of Service, the service is intended

to permit *you to*, among other things, *create customized and unique musical compositions* and purchase such compositions to be downloaded and synced with audio/video footage (‘Licensed Sound Recording(s)’). [...] You acknowledge and agree that, as between the parties, Amper retains all right, title, and interest in and to the [...] Licensed Sound Recordings, all copies or parts thereof (by whomever produced) and all intellectual property rights therein. As consideration for Amper making available the Amper Platform to you, *you, upon creation of each Licensed Sound Recording, hereby assign and transfer, and will assign and transfer, to Amper* ownership of such Licensed Sound Recording and all related patents, copyrights, [...] and all other intellectual property rights in all countries and territories worldwide and under any international conventions [...]. (emphasis added).²³⁶

The contractual term “Licensed Sound Recording” covers “compositions”. Still, the contract is not explicit on the matter of authorship and places emphasis on ownership by referring to

²³⁵ Transcript of the interview with Tom FitzGerald, CFO at Xhail, 13 May 2019, in Clancy (n 36) 471–472.

²³⁶ ‘Per-Track Platform Terms of Service’ <<https://www.ampermusic.com/terms-3/>> accessed 7 September 2021.

several transactions. It mentions the purchase of compositions by users from Amper (implying they are not owners) as well as the assignment and transfer of copyrights related to the compositions from users to Amper. By agreeing to the contract, users acknowledge and agree that Amper may register created works with CMOs for collecting royalties for public performance. These provisions seem to be intended to secure ownership over musical works created by Amper's service without making an explicit statement on authorship. Yet, the users can be transferring rights to newly created original works to Amper only if they are authors of these works.

Amper's Score was notably used by Taryn Southern, an American artist and YouTuber, to create her album "I am AI". Here is how she described the creative process with the system in an interview for Forbes magazine:

it's not like you just press a button and a beautiful song is created. There is a certain amount of binary decision making by the human - BPM, rhythm, key, mood, instrumentation - and then the AI generates possibilities. Of those possibilities, you pick the ones you like and the dump the ones you don't. It's then up to me to arrange the pieces into a song structure to fit the lyrics.²³⁷

The artist also shared her experiences in an interview with BBC, where she responded to the question of whether it was a song of Taryn Southern or of an AI as follows:

The bare bones are always there in what the AI gives you, but the dynamics in the song, the way that it's arranged, deciding what instruments to bring in or get rid of - those creative choices have to come from a human. Making AI music's a bit like being a film editor - it gives you all the raw material, then you have to piece it all together to tell a story.²³⁸

This experience shows that Score's users could make free and creative choices, notably at the final stages of the creative process, in which case they would be qualified as authors.

²³⁷ Dan Schawbel, 'Taryn Southern: How This YouTube Star Used AI For Her New Album' (*Forbes*, 26 September 2017) <<https://www.forbes.com/sites/danschawbel/2017/09/26/taryn-southern-how-this-youtube-star-used-ai-for-her-new-album/>> accessed 17 February 2021.

²³⁸ Alex Marshall, 'Is Music about to Have Its First AI No.1? - BBC Music' (28 February 2018) <<https://www.bbc.co.uk/music/articles/0c3dc8f7-4853-4379-b0d5-62175d33d557>> accessed 17 February 2021.

SOUNDRAW and ecret music

SOUNDRAW and ecret music are online services of AI music creation belonging to SOUNDRAW company, which was established in 2020 in Japan. Art. 5(2) of the SOUNDRAW and ecret music Terms of Service (the provision of the two documents is identical) reads as follows:

You [user] grant SOUNDRAW a worldwide, non-exclusive, free, sub-licensable and assignable *license to freely utilize all intellectual property rights concerning music created using the Service* (including use, reproduction, distribution, creation of derivative works, display, publication, adaptation, making transmittable and demonstration). (emphasis added).²³⁹

According to SOUNDRAW's website response to the frequently asked question (FAQ), "To whom does the copyright belong?", "All intellectual property rights, such as the copyrights and trademark rights relating to ecret music belong to the operating company SOUNDRAW inc. Registration of a YouTube Content ID is prohibited. And claims of copyright of music produce on this Service are prohibited."²⁴⁰

The language used by SOUNDRAW is vague. The reference to the grant of a licence by a service user implies recognition of the user's copyright. But the user can be holding rights to a newly created original work only as its author.

AlgoTunes

The website of the US-based AlgoTunes service presents itself as follows: "AlgoTunes builds artificial intelligence apps *to help you make music*. On this page, *you can generate* royalty free music of your preferred mood and style in seconds. [...] *Own the copyright to your music* at

²³⁹ 'SOUNDRAW Terms of Service' (SOUNDRAW) <<https://soundraw.io/terms>> accessed 8 September 2021; 'Ecret Music Terms of Service' (ecrett music) <<https://ecrettmusic.com/terms>> accessed 8 September 2021.

²⁴⁰ 'SOUNDRAW - FAQ' (SOUNDRAW) <<https://soundraw.io>> accessed 8 September 2021.

low costs.” (emphasis added).²⁴¹ Its Terms and Conditions establish the following contractual terms for service’s users:

To use any of *our music*, we require that *you obtain* [...] the appropriate *license* for the use. [...] When downloading a song with a free license, *we require that you give us credit* for the song. [...] When you buy an exclusive license, *we give you copyright ownership* of the song. You are responsible for registering the copyright in your name with the copyright office, if you desire. (emphasis added).²⁴²

Users of the service can make choices when setting parameters for generating music and at the final stages of the creative process involving curation and editing. Without being explicit on the question of authorship, AlgoTunes is claiming ownership over music created by service’s users.

Interviews with the stakeholders during the research permitted to establish that *software developers* of one of the for-profit online algorithmic music creation services established in the USA are considered (by that service as) *authors of musical works created by users of the services*. In their relations with the service, online users of these services are deemed customers using music creation tools. Users can purchase rights to musical compositions if they want.

Overall, we observe that most of the providers of services for AI music creation that we have studied and identified up to this point claim authorship and/or ownership over music created with the involvement of users of their service.

Flow Machines and other AI systems of Sony SCL

Flow Machines is an R&D project of Sony, one of the world’s major music companies, offering artists AI tools for music creation.²⁴³ The Flow Machine AI has been developed under the

²⁴¹ ‘Generate Original Music for Your Content’ (*AlgoTunes*) <<https://www.algotunes.com/generate-music/>> accessed 31 August 2021.

²⁴² ‘AlgoTunes, Terms and Conditions’ <<https://www.algotunes.com/policies/>> accessed 18 February 2021.

²⁴³ ‘Augmenting Creativity with AI’ (*Flow Machines*) <<https://www.flow-machines.com/>> accessed 19 September 2021.

leadership of Professor François Pachet at Sony Computer Science Laboratories (Sony CSL Paris) and Pierre and Marie Curie University (UPMC), Paris, France, with the support of ERC funding (FP/2007-2013). After François Pachet moved to Spotify Creator Technology Research Lab, the project continued to be developed by Sony CSL team based in Paris and Tokyo. Sony CSL is an R&D unit of Sony. The creative process with Flow Machines, including artists' creative choices, is well-documented.²⁴⁴ As the registration of works of multiple creators, including Jean-Michel Jarre,²⁴⁵ Uèle Lamore,²⁴⁶ Benoît Carré (SKYGGE) and others who contributed to the "Hollow World" album,²⁴⁷ in the repertoire of SACEM confirms,²⁴⁸ Sony is not claiming authorship over works created with Flow Machines and other AI systems it offers to creators (DrumNet,²⁴⁹ BassNet,²⁵⁰ NONOTO²⁵¹).²⁵²

Jukebox and MuseNet

²⁴⁴ Pachet, Roy and Carré (n 7); Fiammetta Ghedini, François Pachet and Pierre Roy, 'Creating Music and Texts with Flow Machines' in Giovanni Emanuele Corazza and Sergio Agnoli (eds), *Multidisciplinary Contributions to the Science of Creative Thinking* (Springer 2016) <https://doi.org/10.1007/978-981-287-618-8_18> accessed 19 September 2021; Melissa Avdeeff, 'Artificial Intelligence & Popular Music: SKYGGE, Flow Machines, and the Audio Uncanny Valley' (2019) 8 Arts 130; Lucy Jordan, 'Inside the Lab That's Producing the First AI-Generated Pop Album' (*Seeker*, 13 April 2017) <<https://www.seeker.com/tech/artificial-intelligence/inside-flow-machines-the-lab-thats-composing-the-first-ai-generated-pop-album>> accessed 5 March 2021; Dani Deahl, 'How AI-Generated Music Is Changing the Way Hits Are Made' (*The Verge*, 31 August 2018) <<https://www.theverge.com/2018/8/31/17777008/artificial-intelligence-taryn-southern-amper-music>> accessed 5 March 2021.

²⁴⁵ EōN and snapshots 1-3 from it.

²⁴⁶ "Thunder Eel King!", "Boss Fight: Glycon!" and "Corruption Of The Toad Forest".

²⁴⁷ 'Credits Track by Track' (*About Hello World*) <<https://www.helloworldalbum.net/track-by-track/>> accessed 19 October 2021.

²⁴⁸ 'Répertoire des œuvres' (n 197).

²⁴⁹ Stefan Lattner and Maarten Grachten, 'High-Level Control of Drum Track Generation Using Learned Patterns of Rhythmic Interaction', *2019 IEEE Workshop on Applications of Signal Processing to Audio and Acoustics* (2019) <<http://arxiv.org/abs/1908.00948>> accessed 24 October 2021.

²⁵⁰ Maarten Grachten, Stefan Lattner and Emmanuel Deruty, 'BassNet: A Variational Gated Autoencoder for Conditional Generation of Bass Guitar Tracks with Learned Interactive Control' (2020) 10 Applied Sciences 6627.

²⁵¹ Théis Bazin and others, 'Spectrogram Inpainting for Interactive Generation of Instrument Sounds' [2021] arXiv:2104.07519 [cs, eess] <<http://arxiv.org/abs/2104.07519>> accessed 11 February 2022; Théis Bazin and Gaëtan Hadjeres, 'NONOTO: A Model-Agnostic Web Interface for Interactive Music Composition by Inpainting', *10th International Conference on Computational Creativity (ICCC 2019), UNC Charlotte, North Carolina* (2019) <<http://arxiv.org/abs/1907.10380>> accessed 19 October 2021.

²⁵² 'Prototypes' (*SonyCSL Music*) <<https://music.cslparis.com/prototypes/>> accessed 19 October 2021.

Jukebox²⁵³ and MuseNet²⁵⁴ are deep neural networks for music creation developed by OpenAI, an AI R&D company based in the USA. Sec. 2(c) of OpenAI API Terms of use states that “*OpenAI will not assert copyright over Content generated by the API for you or your end users.*” (emphasis added).²⁵⁵ The presentation of MuseNet contains the following statement: “We’re excited to see how musicians and non-musicians alike will use MuseNet to create new *compositions!* [...] Please note: *We do not own the music output*, but kindly ask that you not charge for it.” (emphasis added).²⁵⁶

Orb Producer

Orb Producer is advertised as “plugins powered by AI” to “*Write your own copyrighted Music easily*” (emphasis added).²⁵⁷ It is the product of a French start-up, Hexachords, created in 2015, which since then also extended to Spain.²⁵⁸ The purpose of the tool is not as much the generation of ready-to-use musical pieces as assistance to musicians in the creative process.²⁵⁹ Sec. 6 of the Conditions of use of the tool states that “It’s up to the user of Orb Composer to make sure of the *originality of his composition*, and if necessary to submit it to the jurisdiction of his country, to give evidence of it legally.” (emphasis added).²⁶⁰

folk-rnn

folk-rnn is a free online tool for music creation available to anybody without any registration or reference to contractual terms regarding copyright authorship and ownership. A simple, intuitive menu offers a user an option of either clicking on “Compose” button with randomly set parameters or changing the random settings. The user could select the model,

²⁵³ Prafulla Dhariwal and others, ‘Jukebox: A Generative Model for Music’ [2020] arXiv:2005.00341 [cs, eess, stat] <<http://arxiv.org/abs/2005.00341>> accessed 7 September 2021.

²⁵⁴ Christine McLeavey Payne, ‘MuseNet’ (*OpenAI*, 25 April 2019) <<https://openai.com/blog/musenet/>> accessed 31 August 2021.

²⁵⁵ ‘Terms of Use’ (*OpenAI API*, 6 August 2021) <<https://beta.openai.com>> accessed 7 September 2021.

²⁵⁶ McLeavey Payne (n 254).

²⁵⁷ ‘Orb Producer Suite 2.0 - 4 Plugins Powered by Artificial Intelligence’ (*Orb Composer*) <<https://www.orb-composer.com/>> accessed 7 September 2021.

²⁵⁸ ‘Hexachords - About’ (*YouTube*) <<https://www.youtube.com/c/Hexachords/about>> accessed 19 September 2021.

²⁵⁹ ‘Orb Composer’ (2017) 1 Age of Robots 93.

²⁶⁰ ‘Conditions of Use’ (*Orb Composer*) <<https://www.orb-composer.com/cgv/>> accessed 7 September 2021.

temperature, seed, meter, mode and/or initial notation.²⁶¹ Over 100 000 transcriptions were generated by different versions of the folk-rnn tool.²⁶²

Importantly, the *folk-rnn project is not making any explicit claims of copyright authorship or ownership over the music created*. Analysing the creative process for making music with folk-rnn, the project creator, Bob Sturm, together with JRC's copyright expert, Maria Iglesias, and a number of other authors, concluded that while in practice nothing prevents users of the tool from claiming copyright, "if that copyright [*claim*] was challenged, the users would have a hard time arguing that the few clicks that led to the creation of the score is the expression of their own intellectual creation, their free creative choices, personality, or personal touch."²⁶³ Some users of folk-rnn attributed the authorship of some pieces for organ generated by folk-rnn to the neural network itself.²⁶⁴

3.2.2.2. ANALYSIS

From our analysis, two different approaches could be observed regarding the use of AI systems for music creation. A body of scientific literature is devoted to the use of AI systems as *self-sufficient generators* of music. Another approach focuses on the use of AI systems as *tools meant to assist human creators*.²⁶⁵ The former approach is commonly described as "click and select"²⁶⁶ or "generate and curate"²⁶⁷ approach. The latter approach involves more active interaction between humans and AI systems, and it has sometimes been referred to as "co-creation"²⁶⁸. These different approaches seem to be reflected in the overall conception

²⁶¹ Bob LT Sturm and others, 'Artificial Intelligence and Music: Open Questions of Copyright Law and Engineering Praxis' (2019) 8 Arts 115, 3.

²⁶² Bob LT Sturm, 'Volumes 1-20 of Folk-Rnn v1 Transcriptions!' (*Folk the Algorithms*, 25 April 2021) <<https://highnoongmt.wordpress.com/2018/01/05/volumes-1-20-of-folk-rnn-v1-transcriptions/>> accessed 10 August 2021.

²⁶³ Sturm and others, 'Artificial Intelligence and Music' (n 261) 9.

²⁶⁴ Sturm and others, 'Machine Learning Research That Matters for Music Creation' (n 220) 38.

²⁶⁵ Philippe Esling and Ninon Devis, 'Creativity in the Era of Artificial Intelligence' [2020] arXiv:2008.05959 [cs] 8–10 <<http://arxiv.org/abs/2008.05959>> accessed 12 August 2021.

²⁶⁶ Muscutt and Cope (n 7) 13.

²⁶⁷ Emmanuel Deruty and others, 'On the Development and Practice of AI Technology for Contemporary Popular Music Production' (2022) 5 Transactions of the International Society for Music Information Retrieval 35, 41; Cheng-Zhi Anna Huang and others, 'AI Song Contest: Human-AI Co-Creation in Songwriting' [2020] arXiv:2010.05388 [cs, eess] 711 <<http://arxiv.org/abs/2010.05388>> accessed 31 August 2021.

²⁶⁸ Ryan Louie and others, 'Novice-AI Music Co-Creation via AI-Steering Tools for Deep Generative Models', *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (ACM 2020)

of AI systems for music creation: where some are conceived as ready-to-use generators of compositions (e.g., AIVA, Boomy, folk-rnn), others are initially intended to be used as tools assisting with different aspects of a creative process (e.g., AI systems of SONY CSL and IRCAM²⁶⁹).

Still, the same AI systems could be used differently, and it is the creative process with its inherent choices that counts more than a choice of a particular AI system. The “click and select” approach for music creation involves some choices, some of which may, in appropriate circumstances, be considered creative choices as the term is interpreted by the CJEU. In practice, such an approach frequently serves to produce outputs as “sources of inspiration”, “points of departure”, “raw materials” and surprising elements that could serve as a basis for further creation.²⁷⁰ Taken alone, in isolation from any possible accompanying actions, a single act of selecting a few parameters and clicking on a button “create” appears to involve too few (creative) choices by the user to merit copyright protection and a valid claim of authorship.²⁷¹ Yet, a selection of parameters leading to the final output could be a part of a feedback loop in the creative process, where an individual instance of clicking and selecting is preceded by multiple attempts informed by previous results.²⁷² If these choices are sufficient to pass the originality threshold under EU law, as set out above (at 3.1.3), then authorship should be attributed to the human user making such choices.

Here is how Oded Ben-Tal, composer and researcher working at the intersection of music, computing and cognition at Kingston University, UK, explained his experience with using folk-rnn for creating “Bastard Tunes”, a four-movement ensemble piece (fl./pic., cl./bass cl., perc., piano, vl., db.):²⁷³

<<https://dl.acm.org/doi/10.1145/3313831.3376739>> accessed 12 September 2021; Huang and others (n 267) 711 (on the basis of musician's / developers' descriptions of the creative process).

²⁶⁹ Cyran Aouameur, Philippe Esling and Gaëtan Hadjeres, ‘Neural Drum Machine: An Interactive System for Real-Time Synthesis of Drum Sounds’ [2019] arXiv:1907.02637 [cs, eess] <<http://arxiv.org/abs/1907.02637>> accessed 12 August 2021.

²⁷⁰ For a study of several cases of music creation with different AI systems, Sturm and others, ‘Machine Learning Research That Matters for Music Creation’ (n 220) 39ff.

²⁷¹ See Hugenholtz and Quintais (n 83).

²⁷² For an example of such process with DeepBach, Sturm and others, ‘Machine Learning Research That Matters for Music Creation’ (n 220) 49.

²⁷³ Sturm and others, ‘Machine Learning Research That Matters for Music Creation’ (n 220) 39.

“the capabilities and limitations of the model [folk-rnn] shaped the piece and the composition process that led to it. ‘Bastard Tunes’ [...] could not have been produced by either myself or folk-rnn without the other.”

[...]

“On a purely practical level the *control* I had over the model was rather *limited*. I can initialise it with a melodic fragment (usually a few notes to a few bars). If I am unhappy with the outputs, I can try to generate different outputs by changing the random seed, and repeat in the hope that the model yields something useful. I can change the temperature parameter of the generation process – which effectively flattens the sampling distribution and increases the chances of generating unlikely transcription symbols. [...] Finally, I can change the initial sequence that starts the generation process. *None of these steps produce predictable changes in the outputs*, however. I can pull these three levers, but even after many hours of working with the model I only have limited intuition about how these will steer it.”

[...]

“The first movement of ‘Bastard Tunes’ is the only one in which I ended up where I planned to go originally. My idea was to generate melodies that start together and gradually diverge. There are four melodic lines that start almost identically, which I generated by setting the temperature to be low (0.2 instead of the default of 1.0). I then took the last measure of each melody and used it as a seed with a slightly higher temperature. I repeated this 15 or more times for each melodic strand. The first attempt was not successful. While the overall result matched my idea the details did not. The four melodies diverged too quickly initially, meaning there was no audible process. The melodies became separate after four of five bars and it all sounded the same until the final unravelling when high temperature parameters yielded strange results. I restarted the process at an even lower temperature (0.05). I also set the metre to 9/8 to produce more interesting rhythms and tried several initial sequences until I got a promising beginning.”²⁷⁴

²⁷⁴ The performance of “Bastard Tunes” could be listened to here: ‘Bastard Tunes in Concert’ (YouTube, 2 December 2020) <<https://www.youtube.com/playlist?list=PLdTpPwVfxuXpQ03F398HH463SAE0vR2X8>> accessed 20 December 2021.

The above examples under this second scenario demonstrate different approaches to the attribution of authorship in situations when the persons involved exercised similar choices in the creative process. Although it is difficult to draw clear patterns from the studied cases, it can be stated that AI projects that are either significantly supported by public funds and/or are of a non-commercial or not-for-profit nature tend not to claim authorship and/or ownership in the musical outputs produced using their AI systems. The opposite tendency is observed in projects of a more commercial nature.

At first glance, this observation partly disconfirms the hypothesis advanced in our previous research, where it was suggested that

If “off-the-shelf” AI systems are used to create content, co-authorship claims by AI developers will also be unlikely for commercial reasons, since AI developers will normally not want to burden customers with downstream copyright claims. We therefore expect these arrangements to be clarified in the contractual terms of service of providers of such systems.”²⁷⁵

Nevertheless, as also stated in previous research, it appears that commercial AI services use copyright ownership as a trigger for a business transaction, specifying in their terms of service that users may acquire ownership against the payment of some or additional monetary consideration. This begs the question whether they own what they purport to be selling. As things stand now, contractual claims of ownership by developers often serve the purpose of enabling business transactions regarding the ownership of copyright in the AI music output at stake.

The validity of those terms is a matter of some interest because, as already stated, copyright authorship, although being fact-dependent, is a matter of public, not private law. AI music services rely on contracts to achieve the desired distribution of economic rights ownership and/or desired legal certainty. However, a determination of authorship or of what can constitute a protected work, unlike ownership, cannot be decided by means of private

²⁷⁵ Hugenholtz and others (n 2) 117.

contracts.²⁷⁶ Contracts can only create rights and obligations for their parties regarding matters where the law allows private ordering.

A situation when choices of users of online AI music creation services are limited by the functionality of the services (e.g., regarding the setting of some parameters and postproduction editing) but authorship is systematically attributed differently²⁷⁷ is indicative of uncertainty or errors in legal qualification.

Similarly, there could likely be an issue of legal qualification when an online AI music creation service offers its users a variety of options for making choices at different stages of the creative process but ignores the actual choices made when attributing authorship (e.g., by contractually always attributing authorship to the same person). It seems that the authorship of users that are taking full advantage of the functionality of AI systems and making various choices at different stages of the creative process (from data input to postproduction editing) is different from that of a user merely choosing which service to use, a type of music to generate (e.g., Classical, Latino, Rock), and clicking the “Create” button with default or random settings. Given the functional possibility of very minimum human involvement, if any, at all stages of the creative process, it is plausible that some of the musical content over which authorship is claimed is not original as a matter of copyright law, and therefore not protected. In other words, from a copyright perspective, that content is in the public domain.

Many of the studied contractual provisions are not explicit on the matter of authorship, referring to it indirectly, and focus instead on ownership.²⁷⁸ Such contractual arrangements can indeed help to overcome some uncertainty or achieve the desired distribution of (subsequent) ownership over transferable rights.²⁷⁹ Still, even when advertised as “royalty-free” or “rights-free”, none of the online music creation services studied can fully exercise 100% of rights to musical works in the Member States where national laws have in place mechanisms of collective licensing with an extended effect, in particular mandatory collective

²⁷⁶ In some countries, the authorship status is reinforced through the strong concept of moral right to attribution.

²⁷⁷ I.e., in the case of one service, it is attributed to AI systems/teams of developers and in the case of another service, it attributed to users.

²⁷⁸ For observation of practice of claiming ownership by some AI service providers, see also Sturm and others, ‘Artificial Intelligence and Music’ (n 261) 9.

²⁷⁹ Pratap Devarapalli, ‘Machine Learning to Machine Owning: Redefining the Copyright Ownership from the Perspective of Australian, US, UK and EU Law’ (2018) 40 European Intellectual Property Review 722.

management.²⁸⁰ Where national legislation provides for non-waivable and/or non-transferable rights to remuneration subject to collective licensing, private parties cannot by virtue of contracts agree to alter statutory provisions.²⁸¹ Identification of authors is important not only, for example, for the calculation of the duration of rights and respect of moral rights, but also for remunerating authors when some of their economic rights are non-waivable and/or non-transferable.²⁸²

Our analysis of cases in this scenario also demonstrates a variety of contractual approaches for achieving the desired certainty and/or distribution of ownership. From the examples studied, we observe that there are currently no typical or uniform contractual arrangements and/or clauses commonly used by all or most AI service providers. This situation can probably be explained by the absence of clear legal rules and/or authoritative precedents of dispute resolution.

The described uncertainty seems to be global. The examination of projects' geographic locations, changes thereof, literature review and interviews permitted to establish no meaningful relation between national/regional legal copyright regimes relevant for AI music creation and choices of countries for establishing AI music projects. Policy interventions and/or judicial decisions clarifying the question of authorship in some situations of AI music creation could improve the current landscape.

3.2.2.3. LACK OF INFORMATION ON CREATIVE CONTRIBUTIONS AND THE ROLE OF THE PRESUMPTION OF AUTHORSHIP AND OWNERSHIP

For third parties to the specific creation process, it is difficult if not impossible to establish what relevant choices for purposes of copyright law were made by the persons involved. An

²⁸⁰ For an exhaustive overview of such domains in the EEA, see Bulayenko and others (n 12) 131 ff.

²⁸¹ Oleksandr Bulayenko, 'MusicMatic – The French Supreme Court's Decision on Creative Commons Plus (CC+) Commercial Licensing and Mandatory Collective Management of the Right to Remuneration for Communication to the Public of Commercial Phonograms' (2020) 51 *International Review of Intellectual Property and Competition Law* 668.

²⁸² For an overview of such statutory remuneration rights provided by international and EU norms, Christophe Geiger and Oleksandr Bulayenko, 'Creating Statutory Remuneration Rights in Copyright Law: What Policy Options Under the International Legal Framework?' in Axel Metzger and Henning Grosse Ruse-Khan (eds), *Intellectual Property Ordering Beyond Borders* (Cambridge University Press 2022) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3927331>.

accurate legal qualification requires precise information about the specific AI music creation process undertaken for making a piece of music. We observed that the claims of music being created “by AI” are commonly not accompanied by publicly available information detailing the creative process.²⁸³

While the music created with some algorithms could be reverse-engineered²⁸⁴ and the advent of deep learning permitted tremendous progress in the domain of music source separation,²⁸⁵ the possibility to reverse engineer machine learning elements is a matter of ongoing debate, and the complete reverse-engineering of all parts is not realistic.²⁸⁶ Creation of one of the building blocks of a musical piece could involve use of multiple different AI models and techniques²⁸⁷, which could furthermore be intertwined with traditional music creation techniques.²⁸⁸ For an illustration, see below in Figure 1 the workflow decomposition of artists Luc Leroy and Yann Macé, duo known as Hyper Music, using various AI tool prototypes of Sony CSL.²⁸⁹

²⁸³ See also Ed Newton-Rex and Hendrik Vincent Koops, ‘The Ethics of the AI Song Contest’ (*Creative AI*, 18 October 2020) <<https://medium.com/creative-ai/the-ethics-of-the-ai-song-contest-184840c3bbcc>> accessed 31 August 2021.

²⁸⁴ Muscutt and Cope (n 7) 19.

²⁸⁵ Yuki Mitsufuji and others, ‘Music Demixing Challenge at ISMIR 2021’, *arXiv:2108.13559 [cs, eess]* (2021) <<http://arxiv.org/abs/2108.13559>> accessed 6 September 2021.

²⁸⁶ Drexler and others (n 23) 10. This was also confirmed through the stakeholder consultations.

²⁸⁷ See the detailed description of the technical means used by contenders of the first AI Song Contest, Huang and others (n 267) 710.

²⁸⁸ See ‘Interview: One Year Testing A.I. Music Production’ (*Sony CSL*, 29 January 2021) <<https://csl.sony.fr/interview-one-year-testing-a-i-music-production/>> accessed 19 October 2021.

²⁸⁹ Source: Deruty and others (n 267) 41.

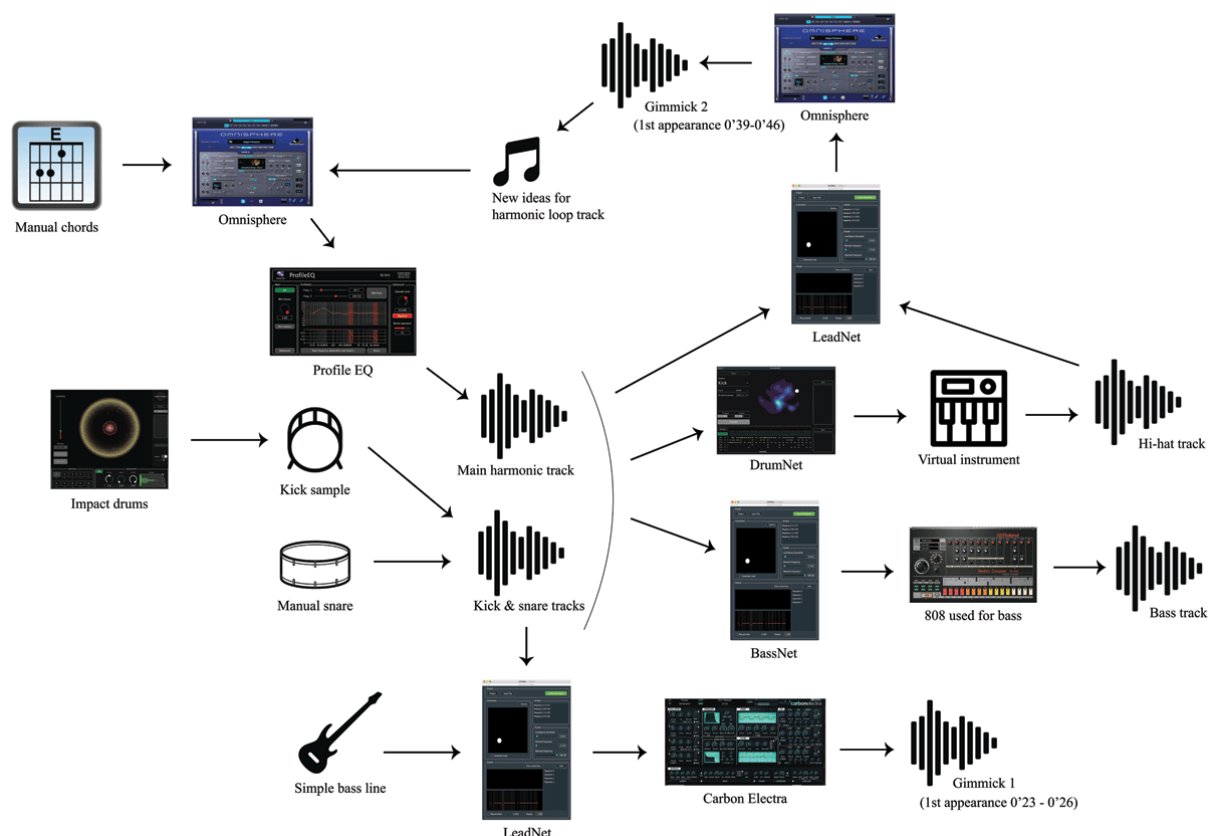


Figure 1. Flow Hyper Music Sony CSL

It is well-known that authors are not obliged to disclose or document their creative process to be granted copyright protection. This statement is true regarding the use of traditional means as well as AI. The challenge with AI musical outputs is that when they pass²⁹⁰ the so-called “Turing test”²⁹¹ it becomes difficult to say with certainty just by looking at the output whether they were created by a human or AI. The necessary fact-finding to identify the nature and origin of the creative choices, if any, could, however, form part of court proceedings clarifying the subsistence of copyright during an infringement case.²⁹²

²⁹⁰ AIVA Technologies did multiple Turing test with the public offering to recognise music created by AIVA and music created through traditional means. The results were always approximately 50/50. Z. (n 201).

²⁹¹ Alan M Turing, ‘Computing Machinery and Intelligence’ (1950) LIX Mind 433, 433.

²⁹² *Telstra Corp Ltd v Phone Directories Co Pty Ltd (2011) 90 I.P.R. 1* (n 119); Ricketson, ‘The Need for Human Authorship - Australian Developments: *Telstra Corp Ltd v Phone Directories Co Pty Ltd*’ (n 119). The court was provided with 91 affidavits describing the highly automatised production process of phone directories for establishing “who did what”.

During the first AI Song Contest in 2020²⁹³, the judging by a panel of experts in AI music creation was facilitated by the contest's rule requiring transparency from the contenders, obliging each team to submit a write-up of the process they went through to create their song (Rule 3 of the Contest).²⁹⁴ "The more musical content created with AI, the more points [the teams] can earn [...]. Human interventions were allowed, but this will cost [the teams] points from the AI-panel." (Rule 4 of the Contest).²⁹⁵ One of the questions that the organisers asked the contestants teams was "How do you feel in terms of ownership and authorship of the song relative to the AI?". Out of the 9 teams expressing their consideration about ownership, 4 considered themselves the sole owners, and 5 considered there to be joint ownership. 10 teams mentioned different parties when forming an opinion on the ownership: 7 also referred to AI developers and AI systems, 2 only to themselves, and 1 to the musicians who provided training data.²⁹⁶

Different AI models and techniques, as well as combinations thereof, were used by the teams for different music building blocks (lyrics, melody, harmony, bassline, drums, multi-part, structure, vocal synthesis and instrument synthesis). Figure 2 below provides an overview of how the 13 teams of the 2020 AI Song Contest considered human and AI roles in different music building blocks.²⁹⁷

²⁹³ See below at 4.3.

²⁹⁴ 'The AI Song Contest - FAQ - What Are the Basic Rules for the Teams?' (*VPRO International*) <<https://www.vprobroadcast.com/titles/ai-songcontest/faq.html>> accessed 1 September 2021.

²⁹⁵ 'The AI Song Contest - FAQ - What Are the Basic Rules for the Teams?' (n 294).

²⁹⁶ Newton-Rex and Koops (n 283).

²⁹⁷ Huang and others (n 235) 710 (with the reproduced figure).

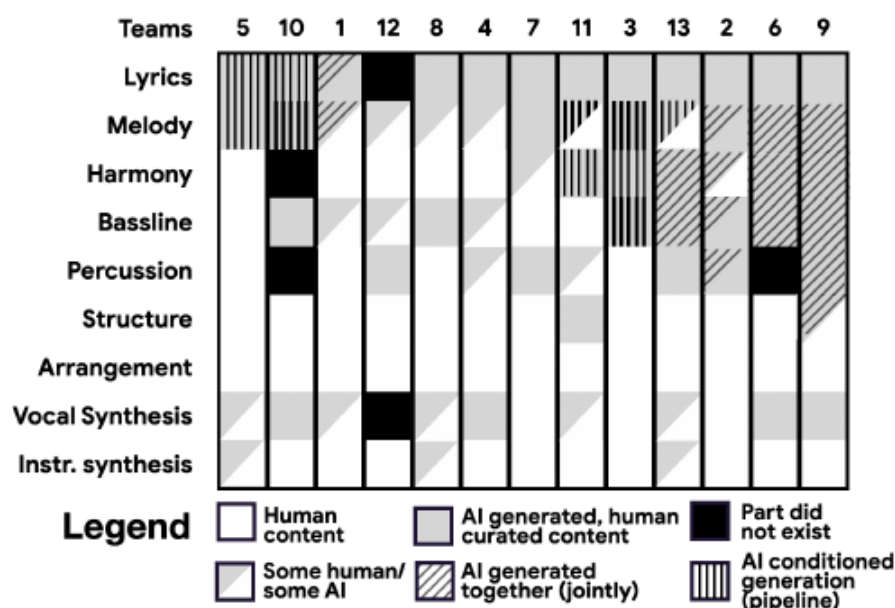


Figure 2. AI Song Contest Human Role

While the contenders of the first AI Song Contest are not teams composed of copyright experts but rather of musicians and developers, the responses are indicative of the differences of interpretation on ownership/authorship for people with intimate knowledge about the process, the role of AI and humans. The responses also highlight musicians' readiness to credit AI developers or AI. For the copyright system granting property titles automatically and without formalities to function, a creator should know when s/he is an author and when he is not. If the occurrence of legally uncertain situations about authorship and ownership are not limited to marginal cases, there is a systemic problem.

The lack of information about the creative process could be partly overcome in practice through the legal presumption of authorship/ownership, provided by Art. 15(1) Berne Convention²⁹⁸ and Art. 5 Enforcement Directive (applying *mutatis mutandis* to the holders of related rights), especially with respect to provisional measures. This presumption is, however, rebuttable.

²⁹⁸ Masouyé (n 84) 93.

A complicating factor is that the literature review and our case studies demonstrated that the statements of musical content being “created by AI” are often used as a marketing tool to attract public and investors’ attention. At the same time, some creators working with AI tools might wish not to disclose how the output was made due to a fear of negatively altering public perception of their music,²⁹⁹ as there appears to be a negative public consideration of AI creations³⁰⁰. Furthermore, many economic operators have a direct financial interest in claiming authorship, and hence copyright protection, over content produced by AI systems.³⁰¹

It is therefore recommended to carry out further research into the operation of the legal presumption of authorship with particular attention to the legal significance of contradictory statements on authorship and false authorship claims.³⁰²

As it is important for creator’s moral and material interests to be recognised as an author, it is equally important for one not to be regarded as the author of the content that s/he did not create from a copyright law perspective. For example, Úna Monaghan, composer, artist, and researcher at Newnham College Cambridge, attributed the creation of “Safe Houses” to herself and to folk-rnn, indicating that the melodies played on concertina were composed by folk-rnn, and the tape part was composed by her. She explained that “I would prefer the audience to understand the role machine learning played. I did not compose the melodies played on concertina, and would not like to have them attributed to me.”.³⁰³ The artist’s statement also illustrates the non-pecuniary interest of creators in distinguishing their own works, or parts thereof, from those generated by AI. The presumption of authorship and ownership could serve as a legal basis for the presumption of content being created by AI

²⁹⁹ For an expression of such artistic concerns, Muscutt and Cope (n 7) 12, 13 and 19.

³⁰⁰ Martin Ragot, Nicolas Martin and Salomé Cojean, ‘AI-Generated vs. Human Artworks. A Perception Bias Towards Artificial Intelligence?’, *Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems* (ACM 2020) <<https://dl.acm.org/doi/10.1145/3334480.3382892>> accessed 20 September 2021; Philippe Pasquier and others, ‘Investigating Listener Bias Against Musical Metacreativity’, *Proceedings of the Seventh International Conference on Computational Creativity* (2016); David C Moffat and Martin Kelly, ‘An Investigation into People’s Bias against Computational Creativity in Music Composition’, *Proceedings of the 3rd International Joint Workshop on Computational Creativity ECAI06 Workshop* (2006).

³⁰¹ Bensamoun, Farchy and Schira (n 16) 47; Lauber-Rönsberg and Hetmank (n 137) 577; Perry and Margoni (n 7) 628.

³⁰² Hugenholtz and others (n 2) 118.

³⁰³ Sturm and others, ‘Machine Learning Research That Matters for Music Creation’ (n 220) 50.

when it is stated so in the absence of a human authorship/ownership statement to the contrary. One would not have to prove a negative fact that s/he is not an author of something.

Overall, while the attribution of authorship is necessarily fact-dependent, much of the legal uncertainty and different approaches to the attribution of authorship is caused by a lack of detailed legal guidelines and authoritative court precedents. In this respect, the four-step test advanced in prior research and expanded upon above at 3.1 provides an analytical tool facilitating the assessment of AI outputs as protected works under EU law. The presumption of authorship and ownership could lead to a reversal of the burden of proof for someone challenging the identify of a human author disclosed on copies of the work (for example, by arguing that an AI system was the actual maker), but it would probably not be regarded as convincing to qualify an AI system as author, for this requires an upstream determination that an AI system *can* be considered an author to begin with.

3.3. NORMATIVE REFLECTIONS

There are and have always been borderline cases when doubts subsisted about copyright protection of a piece of cultural expression. Today, as has been demonstrated in the preceding sections, the situation is different due to the frequency and scale with which the uncertainties about copyright protection of AI outputs occur. The reasons for this situation are the technological developments in the field of AI, their deployment to create cultural content, and the legal requirements to the originality of copyright-protected content (see Section 3.1). As to the uncertainties due to the application of copyright protection to content created with AI, they will inevitably be addressed either through court practice and/or by legislators.

A decision by a court of law asked to decide whether a specific literary or artistic production created with or by an AI system is protected by copyright should be also informed by normative considerations. The court could take into account responses to the same question

of their peers, as they usually do when developing a judicial practice. An argument could be made that this debate should not happen in courts, to spare resources of the private parties and judicial system. The suggestion is that legislators could clarify the originality requirement. The quite regular amendments of EU copyright law testify to the ability and interest of EU legislators to accompany technological, social and cultural developments. Yet, as the law now stands literary and artistic outputs without an identifiable human author are not protected and, as this report explains, this seems the right approach. An amendment to the law could be required if a court were to find that human authorship is not required. As discussed below, the issue of protection of certain AI outputs by a related right is a separate legal question though it rests on similar normative underpinnings.

Different normative bases have been suggested to justify copyright protection. Protection anchored in human rights or in the personality of the author, both of which can justify the grant of, *inter alia*, a moral right, seem inapplicable to nonhuman authors.³⁰⁴ A labour-desert approach based on a Lockean analysis, which is also frequently invoked on this context, seems similarly difficult to apply to the “labour” of a machine. Rewarding the programmer of the AI system for what the machine creates “autonomously” as a matter of copyright law, that is, without significant identifiable human creativity in the *output*, would be a new step as matter of copyright law. It would be protecting not the work created by one or more humans but the work created by the work, a kind of second-level copyright.

This essentially leaves a utilitarian approach, which is also often used to justify intellectual property protection in general and can be applied to the area of copyright as well. Under such an approach, the law’s purpose is to facilitate market transactions in intangible assets and avoid or minimize the risks of underproduction for certain intellectual assets, sometimes viewed as public goods due to their non-excludability absent legal protection, and the non-rivalry of their consumption. Is such approach applicable to AI outputs?

³⁰⁴ Daniel Gervais, ‘Human Rights and the Philosophical Foundations of Intellectual Property’ in Christophe Geiger (ed), *Research Handbook on Human Rights and Intellectual Property* (Edward Elgar 2015) 86–97.

Before we answer this question, it is useful to recall that courts should distinguish cases where a machine is a tool to augment human creativity from those where no significant identifiable human creativity resulted directly in the work's production. One must also bear in mind that the debate about protecting AI software and possibly some datasets is a different debate. In answering the normative question from a utilitarian perspective then, there are at least three important considerations.

First, one should identify one or more classes of intangible assets (in this case, works or categories of literary and artistic works) that are or would be underproduced without copyright protection in AI outputs. This report has not identified evidence of such underproduction. If anything, available evidence arguably points the other way. In the same way that, under a Lockean approach as just noted, granting protection not to the work created by humans but to "works created by the work" (that is, output of code programmed by humans) would be a new step for copyright law and seem to over-reward the programmer.

Second, if massive amounts of protected literary and artistic works are produced by machines, right holders in those works could, without having necessarily provided any of their own creativity, become owners of vast catalogues of content that could then be used to file multiple lawsuits against users and re-users of such material. This would imply that the law would identify a "proxy" human author and assign rights in the machine output to natural or legal persons to be able to interface with users (e.g. licensing) and the court system (machines do not have legal standing).

Third, as is explained more fully in the following paragraphs, it seems necessary to evaluate the impact on human creators of giving authorless AI outputs the same rights as human outputs. The cases of genuine use of AI systems for augmenting human creativity put aside, the medium to long-term normative path is fairly clear. We, as a society, will inevitably have to deal with an ever-increasing volume of content created with minimal human involvement. The choice is therefore between deciding that (i) this content is protected by copyright (including as a result of the operation of the presumption of authorship), or (ii) this content is in the public domain. The three considerations just mentioned should illuminate the path to the optimal answer.

The analysis thus far has highlighted many of the legal challenges associated with applying EU copyright rules to AI outputs, while offering interpretative guidelines to solve or mitigate these challenges. There are other areas where human replacement is underway. This is not surprising. AI systems are outperforming the best humans at chess, Go, poker, Dota2, StarCraft and so much more.³⁰⁵ When it comes to IP, advocates of letting machines do more and replace humans extoll the advantages, especially in the patent field, of new inventions and cheaper and faster drug discovery due to the ability of AI systems to process a lot more data (“big data”) and perform *in silico* research.³⁰⁶ Here, there is relatively little discussion of what will happen if companies that depend on R&D can “employ” machines to *replace* STEM PhDs. An atrophy of employment opportunities for STEM researchers in applied sciences and technology might impact our millennia-old quest to understand nature. This is an empirical question on which this report does not opine.

But when it comes to copyright-protected works, accelerating the replacement of human creators by granting copyright protection to AI outputs without a human creativity is a reason for concern, and the risks are such that it seems to call for a precautionary approach. AI systems have already *replaced* hundreds of human journalists.³⁰⁷ Journalists are self-evidently important for the very existence of a healthy polity in a democratic society. As noted in this report, AI systems have begun to be used to *replace* songwriters and composers.³⁰⁸ They can be used to write award-worthy poetry and short stories.³⁰⁹ They are being used to write contracts, replacing the need to employ lawyers.³¹⁰

³⁰⁵ Geordie Wood, ‘In Two Moves, AlphaGo and Lee Sedol Redefined the Future’ (*WIRED*) <<https://www.wired.com/2016/03/two-moves-alphago-lee-sedol-redefined-future/>> accessed 14 February 2022.

³⁰⁶ Francesco Pappalardo and others, ‘In Silico Clinical Trials: Concepts and Early Adoptions’ (2019) 20 *Briefings in Bioinformatics* 1699.

³⁰⁷ Lucia Moses, ‘The Washington Post’s Robot Reporter Has Published 850 Articles in the Past Year’ (*Digiday*, 14 September 2017) <<https://digiday.com/media/washington-posts-robot-reporter-published-500-articles-last-year/>> accessed 15 February 2022.

³⁰⁸ Gaëtan Hadjeres, François Pachet and Frank Nielsen, ‘DeepBach: A Steerable Model for Bach Chorales Generation’ [2017] arXiv:1612.01010 [cs] <<http://arxiv.org/abs/1612.01010>> accessed 12 August 2021.

³⁰⁹ Samuel Gibbs, ‘Google AI Project Writes Poetry Which Could Make a Vagon Proud’ *The Guardian* (17 May 2016) <<https://www.theguardian.com/technology/2016/may/17/googles-ai-write-poetry-stark-dramatic-vogons>> accessed 15 February 2022.

³¹⁰ Kathryn Betts and Kyle Jaep, ‘The Dawn of Fully Automated Contract Drafting: Machine Learning Breathes New Life Into a Decades-Old Promise’ (2017) 15 *Duke Law & Technology Review* 216.

From a business perspective, there are strong incentives to reinforce this trend of replacing human authors by AI. For large corporate rightsholders, like record companies or book publishers, one of their largest costs is the money spent on authors. The logic behind this approach is understandable: an AI system is not owed royalties, nor does it have, say, reversion rights. Even if you were to grant such rights to a human developer or owner of the AI system, then you might increase developers' employment, but the people who would have made a living writing novels or music are still out of a job.

To be sure, arguments are made that certain humans will always write books and music and make art and that there will always be a market for masterpieces of human creativity. But for many types of literary and artistic works, significant investments by producers and publishers is required either to produce the work (e.g. a full-length motion picture) or to distribute (e.g. making sure online and physical bookstores have copies of a new title). Now, if machines can produce literary and artistic works cheaper and faster than human creators, it is likely that the copyright industries will favour them over their human counterparts. Delegating to machines the task of producing literary and artistic material could have profound consequences and delegating this very purpose to machines is pregnant with implications for the future. Changes in cultural productions and trends both lead to and reflect societal changes, which in turn lead to political and, ultimately, legal changes. Literature in all forms, fine arts and music are among the most important vehicles to both mirror and propagate those changes throughout society. If those cultural vehicles are made of art, books and lyrics produced or generated predominantly by or with the assistance of AI systems, then those systems will control at least a part of cultural, societal and political change.

From a policy standpoint then, the question that arises is whether copyright law should foster or enable this development towards this type of machine-made *culture*. In our view, before we can identify the *risks and valence* of the replacement of human authors, it is unwise to accelerate that replacement by putting behind it the full force of the market. This is what would happen if copyright law were interpreted as protecting AI outputs that do not meet the human originality test (as specified above in section 3.1.) or, from a normative perspective, that have no human cause.³¹¹ That would also be the case if copyright law were

³¹¹ Gervais, 'The Human Cause' (n 11).

changed, as proposed by some authors, to include new (related or sui generis) rights, specifically aimed at recognizing the type of protection. Examples of the latter proposals include those by Ramalho (for a new "disseminators right")³¹², by the CMO SACEM (for example in its submission to the CSPLA study³¹³), Ciani³¹⁴, Noto La Diega³¹⁵, de Lauber-Rönsberg and Hetmank³¹⁶, de Cock Buning³¹⁷ McCutcheon³¹⁸, and Bonadio and McDonagh³¹⁹. In many of these proposals, it is noted, there is an explicit reference to (and inspiration drawn from) the existing regime of sui generis protection of databases.³²⁰

Advancing AI development in Europe is a laudable policy objective. It cannot, however, come at the expense of human development. The risks of delegating journalism, song writing, and so much more to AI systems must imperatively be factored into the policy equation. When it comes to the creation of a new sui generis right, the burden of proof that it is required should rest on the shoulders of those who claim that it is necessary. This would mean showing that current law is insufficient to generate investment in this type of AI research and development measured against both the positive and negative impacts of letting machines create more literary and artistic works in lieu of humans.

It is against this normative backdrop that the doctrinal questions discussed above should be analysed. The two-fold doctrinal inquiry is the following: can machines be said to make choices, and can some of those choices be considered creative. As this report shows, the

³¹² Ramalho (n 4) 22. Ramalho argues for the recognition of AI output as being in the public domain and introduction of rights for "disseminators" of AI outputs, similar to that provided to publishers of previously unpublished works under Art. 4 of the Rental and Lending Directive

³¹³ Bensamoun, Farchy and Schira (n 16) 86. (arguing that AI-generated output deserves protection by IP rights, and it is necessary to designate who is responsible for the use of these rights).

³¹⁴ Jacopo Ciani, 'Learning from Monkeys: Authorship Issues Arising from AI Technology' in Paulo Moura Oliveira, Paulo Novais and Luís Paulo Reis (eds), *Progress in Artificial Intelligence* (Springer International Publishing 2019) <http://link.springer.com/10.1007/978-3-030-30241-2_24> accessed 3 March 2021.

³¹⁵ Guido Noto La Diega, 'Artificial Intelligence and databases in the age of big machine data' in Luigi Carlo Ubertazzi (ed), *AIDA: annali italiani del diritto d'autore, della cultura e dello spettacolo* (Giuffrè Francis Lefebvre 2018).

³¹⁶ Lauber-Rönsberg and Hetmank (n 137).

³¹⁷ Madeleine de Cock Buning, 'Artificial Intelligence and the Creative Industry: New Challenges for the EU Paradigm for Art and Technology by Autonomous Creation' in Woodrow Barfield and Ugo Pagallo (eds), *Research Handbook on the Law of Artificial Intelligence* (Edward Elgar Publishing 2018) <<https://www.elgaronline.com/view/edcoll/9781786439048/9781786439048.00032.xml>> accessed 10 March 2021.

³¹⁸ Jani McCutcheon, 'The Vanishing Author in Computer-Generated Works: A Critical Analysis of Recent Australian Case Law' (2013) 36 Melbourne University Law Review 915. McCutcheon. (calling for a sui generis regime not requiring an author, authorship or originality)

³¹⁹ Bonadio and McDonagh (n 186). (calling for a short-term sui generis protection).

³²⁰ Condition of investment, verification or presentation of content of a database, excluding the investments for the creation of data: CJEU Judgments in *The British Horseracing Board*, C-203/02, ECLI:EU:C:2004:695; *Fixtures Marketing*, C-46/02, ECLI:EU:C:2004:694; *Fixtures Marketing*, C-338/02, ECLI:EU:C:2004:696; *Fixtures Marketing*, C-444/02, ECLI:EU:C:2004:697 But see for criticism of neighbouring and sui generis rights approach Mezei (n 96).

former question can likely be answered in the affirmative. AI systems make decisions that can be called choices, from systems that drive autonomous vehicles to those that create music. The central inquiry, therefore, lies in the latter question.

We noted above that creative choices are those that are not essentially determined by the function of the work, the method or technique used, or by applicable standards, or relevant good practice. This is true both in Europe and internationally.³²¹ Machines can undoubtedly produce *new* material, but originality and novelty are not synonyms, the latter notion belonging to patent law. The inquiry, when addressed in either new, specific legislation or by a court interpreting extant rules, will rest on a human-centred understanding of creativity. It is argued that a machine can, based upon deep learning or, e.g., a dataset of musical works, produce a new work, but as that work is not original as a matter of copyright law.

At bottom, the underlying normative argument is that creativity is a human process. A monkey hitting a camera shutter or a cat randomly walking on a canvas after walking by accident into a paint tray, do not produce copyright works. The assumption that human creativity must be the cause of the copyright work is built-in the author's right system. The necessary causal link can be defined for now as a clear link between one or more humans and the potentially copyright-protected output.

In practice, there will most probably be several situations in which a human and a machine work "collaboratively", as examples used in this report illustrate, a situation sometimes referred to as co-creation. In such cases, the use of AI can truly augment human capabilities. Clearly, human authors should not be deprived of their rights because they use new technological tools, even one with AI capabilities. The notion of the human cause is particularly useful also in this context as it suggests that a court can identify the choices that are present in an output and decide if sufficient creative choices (therefore, human choices, as explained above), are present. Courts are used to this type of analysis. They perform it routinely to exclude choices that do not count in deciding whether (sufficient) originality is present in a new work, for instance, when that work reuses a public domain work (e.g., a new variation of a work by J.S. Bach). Courts are also used to using complex notions of cause in

³²¹ Daniel Gervais, 'Feist Goes Global: A Comparative Analysis of the Notion of Originality in Copyright Law' (2001) 49 J. Copyright Soc'y USA 949.

both contract and tort (delict) law, in the latter case to decide if a person without whom something could not have happened contributed sufficiently to the outcome to be liable. For example, a car manufacturer is unlikely to be found liable caused by a driver's error even though the accident could not have happened without the car having been built. A similar analysis can obtain here. Hence, the principled approach to sift valid copyright claims from nonvalid ones ought to be based on looking for the creative choices that made the work what it is and see who, if anyone, made such choices. It is through this normative lens, we argue, that EU law should be interpreted as regards the legal assessment of criteria for protection, authorship and ownership of works.

4. PROTECTION OF AI OUTPUT BY RELATED RIGHTS

This section presents the conditions for grant of related rights for performances (4.1), production of phonograms (4.2) and broadcasting (4.3). The focus on these three “classic” related rights is motivated by their adoption across the EU and in the world as well as by their importance for economic operators. The attention to the right of performers and phonogram producers is also necessary by virtue of the now typical in-studio music composition practices. Instead of linear chain of steps (from composition, to performance, recording, editing, mixing, and finally mastering) that previously accurately described music creation, the creation of a contemporary popular music now commonly intertwines writing of music in a symbolic form (notation) with sound recording, sound editing and mixing.³²² The present section draws attention to the relationship between copyright and related rights, in particular to the possibility of absence of copyright protection of AI outputs and availability of related rights protection, as well as to the possibility of accumulation by the same person of the status of different rightsholders. The importance of the discussion on related rights is that it demonstrates the availability of legal protection for AI outputs otherwise not protected by copyright or where doubts about copyright protection exist. This is followed by an examination of national sui generis regimes for the protection of computer-generated works (4.4.). This discussion is motivated by the policy attention to this type of regimes and by the lack of empirical information permitting their comparison with copyright protection under the general copyright regime.

4.1. REQUIREMENTS FOR PROTECTION OF PERFORMANCES AND RIGHTS OF PERFORMERS

The international treaties, most notably the Rome Convention and the WPPT, establish a minimum level of related rights protection for performances.³²³ Yet, while not providing for a definition of a “performance”, both treaties require performers to “perform” in order to be

³²² Deruty and others (n 267) 37–38.

³²³ All EU Member States with exception to Malta are parties to the Rome Convention. The EU itself and its member states are parties to the WPPT.

granted related rights. Art. 3(a) Rome Convention states that the notion of “performers” covers “actors, singers, musicians, dancers, and other persons who act, sing, deliver, declaim, play in, or otherwise perform literary or artistic works”, and Art. 2(a) WPPT provides that “‘performers’ are actors, singers, musicians, dancers, and other persons who act, sing, deliver, declaim, play in, interpret, or otherwise perform literary or artistic works or expressions of folklore”.³²⁴

According to the records of the Diplomatic Conference leading to the conclusion of the Rome Convention, “[t]he Hague Draft [of the Rome Convention] contained a definition of ‘performance’ but not of ‘performers’. In view of the addition of a definition of ‘performers’, the Conference found it superfluous to define ‘performance’ separately; obviously, performance means the activities of a performer *qua* performer.”³²⁵ While it was obvious which act constituted “performance” in the age of traditional means of expression, it becomes less so with intensive involvement of computer technologies enabling, for example, voice synthesis and tone transfer. The notion of “performance”, being undefined, could be interpreted in the light of cultural practices and technological developments of the time.

it is clear that [the performer] must “perform” and the words used in French in the [Rome] Convention might tend to exclude mere extras of theatre or cinema and those who assume a merely mechanical role (stagehands for example) since their part in the show bears no personal stamp and is marginal or secondary. It is a matter for the courts to interpret these terms. The words “act, sing, deliver, declaim, play in or otherwise perform” give them wide latitude.³²⁶

While there is a large scope for interpretation of what constitutes a “performance”, it is certain that it should require some human action beyond a mere one-click activating the process of playing a song, for example. At the same time, the term “performance”, as art

³²⁴ For a comment, Mihály Ficsor, *Guide to the Copyright and Related Rights Treaties Administered by WIPO and Glossary of Copyright and Related Rights Terms*, vol 891(E) (WIPO 2003) 138–140, 234 and 301.

³²⁵ ‘Records of the Diplomatic Conference on the International Protection of Performers, Producers of Phonograms and Broadcasting Organizations, Rome, 10 to 26 October 1961’ (ILO, UNESCO, BIRPI 1968) CUA.65/D.32/A 40.

³²⁶ Claude Masouyé, *Guide to the Rome Convention and the Phonograms Convention*, vol 617(E) (WIPO 1981) 22.

itself, is not limited to the use of traditional means of cultural expressions and is flexible to encompass technologically novel performing acts.

Still, playing a song with a voice and intonation resembling that of a human performer would not qualify as a “performance” attracting protection by related rights. The same is true with playing notes of a song from the beginning to an end without any human intervention in the process. For example, Jukebox, a neural network that could be used with very minimal input from its user to generate music with human-like singing sounds.³²⁷ Thousands of non-cherry-picked samples of such “singing” without a human performer of up to several minutes each have been made available by the project in the form of audio recordings.³²⁸

The definitions of “performers” under the Rome Convention and WPPT imply that they are humans (“actors, singers, musicians, dancers, and other persons who act”).³²⁹ AI technology is used not just to enhance human performances (e.g., live pitch correction) but also to produce synthesised performance (e.g., an audio recording sounding like a well-known human performer). The latter drew much policy attention due the phenomenon of “deepfakes”³³⁰. The question of whether such synthesised performances should be protected by a related right could be based on the same premise as authors’ right, namely a normative determination that those rights are contingent on a human cause or origin, and are granted to humans for specific policy reasons. Indeed, granting rights to performances not caused by humans might accelerate the rise of nonhuman performances and crowd out human performers.³³¹

The above observations regarding synthesised performances also apply to the situations where AI enables movements of hardware, manifesting the impressive advances in the field of robotics and AI. For example, Shimon is an AI-powered marimba-playing robot developed

³²⁷ Dhariwal and others (n 253).

³²⁸ ‘Jukebox Sample Explorer’ <<https://jukebox.openai.com/?song=804330754>> accessed 16 February 2022.

³²⁹ Art. 3(a) Rome Convention and Art. 2(a) WPPT.

³³⁰ Mathilde Pavis, ‘Rebalancing Our Regulatory Response to Deepfakes with Performers’ Rights’ 27 *Convergence* 974, 979–980. NB the proposed regulation of “deepfakes” in the AI Act (proposal), Art. 41, defining the term as follows: “AI system that generates or manipulates image, audio or video content that appreciably resembles existing persons, objects, places or other entities or events and would falsely appear to a person to be authentic or truthful (‘deep fake’)”.

³³¹ On the “human cause” as it relates to copyright protection of AI outputs, see generally [Gervais]

by the Robotic Musicianship group of the Georgia Institute of Technology, USA, that can generate compositions and playing them with four arms and eight sticks.³³² Its artificial arms hover over the marimba, and neck and cyclops head move around with the music.³³³ It was displayed in multiple events and countries, including The Today Show, Brisbane Robotronica, Shanghai International Festival and Loop Festival Berlin. Regardless of how entertaining such shows could be, they are not “performances” in the sense of copyright law, provided that the machine’s actions are not resulting from human actions using it as a tool.

In terms of the relation between copyright and related rights, the international treaties require related rights protection at least of performances of works protected by copyright. A performer’s improvisation that meets the requirements of originality (see 3.1) is protected as a work, provided that it fulfils the fixation requirement, where such requirement is required by the national law.³³⁴

Art. 3(a) Rome Convention states that the notion of “performers” covers performers who “perform literary or artistic works”, and Art. 2(a) WPPT provides that performers “perform literary or artistic works or expressions of folklore”. Yet, the relation between works and performances is a conventional minimum and the contracting parties are free to also protect performances of other type of content than “works” in the sense of copyright law (see 3.1). In this respect, Art. 9 Rome Convention states: “Any Contracting State may, by its domestic laws and regulations, extend the protection provided for in this Convention to artists who do not perform literary or artistic works.” In comparison to the Rome Convention, Art. 2(a) WPPT extended the international minimum to also cover the performance of expressions of folklore.

In other words, parties to the international treaties enjoy a margin of discretion as to whether to extend related rights protection to performances of outputs that lack sufficient human intervention or contribution to qualify as “works”.

Under EU law, both the Rental and Lending Rights Directive (Art. 3(1)(b)) and the InfoSoc Directive (Arts. 2(b) and 3(2(a))) recognise protection for performers of fixations of their performances. Neither directive explicitly links the concept of performance to the

³³² ‘About’ (*Shimon Robot*) <<https://www.shimonrobot.com/info>> accessed 19 September 2021.

³³³ ‘Shimon’ (2017) 1 *Age of Robots* 91.

³³⁴ Ficsor (n 324) 26, 140 and 292.

performance of works, although both instruments refer to the Rome Convention (in the case of the Rental and Lending Rights Directive³³⁵), or the WPPT (in the case of the InfoSoc Directive that implements that instrument into EU law).³³⁶ Hence, EU law does not require Member States to limit the grant of related rights only to performances of works.

The approach of Member States to this question is not harmonised. For example, while Belgium does not require the performance of works for the grant of related rights, France does³³⁷. This situation could result in cases where performances of AI-generated outputs are protected in some Member States but not in others.

The point is not trivial, as illustrated by the existence and growing number of events publicly performing music created by and/or with AI have been organised. On 2 July 2012, the London Symphony Orchestra gave a performance at the University of Malaga, performing musical pieces created in the framework of the Iamus project on AI music creation, to mark the 100th anniversary of Alan Turing's birth.³³⁸ It was said that “the first concert consisting almost entirely of music composed by artificial intelligence” was held on 12 October 2016 in London,³³⁹ and “probably the first ever concert showcasing pop tunes [...] with AI” 27 October 2016 in Paris³⁴⁰. In 2017, several orchestras, including that of Luxembourg, Sofia and Hollywood performed music output of AIVA.³⁴¹ On 15 November 2019, the Prague Philharmonic Orchestra performed the third and final movement of “*FROM THE FUTURE WORLD*”, WHICH WAS ADVERTISED TO BE “composed by artificial intelligence [AIVA] inspired by a fragment of Antonín Dvořák’s unfinished work”.³⁴² Between 2017 and 2019, a number of concerts were organised in the UK, Germany and Sweden, within the framework

³³⁵ Recital 15 Rental and Lending Rights Directive.

³³⁶ See Recital 15 InfoSoc Directive.

³³⁷ Bensamoun, Farchy and Schira (n 16) 45 and 48.

³³⁸ Philip Ball, ‘Artificial Music: The Computers That Create Melodies’ (*BBC, Future*, 8 August 2014) <<https://www.bbc.com/future/article/20140808-music-like-never-heard-before>> accessed 15 March 2021; Philip Ball, ‘Iamus, Classical Music’s Computer Composer, Live from Malaga’ (*The Guardian*, 1 July 2012) <<http://www.theguardian.com/music/2012/jul/01/iamus-computer-composes-classical-music>> accessed 8 March 2021. Ball, ‘Artificial Music: The Computers That Create Melodies’; Ball, ‘Iamus, Classical Music’s Computer Composer, Live from Malaga’.

³³⁹ James Vincent, ‘A Night at the AI Jazz Club: This Is What Happens When Artificial Intelligence Is Left to Write the Music’ (*The Verge*, 12 October 2016) <<https://www.theverge.com/2016/10/12/13247686/ai-music-composition-jazz-club-london-deep-learning>> accessed 18 February 2021.

³⁴⁰ Pachet, Roy and Carré (n 7) 14.

³⁴¹ ‘Our Creations: Some Examples of AI-Generated Music Composed by AIVA’ (n 198).

³⁴² ‘AIVA: From the Future World (World Premiere)’ (*Czech music information centre*, 20 November 2019) <<https://www.musica.cz/en/aiva-from-the-future-world-world-premiere/>> accessed 26 August 2021.

of the Machine Folk Session project on computation music creativity.³⁴³ During a concert organised on 23 May 2017 in London, “Partnerships: Music composed by and co-composed with computers having ‘musical intelligence’”, authorship of some musical pieces performed at the event was attributed to AI tools or systems. These are just a few notable examples illustrating that the question of the legal qualification of performances of musical pieces created with or by AI is far from theoretical, and increasingly so, as the use of AI systems in music creation is becoming more widespread.

For instance, the pieces for organ “The Glas Herry Comment & X:7153” and “X:633 & The Drunken Pint”, authorship over which was attributed to folk-rnn and DeepBach, were played by Richard Salmon in 2017 during the “Partnerships” event in London.³⁴⁴ In the countries requiring performance of works, would his performance be protected? If the musical pieces in question are not qualified as musical works under the copyright laws of these countries, then the answer to the questions is negative. Of course, as discussed in 3.1 above, legal qualification of whether a musical piece is or is not protected by copyright is far from being straightforward. Legal analysis is often complicated by unclear attributions and the use of “created by AI” as a marketing vehicle for attracting attention. Yet, legal uncertainty about the grant of related rights is unsatisfactory from the perspective of professional performers.

The development of user-friendly interfaces enables live musical improvisation with AI tools. For example, Reflexive Looper is an AI musical companion developed by Sony CSL that that learns in real time how to generate bass and chord accompaniments,³⁴⁵ and Wekinator is a general-purpose system for on-the-fly machine learning,³⁴⁶ and research/experimentation with real-time instrument interpolation at the IRCAM³⁴⁷. Some pop tunes were performed

³⁴³ ‘Events’ (*The Machine Folk Session*) <<https://themachinefolksession.org/events/>> accessed 26 August 2021.

³⁴⁴ The playbill of the event organised by Bob Sturm and Oded Ben-Tal is reproduced in Sturm and others, ‘Machine Learning Research That Matters for Music Creation’ (n 220) 38.

³⁴⁵ Marco Marchini, François Pachet and Benoît Carré, ‘Rethinking Reflexive Looper for Structured Pop Music’, *NIME’17, 15-19 May 2017, Aalborg University Copenhagen, Denmark* (2017); François Pachet and others, ‘Reflexive Loopers for Solo Musical Improvisation’, *Conference on Human Factors in Computing Systems - Proceedings* (2013); ‘Reflexive Looper – an AI Musical Companion’ (*Flow Machines*, 9 March 2016) <<https://www.flow-machines.com/history/projects/ai-musical/>> accessed 19 September 2021.

³⁴⁶ Fiebrink and Caramiaux (n 7); Fiebrink, Trueman and Cook (n 7).

³⁴⁷ Antoine Caillon, Theis Bazin and Philippe Esling, ‘Realtime Instrument Interpolation Using Differentiable Digital Signal Processing ATIAM Machine Learning Project’ 1.

and composed in real time with Flow Composer at Gaîté Lyrique in Paris on 27 October 2016, for instance.³⁴⁸ Like for performers' improvisations in general, a performer's improvisation with AI tools that meets requirements of originality (see 3.1) is protected as a copyright work, if it fulfils the fixation requirement, where the national law provides such requirement.

Furthermore, some legal questions could be raised in relation to the qualification of some acts involving AI as musical "performances" in the sense of copyright law.

AI technologies open lots of artistic possibilities for speech synthesis, reproducing artificially human speech. The continuous development of text-to-speech (TTS) systems, such as Tacotron 2,³⁴⁹ and the emergence of commercial services offering various voice synthesis services, such as WellSaid Labs,³⁵⁰ Lyrebird AI,³⁵¹ VocaliD,³⁵² Sonantic³⁵³ and Resemble AI³⁵⁴, opens multiple possibilities for widespread use of synthetic voices in the field of music. A person's speech patterns could be reproduced by training speech synthesis models on audio recordings of the person's voice. Once a model for generating speech is developed, it could be used for reciting any kind of text.

Likewise, a sound recording with the artist's voice singing a song could be recorded without the artist actually saying a word. A mature artist might wish to have his new songs performed with the voice he had when he recorded his first songs. One of the interviewed experts reported about an art project where a singer had intentionally synthesised and augmented his voice in a way permitting to have a recording of him singing in a way that he would not be able to perform normally (e.g., to sign high notes). Holly Herndon, an American artist, trained a neural network, Spawn, with various sounds of her voice, creating a polyphonic choir.³⁵⁵

³⁴⁸ Pachet, Roy and Carré (n 7) 14.

³⁴⁹ Jonathan Shen and Ruoming Pang, 'Tacotron 2: Generating Human-like Speech from Text' (*Google AI Blog*, 19 December 2017) <<http://ai.googleblog.com/2017/12/tacotron-2-generating-human-like-speech.html>> accessed 9 August 2021.

³⁵⁰ 'Convert Text to Voice in Real Time' (*WellSaid Labs*) <<https://wellsaidlabs.com>> accessed 25 August 2021.

³⁵¹ 'Lyrebird AI - Using Artificial Intelligence to Enable Creative Expression' (*Descript*) <<https://www.descript.com/lyrebird>> accessed 25 August 2021.

³⁵² 'VocaliD Creates Custom Synthetic Voice Personas For All' (*VocaliD*) <<https://vocalid.ai/>> accessed 25 August 2021.

³⁵³ 'AI Voices: Stunning Realism, Captivating Emotion' (*Sonantic*) <<https://www.sonantic.io/>> accessed 25 August 2021.

³⁵⁴ 'Create AI Voices That Sound Real' (*Resemble AI*) <<https://www.resemble.ai/>> accessed 25 August 2021.

³⁵⁵ 'The AI Song Contest - We Are AI' (VPRO International) <<https://www.vprobroadcast.com/titles/ai-songcontest/articles/we-are-ai.html>> accessed 31 August 2021; Jon Blistein, 'Holly Herndon Releases AI Deepfake Tool That

Would the artist whose voice is synthesised and used in recordings be granted related rights? The answer to this question depends on the meaning given to the notion of “performance”. A performer is not required to necessarily sing in order to perform in the sense of copyright law. Artistic performance is commonly a technologically neutral act not dependent on the use of traditional musical instruments. Yet, as it still requires some active involvement on the side of the artist, an act of mere activating speech generation (e.g., by pushing the button “generate”) with a synthetic voice without any further action is not a “performance” in a sense intended by the international treaties.³⁵⁶

Speech synthesis could be used not only by the person reproducing his own voice but also by other persons wishing to create with the voices of others. Such practices also give rise to the contemporary phenomenon known as “deepfakes”, where voices of others are used without their consent. Technologies used to create deepfakes, as AI technologies in general, are dual-use and can be used for malicious (e.g., fake news) and legitimate purposes (e.g., a creative artistic expression).³⁵⁷ The present study focuses on artistic uses without manifested malicious intentions and considers them from the perspective of copyright law.

The following example helps to illustrate the complexity of the issue at stake. YouTube channels “Vocal Synthesis” and “30 Hertz” make available multiple videos containing audio created through speech synthesis and featuring celebrity artists singing songs they never sang.³⁵⁸ Rightsholders sent take-down requests under the US Digital Millennium Copyright Act (DMCA) to YouTube to take down deepfake audios of Jay-Z singing “To Be or Not to Be” soliloquy from Hamlet and Billy Joel’s “We Didn’t Start the Fire” from the “Vocal Synthesis” channel.³⁵⁹ The channel indicates that it is an art project of an individual hobbyist interested

Lets Others Make Music With Her Voice’ (Rolling Stone, 14 July 2021) <<https://www.rollingstone.com/music/music-news/holly-herndon-ai-deepfake-tool-1197200/>> accessed 31 August 2021.

³⁵⁶ Mathilde Pavis, ‘Artificial Intelligence and Performers’ Rights’ (Submission on behalf of The Centre for Science, Culture and the Law at the University of Exeter, UK 2020) Submission to the UK IPO 25–28 <<https://zenodo.org/record/4298855#.YDKthHlbLIU>> accessed 21 February 2021.

³⁵⁷ Mariëtte van Huijstee and others, ‘Tackling Deepfakes in European Policy’ (European Parliamentary 2021) Study 26, 28 and 70. van Huijstee and others 26, 28 and 70.

³⁵⁸ ‘Vocal Synthesis’ (YouTube) <<https://www.youtube.com/channel/UCRt-fquxnij9wDnFJnpPS2Q/featured>> accessed 10 August 2021; ‘30 Hertz’ (YouTube) <<https://www.youtube.com/c/30Hertz/featured>> accessed 10 August 2021.

³⁵⁹ Andy Baio, ‘With Questionable Copyright Claim, Jay-Z Orders Deepfake Audio Parodies off YouTube’ (*Waxy.org*, 28 April 2020) (containing an interview with the creator of ‘Vocal Synthesis’) <<https://waxy.org/2020/04/jay-z-orders-deepfake-audio-parodies-off-youtube/>> accessed 10 August 2021.

in machine learning and AI technologies and labels each video's title and description as "speech synthesis". While the videos initially were taken down by YouTube, they were later reinstated. Google's spokesperson offered the following explanation to The Verge magazine: "After reviewing the DMCA takedown requests for the videos in question, we determined that they were incomplete. [...] Pending additional information from the claimant, we have temporarily reinstated the videos."³⁶⁰ The underlying logic of this decision is that the voice of a person is not protected by related rights. Only specific performance could be protected by related rights.

With this premise, is anybody granted related rights as a performer of Hamlet's "To Be or Not to Be" with a famous singer's synthesised voice? Again, as with the questions treated above, in the absence of a "performance" as intended by law, there is no performer. Yet, it is, in principle, possible to envisage the use of synthesised voices similarly to the use of synthesisers imitating sounds of classical music instruments. For example, one of the recent "Human Vocals" features of AIVA introduced "new vocal instruments that are based on extensive recordings with professional singers Masha Mnjoyan, Kiera Bickerstaff and Ashley Lawless".³⁶¹ The voice of Hatsune Miku, Japanese animated character who can sing and has released albums, was created by vocal samples from voice actress Saki Fujita.³⁶² The recent successful case of Beverly Standing, a voice-over actor, against TikTok, who used recordings of her voice for making "computer generated voice" for TikTok's videos,³⁶³ suggests that disputes of synthesis of famous actors' voices could be solved through reliance on image or personality rights³⁶⁴ and/or unfair competition.

Speech synthesis is not the only technique of reference for artistic performance. The machine learning technique called Differentiable Digital Signal Processing (DDSP)³⁶⁵ enables tone

³⁶⁰ Nick Statt, 'Jay Z Tries to Use Copyright Strikes to Remove Deepfaked Audio of Himself from YouTube' (*The Verge*, 28 April 2020) <<https://www.theverge.com/2020/4/28/21240488/jay-z-deepfakes-roc-nation-youtube-removed-ai-copyright-impersonation>> accessed 10 August 2021.

³⁶¹ AIVA, 'Version 3 - Upload Audio, Vocals, Revamped Pop, and More!' (9 November 2021).

³⁶² '12 songs created by AI: How musicians are already embracing new technologies' (*Barbican Centre*) <<https://artsandculture.google.com/theme/12-songs-created-by-ai/FwJibAD7QslgLA>> accessed 12 September 2021.

³⁶³ *Standing v Bytedance E-Commerce, Inc*, 7:21-cv-04033, No 4 (SDNY May 6, 2021).

³⁶⁴ For the same conclusion, see also van Huijstee and others (n 357) 40.

³⁶⁵ Jesse Engel and others, 'DDSP: Differentiable Digital Signal Processing' (2020) <<https://openreview.net/forum?id=B1x1ma4tDr>> accessed 9 August 2021.

transfer of any sounds to musical instruments. For example, it is possible to transfer the timbre of a human or a bird singing into a sound of a saxophone, or any other musical instrument.³⁶⁶ In one practical application, Alexander Schubert and a team of AI researchers from the IRCAM used such a technique in an award-winning artistic project.³⁶⁷ Is a singer granted related rights for a saxophone play created from his singing through the tone transfer? Grant of related rights is independent from the type of instrument used for a performance. Hence, the fact that the public perceives saxophone play instead of the artist's voice, because of the artist's choice to alter the output through a tone transfer tool, should in theory not impact the grant of related rights.

4.2. REQUIREMENTS FOR PROTECTION OF PHONOGRAMS AND RIGHTS OF PHONOGRAM PRODUCERS

EU law provides for related rights to phonogram producers in respect of their "phonograms".³⁶⁸ According to Art. 3(b) Rome Convention: "'phonogram' means any exclusively aural fixation of sounds of a performance or of other sounds", and Art. 2(b) WPPT states that "'phonogram' means the fixation of the sounds of a performance or of other sounds, or of a representation of sounds, other than in the form of a fixation incorporated in a cinematographic or other audiovisual work". "[T]he fixation may be of sounds of a performance or of other sounds. During the Rome Conference, bird-song and natural noises were given as examples of the latter. In other words, whatever the origin of the sound, the phonogram as such is protected by the Convention."³⁶⁹

Recording of performances and other sounds, regardless of whether performed content is a work and/or is protected by copyright or related rights, qualifies for protection under related rights of phonogram producers. Phonograms are protected by related rights regardless of

³⁶⁶ 'Tone Transfer' (*Google Research / Magenta*) <<https://sites.research.google/tonetransfer>> accessed 9 August 2021.

³⁶⁷ 'Ars Electronica 2021 Honors IRCAM Researchers!' (*IRCAM*, 29 June 2021) <<https://www.ircam.fr/article/detail/ars-electronica-2021-distingue-les-chercheurs-de-ircam/>> accessed 11 August 2021.

³⁶⁸ Art. 3(1)(c) Rental and Lending Rights Directive and Arts. 2(c) and 3(2)(b) InfoSoc Directive.

³⁶⁹ Masouyé (n 326) 22.

whether the underlying sound was created by humans or generated by an AI system. There is no threshold for protection other than that for the subject matter to be a phonogram, i.e., a fixation of sound.³⁷⁰

The fixation requirement implies that AI-enabled unfixed music generation and streaming projects, such as the aforementioned Endel's soundscapes,³⁷¹ "EōN" of Jean-Michel Jarre³⁷² or "Reflection" of Brian Eno,³⁷³ are not phonograms, and hence are not covered by related rights of phonogram producers. The increasing ability to continuously generate and communicate to the public unfixed (unrecorded) music that is not covered by related rights of performers and phonogram producers could impact the existing industry practices and effects of statutory rules on remuneration for communication to the public of phonograms. For example, when AI-generated non-recorded music is webcasted³⁷⁴ and used for creating musical background in restaurants, bars, supermarkets, etc., no remuneration is due for equitable remuneration for communication to the public of commercial phonograms -- because there are no phonograms. Providers of such AI-enabled music services would in theory be able to offer background music under prices lower than those practised by existing collective and/or statutory arrangements, and there is a demand for lower tariffs.³⁷⁵

The presence of performers is not a condition for the grant of related rights to phonogram producers. If significantly more phonograms without performers are used on the market, it could be relevant to examine their relation to the statutory or collective rules on the distribution of remuneration between performers and phonogram producers. For example, in multiple Member States, such rules provide for 50/50 distribution of equitable

³⁷⁰ P Bernt Hugenholtz, 'Neighbouring Rights Are Obsolete' (2019) 50 *International Review of Intellectual Property and Competition Law* 1006.

³⁷¹ 'Endel: Personalized Soundscapes to Help You Focus, Relax, and Sleep. Backed by Neuroscience' (*Endel*) <<https://endel.io/>> accessed 25 October 2021.

³⁷² Mark Savage, 'Jean-Michel Jarre Launches "Infinite Album"' (*BBC News*, 7 November 2019) <<https://www.bbc.com/news/entertainment-arts-50335897>> accessed 25 August 2021.

³⁷³ Brian Eno, 'Brian Eno Discusses Reflection' <<http://www.brian-eno.net/>> accessed 12 September 2021.

³⁷⁴ In a majority of Member States, a single equitable remuneration for broadcasting and communication to the public of commercial phonograms is due for webcasting, e.g., Austria, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden, AEPO-ARTIS, 'Performers' Rights in International and European Legislation: Situation and Elements for Improvement' (2018) 23.

³⁷⁵ E.g., some music services already tried to combine Creative Commons non-commercial licences with commercial licensing (CC+ business models) in order to bypass statutory rules on equitable remuneration and mandatory collective management of rights, Bulayenko (n 281).

remuneration for communication to the public of commercial phonograms.³⁷⁶ If in the absence of performers, phonogram producers are entitled to 100% of remuneration they might be encouraged to deploy AI tools in the contexts where the absence of performance is more acceptable or less noticeable to listeners.

Art. 3(c) Rome Convention states that “‘producer of phonograms’ means the person who, or the legal entity which, first fixes the sounds of a performance or other sounds”, and Art. 2(d) WPPT affirms that “‘producer of a phonogram’ means the person, or the legal entity, who or which takes the initiative and has the responsibility for the first fixation of the sounds of a performance or other sounds, or the representations of sounds”. When an employee fixes the sound of a recording in the course of his employment, it is the legal entity undertaking the production of phonograms that is designated as “phonogram producer”.³⁷⁷

In the case of the use of online AI music creation services, the question arises of who is the phonogram producer: the user of the service triggering the creation process or the enterprise providing the online service? Several of the studied online AI music creation services explicitly claim related rights in their EULAs (e.g., AIVA and Boomy) or just claim all IP rights to music created without specifically referring to related rights to phonograms (e.g., Score, SOUNDRAW and ecret music). Boomy does so by referring to the US regime of works made for hire.³⁷⁸ For example, users of services of AIVA, Boomy and AlgoTunes can download recordings of the created music in MP3, WAV and/or MIDI format.³⁷⁹ Music attributed by David Cope to Emily Howell, the program that he created, was commercialised by Centaur Records recording company.³⁸⁰

Similarly to our analysis above on contractual practices regarding copyright protection, that the default position of AI music tools providers is to claim ownership of the related rights in the output. As noted, this position enables providers to charge to users for commercial

³⁷⁶ AEPO-ARTIS (n 374) 26–29.

³⁷⁷ Masouyé (n 326) 23.

³⁷⁸ ‘Boomy End User License Agreement’ (n 228); ‘Boomy End User License Agreement’ (n 228).

³⁷⁹ ‘AIVA End User License Agreement’ (n 221); ‘What Formats Can I Download the Music In?’ (*AIVA Helpdesk*) <<https://aiva.crisp.help/en/article/what-formats-can-i-download-the-music-in-1ppr6no/>> accessed 27 August 2021; ‘Boomy End User License Agreement’ (n 228); ‘AlgoTunes, Terms and Conditions’ (n 242).

³⁸⁰ ‘Bibliography: Page 2’ (n 210).

licenses or transfer of ownership of the outputs, or to otherwise monetise that output with third parties (e.g., for subsequent licensing deals).

The literature review, case studies and consultations with experts did not demonstrate significant legal issues with the protection of phonograms to music produced with AI systems or with the attribution of rights in that context.

4.3. REQUIREMENTS FOR PROTECTION OF BROADCASTS AND ATTRIBUTION OF RIGHTS TO BROADCASTING ORGANISATIONS

Broadcasting of music is protected by related rights of broadcasting organisations. Under Art. 3(f) Rome Convention, “‘broadcasting’ means the transmission by wireless means for public reception of sounds or of images and sounds.” Under Art. 2(f) WPPT “‘broadcasting’ means the transmission by wireless means for public reception of sounds or of images and sounds or of the representations thereof”. In the EU, arts. 2(e) and 3(2)(d) InfoSoc Directive provide broadcasting organisations with the exclusive rights to authorise or prohibit reproduction and making available of fixations of their broadcasts, whether these broadcasts are transmitted by wire or over the air, including by cable and satellite. Arts. 8(3) and 9(1)(d) Rental and Lending Directive provide broadcasters with the exclusive rights to authorise or prohibit the rebroadcasting of their broadcasts by wireless means, the communication to the public of their broadcasts if such communication is made in places accessible to the public against payment of an entrance fee, as well as the making available to the public, by sale or otherwise fixations of their broadcasts. To put it simply, broadcasting rights prevent unauthorised recording of broadcasts and their retransmission, for example. In the digital environment, “broadcasting” is often understood to cover “webcasting” and some other digital techniques of continuous communication to the public of content over the Internet. There is no international norm requiring the protection of webcasting.³⁸¹ The CJEU has already ruled that Member States are not precluded from extending the minimum protection provided to broadcasters by the EU law.³⁸² A 2019 study concluded that 6 Member States (Austria, Czech

³⁸¹ P Bernt Hugenholtz, ‘The WIPO Broadcasting Treaty. A Conceptual Conundrum’ (2019) 41 199.

³⁸² Case C-279/13 C More Entertainment AB v Linus Sandberg, (2015) ECLI:EU:C:2015:199, para. 35.

Republic, Denmark, Finland, Romania and Sweden) extend broadcasters' rights to live streaming.³⁸³

Multiple projects already broadcast music produced by or with the assistance of AI systems. A notable broadcasting event involving many songs created with AI was the first AI Song Contest.³⁸⁴ Its first edition was held in spring 2020, with the intention of making it annual. Inspired by the Eurovision Song Contest, it is organised by the Dutch national public broadcaster, VPRO, in partnership with NPO Innovation, the innovation hub and supporter for all Dutch Public Broadcasters, and NPO 3FM, a Dutch radio station with a focus on new music. The European Broadcasting Union (EBU) was the voting supervisor. 13 teams (61 participants) from Europe and Australia were challenged to create a Eurovision-like song of a maximum of 3 minutes with the available data and AI (see *supra* at 3.2.2). Another example is live broadcasting of several musical pieces of Iamus AI from Malaga, Spain, to commemorate the centenary of the birth of Alain Turing in July 2012.³⁸⁵

There were also projects experimenting with AI music web radios. "Flow-Machines radio" of the Flow Composer project (predecessor of Flow Machines of Sony CSL) was a prototype of web radio. It "generated on-the-fly pieces composed by Flow Composer, rendered them with our concatenative synthesis system, and streamed them on a dedicated web site. Users could rate the songs they listened. The goal was to obtain enough feedback on songs to use reinforcement learning to tune automatically the generators".³⁸⁶ The AI Music Radio project, non-operational at the moment of this writing, described itself and its content as follows: "We believe that AI Music Radio is the first radio station in the world that plays only songs composed by Artificial Intelligence – Computer. [...] There are no humans involved in making of songs, everything is made by AI musician – computer program. Every song that you hear on this radio is unique, no song will ever repeat."³⁸⁷

³⁸³ Maurizio Borghi and others, 'Illegal IPTV in the European Union: Research on Online Business Models Infringing Intellectual Property Rights - Phase 3' (2019) 7, 11, 21 and 22 <<https://data.europa.eu/doi/10.2814/28041>> accessed 28 November 2021.

³⁸⁴ 'The AI Song Contest - About' (*VPRO International*) <<https://www.vprobroadcast.com/titles/ai-songcontest/about.html>> accessed 1 September 2021.

³⁸⁵ Ball, 'Algorithmic Rapture' (n 213).

³⁸⁶ Pachet, Roy and Carré (n 7) 25–26.

³⁸⁷ 'AI Music Radio' (*Online Radio Box*) <<https://onlineradiobox.com/uk/aimusic/>> accessed 20 September 2021.

Protection of broadcasts is independent of the subsistence of copyright and related rights of performers and phonogram producers in broadcasted music. The use of AI systems in music production does not seem to have any significant impact on the legal qualification of protection of broadcasts by related rights. This type of related rights could be applicable to musical content that, due to the lack of fixation, is not protected by copyright and/or related rights of phonogram producers (e.g., Endel’s soundscapes,³⁸⁸ “EōN” of Jean-Michel Jarre³⁸⁹ or “Reflection” of Brian Eno³⁹⁰).

4.4. REQUIREMENTS FOR PROTECTION OF COMPUTER-GENERATED WORKS AND ATTRIBUTION OF RIGHTS TO PERSONS THAT ARRANGED FOR THEIR CREATION

The notion of “computer-generated works” was first introduced in 1988 in the UK,³⁹¹ the former EU Member State, before being adopted in several common law countries and territories: Ireland,³⁹² Hong Kong SAR,³⁹³ India,³⁹⁴ New Zealand,³⁹⁵ and South Africa^{396, 397}. Following its adoption in the UK, this notion of “computer-generated works” was introduced

³⁸⁸ ‘Endel: Personalized Soundscapes to Help You Focus, Relax, and Sleep. Backed by Neuroscience’ (n 371).

³⁸⁹ Savage (n 372).

³⁹⁰ Eno (n 373).

³⁹¹ Sec. 9(3), 12(7) and 178 of the CDPA. Robert Hart, ‘Copyright and Computer Generated Works’ (1988) 40 Aslib Proceedings 173.

³⁹² Sec. 2(1) and 21(f), Copyright and Related Rights Act (2000), No. 28/2000.

³⁹³ Sec. 11(3), Copyright Ordinance (1998) Cap. 528.

³⁹⁴ Sec. 2(d)(vi), Copyright Amendment Act (2012), No. 27.

³⁹⁵ Sec. 5(2)(a), Copyright Act (1997).

³⁹⁶ Sec. 1, Copyright Act (1978), *Haupt t/a Softcopy v Brewers Marketing Intelligence (Pty) Ltd and Others* (118/05) [2006] ZASCA 40; 2006 (4) SA 458 (SCA) (29 March 2006); *Payen Components South Africa Ltd v Bovic Gaskets CC and Others* (448/93) [1995] ZASCA 57; 1995 (4) SA 441 (AD); [1995] 2 All SA 600 (A) (25 May 1995); Lee-Ann Tong, ‘Copyright and Computer Programs, Computer-Generated Works and Databases in South Africa’ (2006) 28 European Intellectual Property Review 625.

³⁹⁷ Andres Guadamuz, ‘Artificial Intelligence and Copyright’ (2017) 5 WIPO Magazine 14, 18; Guadamuz (n 4); McCutcheon (n 318); Niloufer Selvadurai and Rita Matulionyte, ‘Reconsidering Creativity: Copyright Protection for Works Generated Using Artificial Intelligence’ (2020) 15 Journal of Intellectual Property Law & Practice 536; Lionel Bently, ‘The UK’s Provisions on Computer-Generated Works: A Solution for AI Creations?’ (Conference of the European Copyright Society (ECS): EU copyright, quo vadis? From the EU copyright package to the challenges of Artificial Intelligence, Brussels, 25 May 2018) <<https://europeancopyrightsocietydotorg.files.wordpress.com/2018/06/lionel-the-uk-provisions-on-computer-generated-works.pdf>>; Paul Lambert, ‘Computer-Generated Works and Copyright: Selfies, Traps, Robots, AI and Machine Learning’ (2017) 39 European Intellectual Property Review 12; Julia Dickenson, Alex Morgan and Birgit Clark, ‘Creative Machines: Ownership of Copyright in Content Created by Artificial Intelligence Applications’ (2017) 39 European Intellectual Property Review 457.

in the European Commission's Proposal for the Computer Programs Directive in 1989.³⁹⁸ Yet, it "was judged to be somewhat premature", and the European Parliament voted to delete the provision during the legislative process.³⁹⁹ At the international level, the notion of "computer-generated works", inspired by the UK law, was subject to considerations at WIPO as a part of work of the Committee of Experts on Model Provisions for Legislation in the Field of Copyright⁴⁰⁰ and of the Committee of Experts on a Possible Protocol to the Berne Convention for the Protection of Literary and Artistic Works⁴⁰¹. This work did not result in a normative action.

In the UK, Sec. 178 CDPA defines "computer-generated work" as the work "generated by computer in circumstances such that there is no human author of the work". Sec. 9(3) CDPA establishes that the author of such work "shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken." One court case dealing with computer game design further helps with the understanding of these succinct provisions. In the *Nova Productions* case, the High Court of Justice established that:

In so far as each composite frame is a computer generated work then the arrangements necessary for the creation of the work were undertaken by [the computer game designer] 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 that [the computer game designer] 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 s.9(3).⁴⁰²

Importantly, a computer-generated work must still be a work. As explained above, this report takes the view that under EU copyright law this means that the work is the result of

³⁹⁸ European Commission, Explanatory memorandum to the Proposal for a Council Directive on the legal protection of computer programs COM(88) 816 final — SYN 183 (Submitted by the Commission on 5 January 1989) (89/C 91/05).

³⁹⁹ Thomas Dreier, 'The Council Directive of 14 May 1991 on the Legal Protection of Computer Programs' (1991) 13 *European Intellectual Property Review* 319, 321.

⁴⁰⁰ WIPO, 'Committee of Experts on Model Provisions for Legislation in the Field of Copyright, Third Session (Geneva, July 2 to 13, 1990)' (1990) 9 *Copyright* 241.

⁴⁰¹ WIPO, 'Committee of Experts on a Possible Protocol to the Berne Convention for the Protection of Literary and Artistic Works, First Session (Geneva, November 4 to 8, 1991)' (1992) 2 *Copyright* 30.

⁴⁰² *Nova Productions Ltd v Mazooma Games Ltd & Ors* Rev 1 [2006] EWHC 24 (Ch) (20 January 2006) [105].

sufficiently relevant (causal) human free and creative choices. It is possible of course that post-Brexit UK courts will revert to a notion of originality based on skill and labour no longer aligned with the EU law standard (as interpreted by the CJEU) and, from there, decide that work and skill demonstrated not by a human (be it the developer or someone else) but by the machine is sufficient. If the test is limited to the presence of *human* skill, labour and judgement in the output, the normative difficulty might be avoided.⁴⁰³ Yet, the very notion of a work generated by a computer creates a tempting semantic bridge to jettison any requirement that a human be creatively involved in the production of the expressed output. In our view, this would be both inconsistent with EU law, and normatively undesirable.

In Ireland, Sec. 2(1) Copyright and Related Rights Act defines “computer-generated” work as the work that is generated by computer in circumstances where the author of the work is not an individual”. Sec. 21(f) of the Act defines “author” as “the person who creates a work and includes [...] in the case of a work which is computer-generated, the person by whom the arrangements necessary for the creation of the work are undertaken”.

Overall, the provisions on computer-generated work are criticised for failing to provide legal certainty.⁴⁰⁴ The provisions permit neither to adequately identify the person that undertook the “arrangements necessary for the creation of the work” nor to clearly define such “arrangements”. The requirement for persons to undertake the arrangements also implies that in their absence AI-generated materials might not be covered by the computer-generated works regime.

It could be added that there is also some uncertainty about the qualification of computer-generated “works” under the international treaties providing for rules of national treatment and/or reciprocity. It was previously found that “these regimes [of computer-generated works] are perhaps better understood or qualified as a species of related rights, in which case they would be compatible with the EU *acquis*.”⁴⁰⁵ If computer-generated “works” are not qualified as “works” under copyright laws of the EU and its Member States, this could raise issues regarding the treaty obligation to apply national treatment protection to such “works”.

⁴⁰³ Dickenson, Morgan and Clark (n 397) 458.

⁴⁰⁴ Lionel Bently and others, *Intellectual Property Law* (5th edn, Oxford University Press 2018); Bently (n 397); Dickenson, Morgan and Clark (n 397); Lambert (n 397); Lauber-Rönsberg and Hetmank (n 137).

⁴⁰⁵ Hugenholtz and others (n 2) 117.

The answer could turn on whether the works are considered protected under copyright law, in which case, it would seem that national treatment is applicable. Sui generis protection for non-original content would conversely be much less likely to be considered captured by the national treatment obligations contained in the Berne Convention, the TRIPS Agreement or the WCT.

In March 2021, the UK IPO concluded its consultations on AI and IP by marking in the “Next steps – actions”:

Consult on whether to limit copyright in original works to human creations (including AI-assisted creations). In tandem with this, consult on whether or not to replace the existing protection for computer-generated works with a related right, with scope and duration reflecting investment in such works. Also consider whether action should be taken to reduce confusion between human and AI works, and the risk of false-attribution.⁴⁰⁶

Policy developments in this area should proceed with utmost caution. In the 1990s, after the rejection of the so-called “sweat of the brow” doctrine by the United States Supreme Court in the *Feist* case, which made the protection of by copyright of databases contingent on originality in the selection and arrangement of their contents, the European Commission adopted a directive recognizing a sui generis right in databases independent of copyright originality. Whether this directive was effective and achieved its systemic policy goals has been a matter of considerable controversy. By the Commission's own admission, it does not seem to have achieved such goals. As a matter of policy, it is not advisable to recognize new rights in new types of products or outputs simply because they may acquire some economic value.

At the same time, however, the use of AI technologies will force courts and policy makers to consider potential new forms of creativity that may qualify for copyright protection, even assuming a human cause requirement. Just as DJs have revolutionised music by finding new

⁴⁰⁶ UK IPO, ‘Executive Summary, Consultation on Artificial Intelligence and Intellectual Property’ (23 March 2021) para 6 <<https://www.gov.uk/government/consultations/artificial-intelligence-and-intellectual-property-call-for-views/executive-summary>> accessed 25 March 2021.

ways of reusing existing sound recordings, a human may direct an AI system to perform tasks near or past the above-mentioned originality threshold.⁴⁰⁷

A concrete example might illuminate the dilemma ahead. Assume that an AI system is programmed to look for patterns in songs and can produce a musical output that “blends” songs it has been given to learn. Then assume that User A (who is not a professional musician) gives this AI system five recordings from by Malcom Maclaren as input. Would User B be barred from doing the same? In other words, would User A’s selection of the recordings give her an exclusive right to prevent others from doing the same? Would there be enough originality in combining not the recordings but different authors/performers? What if the AI system was asked to blend music from Dadju and 5Miinust? Would that combination then be off-limits to others? Naturally, one can turn the various “knobs and dials” of this example in several ways. The users may be able to choose modes of blending, or they may be able to combine specific songs and artists, etc. In all such cases, the AI system is doing the bulk of the work leading to the protection of the output but there is, at the point of origin, a human “feeding” the machine. Will that be enough to justify copyright protection? Should it? Given the degree of inchoateness of the technology and the less than obvious benefits of conferring rights under existing schemes (copyright or related rights) in such cases, there is no pressing need to consider adding a new layer of sui generis rights, at least not until the technological and commercial circumstances have substantially stabilised.⁴⁰⁸

Discussions with stakeholders and experts, as well as a review of publicly available sources, did not permit to identify a single AI music creation project claiming the protection of its outputs as “computer-generated works”. This is despite the fact that multiple AI music services are established or provide their services in the UK and Ireland. This could probably be explained to some extent by the fact that the regime of computer-generated works offers less protection in comparison to the usual regime of copyright, and that the disclosure of works being computer-generated could create some copyright protection uncertainties in

⁴⁰⁷ See above at 3.1.

⁴⁰⁸ See generally on the challenges of regulating new technologies, Daniel Gervais, ‘The Regulation of Inchoate Technologies’ (2010) 47 *Houston Law Review* 665.

other countries. Still, the grant of rights for creation for computer-generated works is a matter of law and not of individual decisions of private actors.

None of the stakeholders and experts consulted about the regime of computer-generated works considered it to be of any particular importance for AI music production, as they either rely on copyright and/or related rights, or claim no rights at all (see 3.2). It seems that the choices of a country for establishing AI music services were motivated by habitual residence and/or overall business environment, including financing opportunities, vibrant cultural sector and taxation regime, rather than the existence of a specific legal regime for “computer-generated works”.

5. CONCLUSIONS AND RECOMMENDATIONS

The creation and development of copyright law are closely connected to technological and associated business transformations. It is therefore not surprising that progress in AI technologies and their deployment in the creative sector creates new opportunities and challenges for the law, creators (authors and performers), and rightsholders. What is perhaps different with AI technologies is the magnitude of the potential impact, brought about by unprecedented scale of automation that increase productivity and access to creativity. Yet, the very same automation poses challenges for the application of copyright law, increasing legal uncertainty, as demonstrated in this report vis-à-vis AI music outputs. This begs the question of how can and should EU law meet this challenge. In this final chapter, we first summarize the conclusions of our research on how EU copyright and related rights rules apply to AI music outputs (5.1). On that basis, we outline policy recommendations for EU legislators in this field (5.2).

5.1. CONCLUSIONS

5.1.1. COPYRIGHT PROTECTION AND AUTHORSHIP OF AI MUSIC OUTPUTS

Under International and EU copyright law, authors are granted protection automatically upon the creation of original works. There were always situations where doubts subsist about the originality of created subject matter and the identity of their authors. The main difference brought about by the increasing deployment of AI systems, tools and techniques in the creative process is the scale and frequency of situations where there is uncertainty about: (i) the copyright protection of content produced; and (ii) the authorship status of the persons involved at different stages of that process (e.g., developers and/or users). This uncertainty is rooted in the technical nature and operation of AI systems, namely of the machine learning type, which erode the (causal, creative and expressive) link between the human contribution to or intervention in the process and the output generated by (or with the assistance of) the AI system.

Based on an analysis of international and EU law, including the case law of the CJEU, it is possible to identify a four-step test for the assessment of copyright protection of subject matter as a “work”. This test, conceptualised in prior research and further developed here, can be used to assess whether AI output qualifies as a work from the perspective of EU law. The four interrelated criteria that subject matter such as an AI output should meet to qualify as a copyright-protected “work” are as follows: (1) a “production in the literary, scientific or artistic domain”; (2) the product of human intellectual effort; (3) the result of creative choices; and (4) the choices “expressed” in the output.

In our analysis, we applied this test to AI musical outputs. The domain of music was selected for different reasons: it is one of the creative fields where the deployment of AI technology is the most significant; it contains a diversity of applicable legal rules (including related rights) in EU copyright law; and due to its economic and cultural significance, this field often acts as a catalyst for legal and policy changes in the area of copyright.

Our analysis shows that many of the AI music outputs examined will likely pass steps (1), (2) and (4) unscathed. The crux of the test is therefore in step (3), which encapsulates the essence of the originality standard under EU copyright law. From this perspective then, where an output does not qualify as original in the sense that it reflects the author’s free and creative choices, that output is – from the perspective of *copyright* – in the public domain. As noted below, however, it might still benefit from protection under related rights.

In the context of step (3), it is possible in the first place to identify a series of external constraints on the assessment of originality: rule-based, technical, functional, and informational. The existence of such constraints reduces the author’s margin for creative freedom, sometimes below the originality threshold. In the second place, the step allows for the identification of three *iterative* stages of the creative process when using an AI system: “conception”, “execution”, and “redaction”. This approach maps well to the basic definition of AI systems used in our analysis, particularly to machine learning systems.

From our analysis, it results that the most relevant human contributions for purposes of an assessment of originality take place at the “conception” and “redaction” stages, rather than

the execution stage. Furthermore, the iterative nature of the process means that a determination of originality requires a case-by-case assessment, for which there might not always be readily available public information. The result is that questions of originality – as well as authorship and ownership – in these cases will prima facie be governed by the operation of legal presumptions. Hence, absent additional transparency measures, an accurate substantive assessment of originality will require reverse engineering of the human interventions or contributions in the use of the AI system leading to a certain output.

Our analysis of the concept of work also investigated the legal status of secondary (derivative) works in relation to the (primary) works used in the input in the context of AI music outputs. In our view, subject to specific unharmonized national provisions to the contrary, works created with the aid of AI systems are generally not, as such, secondary (derivative) works in relation to the primary works used in the input if they do not reproduce any original elements of the primary works. From our understanding of AI technology (and in particular of machine learning systems), such a reproduction does not occur in a technical or legal sense in such a way as to influence the qualification of the output as a secondary (derivative) works; rather, eventual similarities between the output and a pre-existing (original) work would mostly matter for analysis in the context of an infringement assessment.⁴⁰⁹

After examining the criteria for protection, our analysis then explored private actors' practices of claiming copyright protection and attributing authorship in the domain of music, including through contractual means. The case studies and interviews carried out in our research allowed us to identify areas of uncertainty and/or errors with legal qualifications regarding the subsistence of copyright protection and/or authorship in practice. The issue is manifested through the fact that claims to authorship and/or ownership are often associated with the nature (commercial/non-commercial) of AI music creation projects rather than with a facts-based analysis of the creative processes.

Originality and authorship are matters of public law, leaving private parties with limited margin for interpreting the legal significance of their actions in the creative process; but not the ability to determine whether someone—or something—is an author as a matter of law

⁴⁰⁹ Our research did not examine issues of reproduction of works for the purpose of training AI systems.

nor whether a particular output is a work protected by copyright. Still, in some cases, there is likely an issue of legal qualification when an online AI music creation service offers its users a variety of options for making choices at different stages of the creative process but ignores the actual choices made when attributing authorship (e.g., by contractually always attributing authorship to the same person). Similarly indicative of uncertainty or errors in legal qualification is the situation where choices of users of online AI music creation services are limited by the functionality of the services (e.g., regarding the setting of some parameters and postproduction editing), but authorship is systematically attributed to different parties in the process (e.g., developer or user).

The uncertainty is compounded by the fact there are currently no typical or uniform contractual clauses used by all or most AI service providers. This situation can probably be explained by the absence of clear legal rules and/or authoritative precedents in this regard. Our research suggests that this state of uncertainty is a global problem. The examination of AI projects' geographic locations, literature review and interviews identified no meaningful relation between national/regional legal copyright regimes relevant for AI music creation and choices of countries for establishing AI music projects. Instead, factors like overall business and investment climate, public grants and taxation seem to play an important role.

Our legal analysis of authorship of AI musical outputs suggests that it is useful to distinguish between two scenarios. The first scenario refers to the situation when AI developers and users are the same person(s), whereas the second refers to cases when AI music creation systems are offered to users "as a service". The second scenario is more complex as regards establishing authorship of the persons involved in the creative process, since it requires an understanding of functional freedom enjoyed by users, as well as the specific choices made by all persons involved in the creative process. The proposed four-step test facilitates the qualification of AI outputs under copyright.

As in the case of creating with traditional means, the recognition of copyright protection and authorship to works created by or with the assistance of AI systems is not subject to artists disclosing and documenting the creative process. Naturally, the persons directly involved in the creation are mostly well-informed about the factual circumstances surrounding the

production of an AI output. Still, even when detailed records of the creative process are available, there are often issues with the certainty of legal qualifications.

Legal presumptions of authorship and ownership – like those in the Berne Convention and Enforcement Directive – may shift the burden of proof for someone challenging the identity of a human author (of his or her actual authorship) but they are much less likely to help determine whether an AI output is actually original and copyright-protected. They can be used by economic actors to deviate from a legally accurate attribution of rights, which is necessarily fact-specific. Persons with such factual knowledge and control over the publication of the output have therefore the possibility to claim authorship and ownership of such content, even if the same lacks originality from the perspective of copyright law. In other words, while the presumption of authorship helps with addressing the problem of lack of information on the creative process characteristic of AI outputs, it also enables false authorship and ownership claims that may inter alia cause the practical extension of copyright protection in practice to AI-generated outputs that should be unprotected and, therefore, in the public domain.

The answers to this problem would then need to be found in the fact-finding that form part of eventual litigation process. To be sure, this is limited solution to the problem of false authorship and ownership claims. Fundamentally, it cannot in any way contribute to clarify the assessment of ex ante question of whether an AI system can ever be considered an author or the maker of creative choices that can somehow generate authorship in a human being who has not made such choices, such as the owner or user of the system.

5.1.2. RELATED RIGHTS

In the music field, the practical significance of the uncertainties regarding copyright protection of AI outputs is mitigated to some extent as commercial actors can rely on related rights protection.

Performances and performers

The relationship between works and performances is a conventional minimum for granting related rights to performers. As EU law does not make protection of performances conditional on the performance of works, Member States are free to grant related rights for the performance of subject matter that is not protected by copyright. There is no uniform approach among the Member States to this question. Presently, the performance of non-copyright protected AI-generated outputs is protected in some Member States but not in others.

Artistic performance is commonly a technologically neutral act. While performers are free to choose any means, performance requires some active involvement on the side of the artist to be granted related rights protection. A mere act of activating AI-enabled speech or sound generation (e.g., by pushing the button “generate”) without any further action is not a performance in a sense intended by the international treaties. The technological neutrality of related rights protection also means that they are granted to performers using AI systems as tools for enhancing, altering or transforming their performances.

Performers’ original improvisation with AI tools and techniques, like with traditional instruments, is protected as a copyright work if it meets the originality requirements and fulfils the condition of fixation, where it is required by national law.

Phonograms and phonogram producers

Related rights protection of phonograms is independent of that of copyright or performances. As such, phonogram producers benefit from legal protection regardless of whether the underlying sound was created by a human or AI-generated. There is no threshold for protection other than that for the subject matter to qualify as a phonogram, i.e., it must be a fixation of sound. The fixation requirement implies that AI-enabled continuous unfixed music generation and streaming projects are not phonograms and hence are not covered by rights awarded to phonogram producers. Our research did not identify significant legal issues with the qualification of recordings of music produced with the aid of AI systems as phonograms or with the corresponding attribution of rights.

Broadcasts and broadcasters

Protection of broadcasts is independent of the subsistence of copyright and related rights of performers and phonogram producers to the broadcasted content. The use of AI systems in music production does not seem to have any significant impact on the legal qualification of broadcasts or the protection of broadcasters. In the Member States where broadcasting protection extends to webcasting, such protection could apply to AI-enabled continuous unfixed music generation and streaming projects.

As a general remark, the availability of related rights protection for non-copyright protected AI-generated outputs should, from a normative and policy standpoint, be taken into account when assessing the desirability of proposals for new modes of protection of AI outputs.

Computer-generated works

None of the consulted stakeholders and experts relies on or considers the existing national regimes of computer-generated works to be of particular importance for AI music production. In this regard, economic actors appear to rely on the familiar copyright and related rights protection rather than on the specific regime for computer-generated works. Our research found no evidence that the establishment of any AI music services studied in a particular jurisdiction was motivated by the existence of legal protection for computer-generated works. This finding also suggests that policy proposals for a legislative change based on this legal model should be considered with particular caution.

5.2. RECOMMENDATIONS

- There is no clear case for a legislative action at the level of substantive rules in the EU copyright acquis in the short term as regards AI outputs. Existing proposals for new rights and forms of protection for AI outputs generally lack clear and convincing theoretical and economic justification. In most cases, these proposals fail to adequately

consider existing protection for AI outputs under copyright law and, where such protection is lacking, under related rights or (in limited cases) specific regimes for protection of computer-generated works. Considering this, we recommend that no new protection regimes for AI outputs are introduced absent clear and compelling evidence that justifies a change to the status quo.

- With regard to the protection of performers, given the increasing frequency and scale of performances of AI music outputs, it is recommended in the short term to carry out a mapping analysis of whether and how Member States' laws grant of related rights to performers is conditional on the performance of "works". Taking into account the uncertainties of qualifying AI outputs as "works", it is recommended in the medium term to consider EU harmonisation of the requirement for granting related rights to performers independently from the copyright status of the content performed.
- The flexibility of the requirements for copyright protection and authorship at the EU level provides private parties concerned with some interpretative space. Private actors are experimenting with different contractual arrangements for achieving desired legal certainty and rights attribution. Open disputes between the parties on the subsistence of copyright protection and/or authorship are rare. As such, and absent concrete evidence to the contrary (particularly of economic nature), it is recommended that the development of artistic, business, and contractual practices is closely monitored and subject to further study. Future work in this respect at the international or EU level could include stakeholder dialogues and co-regulatory approaches with a view to identifying and developing best practices and model clauses to guide AI service providers in this area.
- In the medium term, it is recommended to scrutinise the presumption of authorship and ownership in Art. 5 Enforcement Directive. The assessment of this provision should focus on the areas: (i) where a declared absence of authors could spare economic actors from some copyright-related costs (e.g., royalty payments to authors); and (ii) where the declared presence of authors could create copyright-related revenues (e.g., based

on copyright protection of the AI outputs). Users of AI systems should retain the right to claim authorship over AI outputs that qualify as works as a result of their contribution, as well as have recourse to legally effective means to disclaim authorship of AI outputs or parts thereof. Further research should focus on the legal mechanism(s) that could achieve these goals in the context of a revision presumption of authorship and ownership and/or the right to object to false attribution.

- The proposed four-step test for assessing copyright protection of output created with AI as a “work” provides a solid analytical basis for reducing the legal uncertainty in this area and a strong descriptive capacity in EU copyright law for the attribution of copyright protection to human authors. Although further research is needed to develop a corresponding normative argument, we have identified the notion of “human cause” as a promising avenue in that direction. Based on this normative consideration and to address existing uncertainties, it is recommended that legislative and/or judicial authorities authoritatively affirm the normative anthropocentric conception of EU copyright protection, thus guiding the application of copyright rules to AI outputs.

ANNEX 1. STUDIED CASES

AI project / company	Location
AIVA	Luxembourg
AlgoTunes	USA
Amper / Score	USA
Boomy	USA
ecrett music	Japan
Emily Howell	USA
Endel	Germany
Evoke Music / Amadeus Code	Japan
Flow Machines / Sony CSL	France and Japan
folk-rnn	UK
Jukebox	USA
Melomics	Spain
MuseNet	USA
Orb Producer	France and Spain
SOUNDRAW	Japan
Xhail	Ireland, Sweden and USA

ANNEX 2. STAKEHOLDERS AND EXPERTS INTERVIEWED

Person and organisation / project
Alexandra Bensamoun, Professor, University Paris-Saclay; co-author of the study on AI and culture for the French Superior Council for Literary and Artistic Property, involving stakeholder consultations
Benoit Carré / SKYGGE, French pop artist who created with Flow Machines of Sony CSL and now works with Spotify (residence)
Martin Clancy, artist, events producers and academic working on questions of AI and music
Jean-Marc Deltorn, Senior Researcher / Training and scientific projects coordinator, CEIPI, University of Strasbourg
Emmanuel Deruty, PI in Music, Sony Computer Science Laboratories (Sony CSL)
Philippe Esling, Associate Professor, Institut de Recherche et Coordination Acoustique Musique (<i>IRCAM</i>)
Celine Garcia, Manager and Publisher of innovative music projects; PUPPET MASTER Label & BRUIT ROSE Publishing
Loayeh Jumbam, Founder of AlgoTunes
Drew Silverstein, VP Music Shutterstock; Co-founder and CEO of Amper Music

Alain Strowel, Professor, University Saint-Louis, Brussels and UCLouvain

Sari Depreeuw, Partner heading IP/IT team, DALDEWOLF

Luc Desautettes, Researcher, UCLouvain

Members of the research team of the Study on Copyright and New Technologies:
Copyright data management and trustworthy Artificial Intelligence for the DG CNECT of
the European Commission, involving stakeholder consultations

Bob L. Sturm, Associate Professor, KTH; PI of the Music at the Frontiers of Artificial
Creativity and Criticism (MUSAiC) ERC project; and creator of folk-rnn

Frédéric Traverso, Co-Director, Longevity Music School; Ableton Certified Trainer; and
Lecturer at the University of Strasbourg

ANNEX 3. QUESTIONNAIRE

Questions
Popular AI technology for musical outputs What AI technology you chose for your project and why? What were the alternatives and/or most popular technology?
Complexity of AI musical outputs and intensity of human involvement Is it generally correct to differentiate between complex and simple AI outputs (e.g., it is more complex to create successful pop songs with AI than electronic music)? Is it generally correct to state that more complex output requires a higher intensity of human involvement in the creative process than simpler output? Is it accurate to state that AI is more often and effectively used for creation of musical compositions than of lyrics?
Productivity and complexity of outputs How many musical outputs were created on average with your AI tool by a single user?
Accessibility of music creation How necessary is specialised musical knowledge (e.g., notation and composition rules) for creation of music with AI?

How necessary is specialised IT **technical** knowledge (e.g., programming) for creation of music with AI?

Importance of different legal protection tools for AI businesses

How do you evaluate importance of different **legal tools** for our AI music creation business (copyright and related rights, contracts, protection through technological protection measures, labour law, trade secrets, etc.)?

What is the **relative important of copyright** among these legal tools?

Assertion of copyright protection over AI musical outputs

Do you consider that the music created with your AI tools by others is protected by your copyright?

Do you consider that users of your AI tools also have copyright to the music they create?

Claiming copyright and/or related rights

If you claim that music created by others using your AI tools is protected by your copyright, what kind of copyright protection you claim?

- (a) protection of compositions and/or lyrics
- (b) protection of recording
- (c) both

Claiming “computer-generated works” protection

Do you claim “computer-generated works” legal protection in the UK, Ireland and other countries that provide for this special form of copyright protection?

If yes, whom do you designate as a person that undertook all the “arrangements necessary for the creation of the work”?

Practice of attribution of copyright authorship/ownership

What roles (e.g., developer, performed persons involved in AI creative process to whom copyright authorship and/or ownership over AI outputs was attributed? And what was the involvement of persons to whom no rights were attributed?

Why copyright authorship and/or ownership were attributed to these persons?

Were there any uncertainties as to the attribution of authorship/ownership? If yes, how were they resolved (e.g., copyright transfer clauses in labour contracts)?

Is it possible to speak of an industry “**practice**” in this regard (that other actors in the field commonly do the same)?

Copyright disputes in relation to AI outputs

Have they had a dispute (in court or otherwise) about protection of AI by copyright and/or attribution of rights (authorship/ownership)?

Have they received derivative works claims from rightholders of content used in data sets?

Access to input data and its impact on output

What are challenges for obtaining input data sets and to what extent they impact AI output?

Does use of the same type of AI, same input data and same parameters necessarily result into an identical output? If not always, then when?

Competition

Who are the main AI music services competing with yours?

Impact of the AI musical output

How do you see AI outputs impacting music industry?

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The ReCreating Europe project aims at bringing a ground-breaking contribution to the understanding and management of copyright in the DSM, and at advancing the discussion on how IPRs can be best regulated to facilitate access to, consumption of and generation of cultural and creative products. The focus of such an exercise is on, inter alia, users' access to culture, barriers to accessibility, lending practices, content filtering performed by intermediaries, old and new business models in creative industries of different sizes, sectors and locations, experiences, perceptions and income developments of creators and performers, who are the beating heart of the EU cultural and copyright industries, and the emerging role of artificial intelligence (AI) in the creative process.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870626