



Trends and Developments in Artificial Intelligence

Challenges to the Intellectual Property Rights Framework

Final report

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design and under the supervision of an author.³⁷⁷ The Dutch Copyright Act goes a step further by providing that when a legal person “discloses a work to the public as its own without indicating any natural person as the author, it is then considered to be the author of that work unless it is proved that, in the circumstances, the disclosure to the public of the work was unlawful.”³⁷⁸ Nevertheless, national rules like these that reallocate authorship to a legal person or other non-creating entity are rare and controversial, since they deviate from the fundamental principle, enshrined in the Berne Convention, that the copyright work results from an act of human creation.³⁷⁹ Indeed, the French Court of Cassation has expressly rejected the possibility of according authorship status to any other entity than a natural person.³⁸⁰

On the other hand, national rules that allocate copyright ownership to non-authors are quite common. For example, most Member States have special rules on copyright ownership of audio-visual works. In addition, some Member States maintain rules that directly vest the copyright in works created under employment to the employers, usually legal persons.³⁸¹

Proving or enforcing authorship or copyright ownership of a work is sometimes difficult in practice. For this reason, many Member States provide for rules that establish a (rebuttable) presumption of authorship or copyright ownership, in that the person indicated on or with the published work as the author is deemed to be the author, unless proven otherwise. The Berne Convention and Enforcement Directive validate such legal presumptions, and allow the person whose name “appear[s] on the work in the usual manner” to instigate infringement procedures.³⁸² Evidently, rules like these might be abused in cases where AI-assisted outputs that do not meet the standards of copyright protection are published.³⁸³

In sum, rules on authorship and copyright ownership are largely unharmonised in the EU. This allows Member States discretion to devise tailor-made rules on attribution of authorship and allocation of ownership in borderline cases.

As we will further discuss in section 3.5, this may lead to divergent outcomes across the EU in respect of AI-assisted outputs.

3.4. Are AI-assisted outputs “works”? A four-step test

In light of the preceding analysis, we will now assess whether AI-assisted outputs can qualify as “works” protected under current EU copyright law. In answering this pivotal question we will concentrate on outputs produced by or with the aid of a pre-existing AI system. As explained in the state of the art review (Section 2 of this Report), the use of “artificial intelligence as a service” (AlaaS) allows users access to powerful AI systems capabilities without the need to develop the technology themselves. Nevertheless, we will occasionally also refer to bespoke (tailor-made) AI systems.

In the following we will assume a “user” of an AI system as a company or individual having access to an AI system that he, she or it has not developed, who produces an artefact with the aid of the system – the AI-assisted output in our terminology. It is this user, and this artefact, that will be central to our copyright law analysis.

⁽³⁷⁷⁾ For example, art. 6 Dutch Copyright Act. For French law, see Ginsburg, “The Concept of Authorship in Comparative Copyright Law,” 1072.

⁽³⁷⁸⁾ Art. 8(1) Dutch Copyright Act reads: “Where a public institution, an association, a foundation or a company discloses a work to the public as its own without indicating any natural person as the author, it is then considered to be the author of that work unless it is proved that, in the circumstances, the disclosure to the public of the work was unlawful.”

⁽³⁷⁹⁾ See Quaedvlieg, in: Sinodinou (ed.), *Codification of European Copyright Law*, Alphen aan den Rijn (2012), p.215.

⁽³⁸⁰⁾ Cass. 1re civ., 15 janv. 2015, n° 13-23.566, D. 2015, p. 206 et p. 2215. See CLSPA, Bensamoun, and Farchy, “Mission du CSPLA sur les enjeux juridiques et économiques de l’intelligence artificielle dans les secteurs de la création culturelle,” 33.

⁽³⁸¹⁾ For example: art. 7 Dutch Copyright Act; art. 51(1)-(3) Spanish Intellectual Property Act.

⁽³⁸²⁾ Art. 15(1) Berne Convention; Art. 5 Directive 2004/48/EC of the European Parliament and of the Council of 29 April 2004 on the enforcement of intellectual property rights (as corrected in OJ L 157, 30.4.2004) (Enforcement Directive).

⁽³⁸³⁾ See *infra* discussion at 3.5.

As our inquiry into EU copyright law has revealed³⁸⁴, four interrelated criteria – comprising a “**four-step test**” – need to be met **for an AI production to qualify as a “work”**:

- Step 1 – Production in literary, scientific or artistic domain;
- Step 2 – Human intellectual effort;
- Step 3 – Originality/creativity (creative choice);
- Step 4 – Expression.

Step 1: Production in literary, scientific or artistic domain

According to art. 2(1) of the Berne Convention, copyright protects productions “in the literary, scientific or artistic domain”. Whether this translates into a substantive requirement under EU copyright law however remains unclear. The CJEU has yet to apply this test in its case law on the concept of “work”.

Assuming the words “in the literary, scientific or artistic domain” would indeed constitute a hard-core preliminary test, **it will probably not stand in the way of copyright protection for many categories of AI-assisted outputs**. As noted previously in this Report, many AI productions resemble archetypal works, and belong to “the literary, scientific or artistic domain” without any difficulty. AI systems are capable of generating almost the entire spectrum of work types mentioned in art. 2(1) of the Berne Convention, including news articles, poems, musical compositions, paintings, maps, industrial designs, geographical maps, photographs, films, et cetera. For these kinds of outputs, passing this initial test will therefore be unproblematic, assuming the domain requirement is a material prerequisite under EU law at all.

Step 2: Human intellectual effort

The second condition for an AI-assisted output to qualify as “work” is that it is the result of human intellectual effort. *Prima facie*, this requirement seems to present an obstacle, since many AI outputs appear to be automatically generated. The criterion of human intervention does not however rule out AI productions as a matter of course. As the Court clarified in *Painer*, **it is entirely possible to create works of authorship with the aid of a machine or device**.

Moreover, leaving aside the futuristic scenario of a completely autonomous creative robot, AI-assisted outputs will always go hand in hand with some form of human intervention, be it the development of the AI software, the gathering and choice of training data, the drawing up of functional specifications, supervising the creative process, editing, curation, post-production, etc. Even if the connection between the human intervention and the AI-assisted output is increasingly remote, at this point in time, **it is hard to conceive of content that is generated through AI that involves no human agency whatsoever**. What is problematic today and for the immediate future is whether, and to what extent, a natural person’s involvement with the AI-assisted output – however remote – is sufficient for it to qualify as an intellectual *creation*. This brings us to the third criterion.

Step 3: Originality/creativity (creative choice)

The third and most crucial criterion is originality or creativity. In the words of the CJEU, this test is met “if the author was able to express his creative abilities in the production of the work by making free and creative choices.”³⁸⁵ As we have seen, the emphasis here is on the existence (a priori) of sufficient creative space, rather than on the creativity of the production as such. As long as externally imposed rule-based, technical, functional or informational constraints do not rule out creative freedom, the originality of the production is basically a given since the minimum level of required originality/creativity is rather low.

⁽³⁸⁴⁾ See the previous analysis at 3.3.

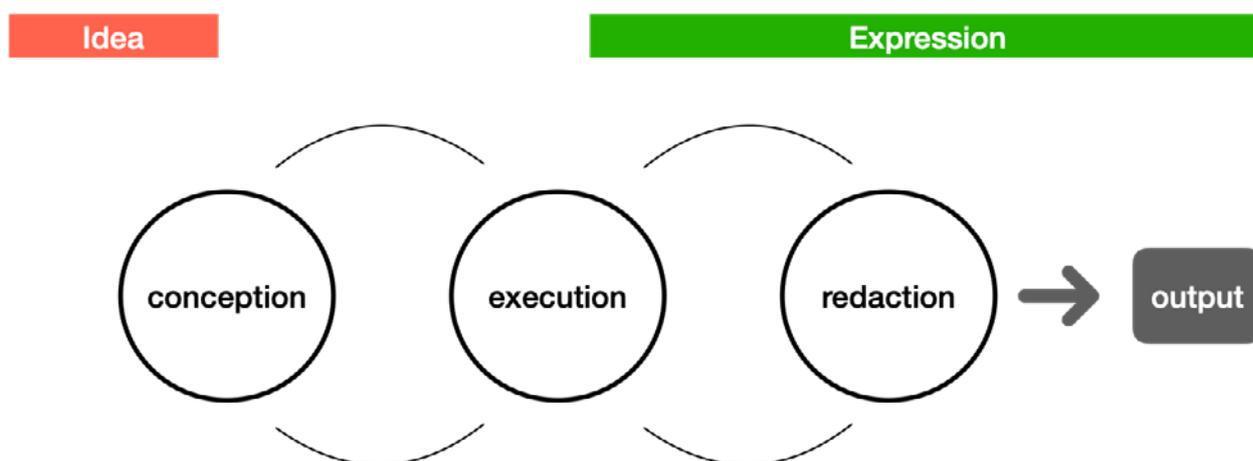
⁽³⁸⁵⁾ CJEU *Funko Medien*, para. 19; CJEU *Painer*, paras. 87-8.

Creative choices may occur at various levels and in different phases of the creative process: preparation, execution, and finalisation.³⁸⁶ As the *Painer* case illustrates, a creative combination of ideas at distinct stages in the production process might be enough for the result to qualify as a “work” protected under EU copyright. Even creativity occurring solely at the preparatory stage of a work could potentially suffice. This, however, must be assessed on a case-by-case basis.

The originality of an AI-assisted output will therefore depend on whether the production process involved creative choices by human authors that are reflected in the final result.

Inspired by the Court’s decision in *Painer*, it seems useful at this stage of our analysis to have a closer look at the process of creating works with the aid of intelligent machines. As the *Painer* Court has well understood, **creativity in machine-aided production may occur at three distinct phases of the creative process: “conception”, “execution” and “redaction”**.³⁸⁷ Although these phases are to be distinguished for analytical purposes, in practice the **creative process** is usually **iterative**, involving multiple cycles of conception, execution and redaction. Figure 3.1 provides a simplified diagram of this iterative creative process.

Figure 3.1 Diagram of an iterative creative process



The conception phase involves creating and elaborating the design or plan of a work. This phase goes beyond merely formulating the general idea for a work.³⁸⁸ It requires a series of fairly detailed design choices on the part of the creator: choice of genre, style, technique, materials, medium, format, et cetera. It also involves conceptual choices relating to the substance of the work: subject matter (news article, portrait), plot (novel, film), melodic idea (musical work), functional specifications (software, databases), etc.³⁸⁹ As the CJEU clearly stated in *Painer*, creative choices at this pre-production stage are important factors in a finding of originality of the final production.

In the case of **productions created with the aid of DL algorithms**, above and beyond the design choices identified above, additional conceptual choices may involve the choice of AI system (e.g. the type and characteristics of the models used), as well as the selection and “curation” of input data (e.g. in the labelling of training data) and other parameters.³⁹⁰ With AI-assisted outputs most of these conceptual choices will be exercised by human actors. **The AI system at this stage has no role in the creative process**, other than acting as an external constraint limiting the designer’s creative possibilities.

⁽³⁸⁶⁾ Ramalho, “Originality Redux,” 7.

⁽³⁸⁷⁾ See Ginsburg and Budiardjo, “Authors and Machines,” (discussing “detailed conception” and controlled execution). See also Ramalho, “Originality Redux,” 7. (distinguishing “preparation”, execution” and “final” phases in analysis of *Painer* judgment).

⁽³⁸⁸⁾ Ginsburg and Budiardjo, “Authors and Machines,” 347–48.

⁽³⁸⁹⁾ van Gompel, “Creativity, Autonomy and Personal Touch. A Critical Appraisal of the CJEU’s Originality Test for Copyright,” 112ff. See, e.g., Court of Brussel, 23 May 2017 (Diplomatic card v. Forax), I.R.D.O., 2017, 204 (functional and technical specifications protected as part of computer program). But see Dutch Supreme Court (Hoge Raad) 19 January 2018, ECLI:NL:HR:2018:56, NJ 2018/237 (Diplomatic Card v. Forax) (technical specifications do not qualify as “preparatory design material” if programming requires subsequent “creative steps”).

⁽³⁹⁰⁾ See Th. Dreier, “Creation and Investment: Artistic and Legal Implications of Computer-generated Works,” in: H.G. Leser & T. Isomura (eds.), *Wege zum japanischen Recht. Festschrift für Zentaro Kitagawa*, Berlin (1992), p. 869–888.

The **execution phase** involves, in simple terms, **converting the design or plan into what could be considered (rough) draft versions of the final work**. This phase involves the producing of text, the painting of art work, the notation or first recording of music, the “shooting” of photographs or video, the “coding” of software, etc. In the context of a supervised ML system, this phase would also include the optimisation of the model or models within the AI operational logic to match the pre-defined objectives or goals of the system.

With traditional forms of creation, the role of a human author at this execution stage is crucial. The novelist converts their plot for a novel into words, the composer translates their musical ideas into notes. From the 19th century onwards, machines have played an increasingly important auxiliary role in this creative phase. Photographs and films cannot be made without cameras, music not recorded without recording devices, etc. Even so, the human author has always stayed in control of the execution phase of creation. That is to say, the role performed by the machine was that of a tool or aid in converting executing the conception of the human author into towards an understandable or explainable outcome.

With AI technologies part of this relationship has arguably changed, at least in degree if not in nature.

ML systems can be instructed and trained to perform complex tasks and produce sophisticated output in ways that the user of the system will not be able to (precisely) preconceive, understand or explain. From the user’s perspective, this creates the impression of an autonomously operating system; one that they do not fully control and that strains the classification as a “tool”. This is particularly true for DL systems, where the architecture based on several layers of neural networks places a greater distance between the user and the machine during the execution phase. This is even more so where the system relies on unstructured data and follows a paradigm of unsupervised or reinforced learning, which rely less (or sometimes not at all) on human intervention during the execution phase.

Whereas some AI systems are capable of generating highly sophisticated, “work-like” content at this stage of the creative process, the quality of the output should not be mistaken for proof of “creativity”. What is relevant under a copyright analysis is *human* creativity – whether a machine is capable of autonomous creative behaviour is, *per se*, irrelevant.

While the AI system has taken over much of the human author’s role in the execution stage, this does not imply that the user remains entirely passive. Especially in the case of supervised DL systems, the user’s role is vital in constantly monitoring the output of the process and giving feedback to the AI system, by adjusting weights and parameters to better match pre-defined objectives, as noted previously in this Report.

Nevertheless, at this execution stage, the AI system will normally play a dominant role in the creative process, while the role of the user will be mostly operational, by incrementally guiding the AI system towards the desired output. Even so, this may involve (additional) creative choices on the part of the (human) user.

Finally, the *redaction* phase involves processing and reworking the draft versions produced in the execution phase into a finalised cultural product or output ready to be delivered to a publisher or other intermediary, or directly to the market. This final phase *might* (and often does) involve a wide range of activities, depending on the genre and medium of the production. These include extensive rewriting, editing, correction, formatting, framing, cropping, colour correction, refinement and all sorts of (other) “post-production” activities that are necessary to give the final touch to the production before it is published and marketed.

Redaction is an often underestimated but essential, final stage in the creative process, allowing the human author many additional creative choices. As the *Painer* Court has explained, this final phase of the creative process may involve a variety of creative choices.³⁹¹ Indeed, depending on the circumstances, creative choice at the redaction phase may even suffice for a finding of originality of the entire production. For example, in a case involving geographical maps directly created on the basis of unprotected satellite photographs, the French Court of Cassation accepted that the maps qualified for copyright protection because they were “the result of a personalised implementation of a complex technology by a process of transformation and improvement of choices, in particular colours, contrasts and of luminosity”.³⁹²

⁽³⁹¹⁾ CJEU *Painer*.

⁽³⁹²⁾ Cass. Civ. I, 8 jan, 2002, R.I.D.A. 2002, no. 193, 321 (Père-Lachaise cemetery map).

With AI-assisted outputs, this has not fundamentally changed. Even a largely autonomously operating AI system will normally not deliver output that is immediately ready for publication or commercial use. More likely, the output produced by the AI system in the execution phase will often require redaction and selection by human actors. For example, a professional musician using an AI music composer such as AIVA or MuseNet would probably rework and edit output generated by the AI system before finalising the composition.³⁹³

Even so, not all AI-assisted productions will call for extensive redaction. For example, DL translation machines such as DeepL and Google Translate generate output that is almost ready to use. Nevertheless, here too some measure of human redaction will be required to convert the output into a useful and potentially marketable professional translation. Indeed, DeepL allows its users virtually endless creative freedom in selecting and rephrasing the wording and ordering of each (part of) the translated text.

In practice, producing content with the aid of AI systems will often be an iterative process where the execution and redaction phases are constantly repeated until the desired outcome is achieved. This will most likely be the case where users employ customisable DL systems that are trained to produce a specified type and quality of output. When the system has eventually “learned” to generate output in conformity with the user’s specifications, ideally even the redaction stage can be (largely) performed by the AI system itself. This is the case, for example, with the football match reports generated by Fussball.De introduced in Section 2 and discussed below.³⁹⁴

In some cases, the redaction role of the human user will be reduced to that of selecting or refusing ready-made output generated by the AI system. This raises interesting questions from a copyright perspective. Clearly, the mere act of selecting may be one of many factors contributing to a finding of originality. But what if selecting one from multiple AI outputs is the *only* creative choice left to the user? Like many other questions raised by AI, this is not really a novel issue.

In the past, the emergence of non-traditional art forms such as the “ready-mades” created by conceptualist artists, have triggered similar questions. What is it that elevates a pre-existing artefact, such as a prefabricated urinal³⁹⁵ or a bicycle wheel³⁹⁶ to a work of art – and, by implication, to a work of authorship? According to Swiss copyright scholar Kummer, the decisive creative act here is converting the (in itself unprotectable) idea of a “ready-made” into copyright protected expression by *presenting* the artefact (the “objet trouvé”) as a work of art.³⁹⁷ Kummer’s “presentation theory” implies that the mere act of selecting a pre-existing object suffices to convert the object into a work. While Kummer’s theory has been embraced by some copyright scholars, it remains somewhat controversial.³⁹⁸ In any case, **personal selection undoubtedly contributes to a finding of originality of an AI-assisted output.**

As the preceding discussion reveals, the use of highly advanced AI systems in the production of cultural goods does not imply that human beings have totally surrendered their vital role in the creative process to machines. Whereas the human creator has been partly or largely replaced by the machine in the execution stage of creative production, their role in the conception stage remains essential, while their role in the redaction stage may have become even more important than before – given that many AI-assisted outputs will probably require more redactional work than rough drafts produced by human beings. **This leaves both the design choices in the conception phase, some calibration in the execution phase, and the editing and post-production choices at the redaction phase for human authors.**

Moreover, it is important to realise that the three-phase creative process described above is simply a model to analyse and explain the authorial choices that contribute to a finding of originality. In reality, as noted, the creative process will be iterative; the execution phase will often yield unexpected results that inspire conceptual changes. Redaction as well may inspire new ideas that feedback to the conceptual level. In light of the *Painer* Court’s reasoning regarding machine-aided creation, which designates both conceptual choices and post-production decisions

⁽³⁹³⁾ See AIVA, <https://www.aiva.ai/>, and OpenAI, MuseNet, <https://openai.com/blog/musenet/>.

⁽³⁹⁴⁾ See *infra* at 3.7.

⁽³⁹⁵⁾ Tate, Marcel Duchamp, Fountain, <https://www.tate.org.uk/art/artworks/duchamp-fountain-t07573>.

⁽³⁹⁶⁾ Tate, Marcel Duchamp, Bicycle wheel, https://www.moma.org/learn/moma_learning/marcel-duchamp-bicycle-wheel-new-york-1951-third-version-after-lost-original-of-1913/.

⁽³⁹⁷⁾ Max Kummer, *Das Urheberrechtlich Schützbares Werk* (Stämpfli, 1968), 193ff.

⁽³⁹⁸⁾ See [AIPPI report Germany. Pro: Dreier, Fs Kitagawa. Contra Lauber-Rönsberg GRUR 2019, 244 at 247].

as relevant factors in the originality analysis, these choices should in many cases be sufficient for a finding of originality in AI-produced content.³⁹⁹ Applying the precedent set in *Painer*, “The Next Rembrandt” will most likely qualify as a work protected according to EU copyright.

Copyright doctrine and case law lend support to our conclusion that the production of an artefact executed by a largely autonomous AI system *could* qualify as a work protected under EU copyright law on condition that a human being initiated and conceived the work and subsequently redacted the AI-assisted output in a creative manner. That is to say, mere human intervention at the conception and redaction stages could suffice for copyright protection.

This conclusion is in line with copyright rules in many national laws that allocate authorship to the person that “masterminds” (conceives) and closely supervises the execution of a work by others, without that person materially contributing to the execution phase of creation.⁴⁰⁰ In the words of Professor Ginsburg, “authorship places mind over muscle: the person who conceptualises and directs the development of the work is the author, rather than the person who simply follows orders to execute the work. Most national copyright laws agree that mere execution does not make one an author. An ‘author’ conceives of the work and supervises or otherwise exercises control over its execution.”⁴⁰¹ For example, a marble sculpture designed in some detail by an artist who instructs and closely supervises a craftsman to execute the sculpture would qualify as the sole author of the sculpture, even if they never touched the marble stone.

While the CJEU has not pronounced itself on the issue of computer-generated productions, there is some case law at the national level that supports our general conclusion. For example, the Paris Court of First Instance has held that “computer-assisted musical composition, when it involves human intervention, the choice of the author [...] leads to the creation of original works”.⁴⁰² In the same vein, the Bordeaux Court of Appeal opined “that a work of the mind created by a computer system can benefit from the rules protecting copyright, provided that it reveals even in a minimal way the originality that its creator wanted to bring.”⁴⁰³

The preceding conclusion is consistent with the European Commission’s Explanatory Memorandum that accompanied the initial proposal for the Computer Programmes Directive, which included a brief discussion of machine-generated software:

*“The human input as regards the creation of machine generated programs may be relatively modest, and will be increasingly modest in the future. Nevertheless, a human ‘author’ in the widest sense is always present, and must have the right to claim ‘authorship’ of the program”.*⁴⁰⁴

Step 4: Expression

The fourth part of our four-step test of copyright protection is that the human creator’s creativity be “expressed” in the final production. As we have seen, this requirement rules out largely subjective subject matter that cannot be expressed with sufficient precision, such as the taste of a food product. In addition, we have derived from this criterion a prerequisite of *general authorial intent*: the human author must have a general conception of the work before it is expressed, while leaving room for unintended expressive features.

Prima facie, this requirement of general intent might present an obstacle for AI-assisted outputs. Due to the **“black box” characteristic of ML systems**, the human author in charge of designing the production at the conception

⁽³⁹⁹⁾ See also Dreier, p. 882.

⁽⁴⁰⁰⁾ Ginsburg & Budiardjo, p. 360. See also Ginsburg, “The Concept of Authorship in Comparative Copyright Law,” 1072. For example, art. 6 Dutch Copyright Act provides: “Where a work has been made according to the design by and under the direction and supervision of another person, that person is considered to be the author of the work.” See J. Seignette, in Hugenholtz, Quaendvlieg & Visser (eds.), *A Century of Dutch Copyright Law*, Amsterdam 2012, p. 123. Spoor Verkade Visser, p. 31 ff.

⁽⁴⁰¹⁾ Ginsburg, 1072.

⁽⁴⁰²⁾ TGI Paris 5 July 2000, No. 97/24872 (Matt Cooper v. Ogilvy and Mather),

⁽⁴⁰³⁾ Cour d’Appel Bordeaux, 31 January 2005, No. 03/05512.

⁽⁴⁰⁴⁾ Explanatory Memorandum to Directive Draft L 1989 OJ. (C 91) 4, p. 21. See Ramalho, “Originality Redux,” 11.

phase will not be able to precisely predict or explain the outcome of the execution phase. This, however, need not present an obstacle to the “work” status of the final output, **assuming that such output stays within the ambit of the author’s general authorial intent**. Moreover, even completely unpredicted, non-explainable, quasi-random AI-assisted output might still be converted into a protected “work” at the redaction phase.

What “expression” does not require is that courts engage in an assessment of the production’s creative merit, aesthetic value or cultural importance. As the case law of the CJEU suggests, it is sufficient for a production to be the expression of free creative choices.

As regards AI-assisted outputs, none of these expression-related conditions seem to pose insurmountable obstacles to copyright protection.

Borderline cases

The preceding analysis does not, however, imply that all AI-assisted outputs will unconditionally qualify as copyright-protected works under EU copyright standards. As the examples given and the case studies reveal, much will depend on the facts and circumstances of a case. While sophisticated art created with the aid of an AI system, such as *The Next Rembrandt* portrait, will necessarily involve important human creative input at several stages of the creative process, this may not be the case for more mundane AI-assisted output such as weather forecasts and news reports (see the cases discussed in section 3.7).

For example, in the case of a **weather report**, most design choices at the conception level (phase 1) will be pre-determined; the specifications of the report are largely dictated by the utilitarian function of the weather forecast, and leave only limited space for creative choices by a human being. Possibly the designing of the format of the weather report (involving, for example, the template of a weather map) may involve some human creativity, but whether this will be enough for a finding of originality is questionable.

Assuming weather reporting entails insufficient creative choice at the conception level, we will have to look for originality elsewhere in the process. This may be difficult. At the execution phase, AI production of weather forecasts leaves hardly any room for human creativity. Whether the report as published will eventually qualify as a “work” will therefore largely, if not entirely, depend on the final stage of redaction. Again, this will hinge on the circumstances of the case. If the AI-produced weather reports are edited and formatted by human editors before being submitted to the media or other clients for publication and marketing, there may still be sufficient room for human creativity justifying copyright protection.⁴⁰⁵ If, by contrast – as occurs in our case studies – the AI-produced reports are marketed “as is” with no or only limited human redaction, the reports will most likely not qualify as copyright-protected works.

While the latter scenario may be disappointing for the companies producing the news or weather reports with the aid of AI, it is not entirely surprising. More than a century before AI arrived on the creative scene, the drafters of the Berne Convention agreed that “[t]he protection of this convention shall not apply to news of the day or to miscellaneous facts having the character of mere items of press information.”⁴⁰⁶ In other words, simple news or weather reports “having the character of mere items of press information” will not be deemed literary artistic works under the Convention, even absent the use of any AI system. Evidently, the drafters of the Convention assumed that such productions do not reflect sufficient *human* creative activity.

In extreme cases, the AI system will not leave its users any meaningful choice beyond pushing a few buttons. Such cases are evident in the domain of natural language generation (relying on unsupervised learning), such as the GP-T2 and GP-T3 text generator from OpenAI discussed above.⁴⁰⁷ One famous illustration is *Talk to Transformer* (now InferKit), which automatically completes a text based on a text fragment (prompt) supplied by the user.⁴⁰⁸

⁴⁰⁵ See, for example, Cass. Civ. I, 8 Jan, 2002, R.I.D.A. 2002, no. 193, 321 (Père-Lachaise cemetery map); see section 5.4.1.3 above,

⁴⁰⁶ Art. 2(8) Berne Convention.

⁴⁰⁷ See: Open AI, GPT-2: 1.5B Release (5 November 2019), <https://openai.com/blog/gpt-2-1-5b-release/>; Brown, Tom B., Benjamin Mann, Nick Ryder, Melanie Subbiah, Jared Kaplan, Prafulla Dhariwal, Arvind Neelakantan, et al. “Language Models Are Few-Shot Learners.” ArXiv:2005.14165 [Cs], July 22, 2020. <http://arxiv.org/abs/2005.14165>. For further references on GPT-3, see supra at 1.3.

⁴⁰⁸ See *Talk to Transformer*, <https://talktotransformer.com>. *Talk to Transformer* has recently been turned into the paid product InferKit. According to its website, “InferKit offers an interface and API for custom AI-based text generators. Whether you’re a novelist looking for inspiration, or an app developer, there’s

Somewhat similar tools are Deep AI's Text Generation API⁴⁰⁹ and StoryAI⁴¹⁰. Recently, OpenAI has begun experimenting with applying the “transformer” model previously used on text to images, by training it with pixels. Early findings are that “sequences can generate coherent image completions and samples”, meaning that automatic image generation through unsupervised learning may develop significantly in the foreseeable future.⁴¹¹ In other words, the legal challenges raised here for text may soon apply also to image generation. In both cases, however, it will be difficult to identify any creative choice by the human user either at the conception, the execution or the redaction phases. Consequently, the AI-assisted output generated by such systems would not qualify as a “work”.

3.5. Authorship and Ownership of AI outputs

3.5.1. Authorship

As discussed, copyright law generally requires human authorship. The law of copyright allocates authorship to those person(s) that have, individually or jointly, creatively contributed to the production. In this section we query to whom authorship and copyright ownership in AI-assisted outputs is to be allocated. This analysis assumes that the AI-assisted output is a protected work in the first place. **In cases of AI-assisted outputs that do not qualify as works, no authorship can exist.** Such “authorless” productions might however still **enjoy protection under related rights**, as discussed below.⁴¹²

Our analysis will focus on situations where *multiple* persons have a potential claim to authorship. These can involve for example the developer or programmer of the system, its owner, or its users. In light of the near absence of harmonised EU rules on authorship, and the lack of uniformity of national rules on authorship throughout the EU, the enquiry will necessarily remain very general.

For our authorship analysis of AI-assisted outputs, we follow the three-phase model of creativity previously developed: conception, execution and redaction.⁴¹³ As we have seen, in the case of artefacts produced with the aid of DL systems, at least the conception phase and (often) the redaction phase will normally entail creative choices by human persons to justify a finding of copyright protection of the AI-assisted output. Authorship in such cases is to be attributed to the person or persons individually or collectively engaging in these creative choices. **If more than a single author is involved in the process, and the authors collaborate, this will lead to co-authorship, even if the creative contributions occur at different stages of the creative process.** For example, the Dutch Supreme Court has held that a stylist who creatively arranged needlework pieces to be photographed for a magazine was a co-author with the photographer of the resulting photographs.⁴¹⁴

We have also seen that the AI system usually plays a dominant role at the execution stage, despite some level of human intervention in systems relying on supervised learning. Following the design conceived by a (team of) human authors, the AI system (with the help of actuators) will paint, compose, photograph, 3D-print or otherwise produce a draft version of the production. Even if the AI system, depending on its capabilities, has added all sorts of expressive features to the human-conceived design, this will not justify an additional claim to authorship, since the AI system is not a human author and does not have legal personality.

something for you.” See InferKit, <https://inferkit.com/>. For a basic explanation of how InferKit's text generation tool works, see InferKit, Docs, Text generation <https://inferkit.com/docs/generation> (“InferKit's text generation tool creates continuations of any text you give it, using a state-of-the-art neural network. It's configurable and can produce any length of text on practically any topic. You can also create custom generators for specific kinds of content.”).

⁽⁴⁰⁹⁾ DeepAI, Text Generation API, <https://deepai.org/machine-learning-model/text-generator> (“The text generation API is backed by a large-scale *unsupervised* language model that can generate paragraphs of text. This transformer-based language model, based on the GPT-2 model by OpenAI, intakes a sentence or partial sentence and predicts subsequent text from that input”) (our emphasis).

⁽⁴¹⁰⁾ See StoryAI, About – Q&A, <https://storyai.botsociety.io/about> (“Write the story you couldn't quite find the words to complete with this easy to use OpenAI model. Input 40 words to start, and watch what the model comes up with. It's powered by the GPT-2 774M model released on August 20th 2019 by OpenAI.”)

⁽⁴¹¹⁾ See OpenAI, Image GPT (17 June 2020), <https://openai.com/blog/image-gpt/> (“By establishing a correlation between sample quality and image classification accuracy, we show that our best generative model also contains features competitive with top convolutional nets in the unsupervised setting”).

⁽⁴¹²⁾ See *infra* at 3.6.

⁽⁴¹³⁾ See 3.4.

⁽⁴¹⁴⁾ *Kluwer v. Lamoth*, Supreme Court of the Netherlands, June 1, 1990, *Nederlandse Jurisprudentie* 1991, 377. See also *TGI Paris*, 6 July 1970, RIDA 190 (1970) (*affaire Paris Match*). See Ginsburg, “The Concept of Authorship in Comparative Copyright Law,” 1070 (n.24).

Much of the literature on AI and copyright focuses on another scenario, that of the AI system producing content with only limited input on the part of the user of the system.⁴¹⁵ **If the role of the user of the system is so constricted that he cannot exercise free choices at any stage of the creative process, the user will not qualify as author of the ensuing production.** In such cases, the role of the user is essentially reduced to an initial prompt (e.g. writing an initial sentence) and/or “pushing buttons”, as in the case of the AI text generation tools discussed above. Here the user’s role is somewhat comparable to that of a person playing a computer game.⁴¹⁶ For example, authorship of film footage generated by a person playing the popular video game *Grand Theft Auto* most likely vests in the developers and animators of the video game – not in the player of the game. Even if the player feels empowered and “in control” of whatever transpires on the computer screen, they have no control over the creative process, and their choices do not amount to creative acts justifying a claim of authorship.⁴¹⁷

As regards such AI systems, where users are effectively no more than passive “players”, the user clearly does not have a valid claim to authorship in the AI-assisted output (i.e. in anything beyond its initial prompt) – leaving the **developer of the AI system** as the only candidate for authorship of the AI-assisted output.⁴¹⁸ Note, however, that a valid authorship claim may only arise if it is established that the output qualifies as a “work” in the first place. In the case of AI text generation tools such a finding, however, seems unlikely. The text generated by the AI system was not preconceived by the designer of the system, nor is it creatively redacted. At best one could argue that the output text is an adaptation (transformation) of the text the user input, of which the user (not the developer) is the author.

Valid authorship or co-authorship claims by developers of AI systems are likely to arise primarily in situations where developers and users collaborate on an AI production. Again, *The Next Rembrandt* project is a good example; the painting that the project eventually produced is the result of a team of AI developers, engineers, art historians, and others closely collaborating and jointly creating a work of authorship.⁴¹⁹ If the AI system developer played a creative role in the process, he or she clearly deserves co-authorship status.

In many if not most cases, however, the **developers of AI systems will not collaborate in a material way with the users on generating specific outputs.**⁴²⁰ For example, providers of AlaaS (AI as a service) will provide customers (users) access to their ML systems (usually in B2B relationships) and customise it to the user’s particular needs. As Section 2 notes, this is an emerging model in the field of automated journalism.⁴²¹ This may involve assistance in adjusting the system’s goals to the needs of the users and relying on user data as input to the learning algorithm. The customised AI solution will then generate outputs without any further knowledge or direct intervention of the AI developers. In such cases, instances of (co-)authorship by AI systems developers are unlikely to materialise, since under prevailing (national) copyright law co-authorship can only arise if the work is the result of a “concerted creative effort”, i.e. if multiple authors collaborate according to a common plan to create a specific work. Note that the developers of such general-purpose AI systems will usually be ignorant of the specific productions created with the aid of their systems.

Moreover, **co-authorship claims will also be unlikely for obvious commercial reasons.** An AI developer that would claim authorship (or even copyright co-ownership) in outputs generated with the aid of its system would probably not attract many customers. Assuming, as does this report, that AI systems will eventually become standard services or tools in the hands of business or commercial users and individual creators (similar to, e.g. Photoshop or Garage Band), the contractual terms of use of the AI system will probably resolve – and preclude – any such (co)authorship claims.⁴²²

⁴¹⁵ See e.g. Gervais, “The Machine As Author”

⁴¹⁶ See Cass. Ass. Plen., 7 March 1986: two cases: Atari and Williams Electronics, R.I.D.A. 1986, no. 129, 136.

⁴¹⁷ See [Ginsburg a.o.] with reference to U.S. cases on computer games.

⁴¹⁸ See, e.g., *Express Newspapers v Liverpool Daily Post* [1985] 1 W.L.R. 1089, 1093 (computer programmer considered author of output generated with tailor-made program). See also: [AIPPI UK report, p. 5]; Ginsburg, “The Concept of Authorship in Comparative Copyright Law,” 1074. Ginsburg, *The Concept of Authorship*, p. 1074.

⁴¹⁹ See Microsoft reporter, “The Next Rembrandt: Recreating the Work of a Master with AI,” *Blurring the Lines between Art, Technology and Emotion: The Next Rembrandt* (blog), 04 2016, <https://news.microsoft.com/europe/features/next-rembrandt/>.

⁴²⁰ See Samuelson (1986), p. 1223-1224.

⁴²¹ See supra at 2.5 (namely the future trends identified at 2.5.4.3).

⁴²² For a brief overview of the many legal and practical complexities that authorship/ownership claims by AI developers would entail, see CLSPA, Bensamoun, and Farchy, “Mission du CSPLA sur les enjeux juridiques et économiques de l’intelligence artificielle dans les secteurs de la création culturelle,” 39.

For example, the popular DeepL AI-powered translation service does not claim any authorship or copyright in relation to content produced by its users with the aid of DeepL. Article 7.5 of DeepL Pro's terms and conditions provides:

*DeepL does not assume any copyrights to the translations made by Customer using the Products. In the event that the translations made by Customer using the Products are deemed to be protected under copyright laws to the benefit of DeepL, DeepL grants to Customer, upon creation of such translations, all exclusive, transferable, sublicensable, worldwide perpetual rights to use the translations without limitation and for any existing or future types of use, including without limitation the right to modify the translations and to create derivative works.*⁴²³

Another example can be found in AIVA's end-user license agreement, which distinguishes between different "types of licenses" that apply depending on the plan the user chooses. A "free plan" entitles users to a broad "non-commercial" license to use the output (musical composition) created with the assistance of the AIVA system, but ownership remains with AIVA and users must give a "Copyright Buyout" clause applies, according to which the "Licensor [AIVA]... assigns, grants and conveys all copyrights of the MIDI and/or Audio Composition to Licensee [the user]".⁴²⁴

Issues of co-authorship will also not arise in the scenario that an AI-assisted output incorporates (parts of) a pre-existing work. For example, a ML system trained to produce poetry will be "fed" vast amounts of poems, some of which are probably still in copyright. If the system inadvertently copies a part of a poem to the extent that it reproduces "the author's own intellectual creation", this will be deemed an infringement of the reproduction right.⁴²⁵ As the CJEU has stated in *Infopaq I*, even reproducing short fragments of text might amount to infringement in so far as the reproduced fragment reflects the author's creative choices. By the same token, such a taking might be deemed an *adaptation* or derivative work (under national copyright law) in the case that the final AI-assisted output qualifies as an original work in its own right.⁴²⁶ Although in such cases the author or copyright owner of the original work may have a valid claim of copyright infringement against the producer of the output, (s)he cannot claim (co-)authorship since the AI-assisted output is not the result of a concerted creative effort.

In the EU, allocating authorship to developers of AI systems may be further complicated by the divergent treatment of computer programmes, databases and other creative content.⁴²⁷ Like computer games, AI systems that generate audio-visual content are a mix of computer software, databases and (in some cases) audio-visual works. Since the authorship of the component parts (software, databases, other works) will rarely coalesce in a single author, it may be problematic to establish (co-)authorship of the output generated by the system in those cases where the AI developer have a valid claim to (co-)authorship, that is, when the developer and the user of the AI system collaborate in producing creative output.

This point is illustrated by the *BSA* judgement of the CJEU. According to the Court, the copyright in a computer programme does not extend to the graphic user interface (GUI) generated by the computer programme on the screens of computer users, since the visual characteristics of the GUI are not "expression" of the computer code protected under the Computer Programmes Directive.⁴²⁸ Nevertheless, the Court left open the possibility that the GUI is protected according to the general rules of the InfoSoc Directive.⁴²⁹ Since the authorship and ownership rules of the Computer Programmes Directive are not repeated in the InfoSoc Directive, this may lead to inconsistent authorship and ownership allocation for AI-assisted outputs.

⁽⁴²³⁾ DeepL Pro Terms and Conditions, available at <https://www.deepl.com/pro-license/>.

⁽⁴²⁴⁾ See: AIVA, AIVA End-User License Agreement, <https://www.aiva.ai/legal/1> (clauses 2 and 3); AIVA, Pricing, <https://www.aiva.ai/>; AIVA, Frequently Asked Questions – I don't understand the terms of License, <https://aiva.crisp.help/en/article/i-dont-understand-the-terms-of-license-1wqvh5v/>.

⁽⁴²⁵⁾ Case C-05/08 *Infopaq International v Danske Dagblades Forening* (2009). Note that the copyright issues relating to the input process are outside the terms of reference of the present study.

⁽⁴²⁶⁾ Note that the right of adaptation has not yet been (fully) harmonized at EU level.

⁽⁴²⁷⁾ See BGH 06.10.2016 - I ZR 25/15, *World of Warcraft I*, GRUR 2017, 266 ('2nd world' game *World of Warcraft* contains distinct elements (software, graphics, sound) protected by different IP regimes). See also Case C-355/12 *Nintendo Co. Ltd and Others v PC Box Srl and 9Net Srl* (2014) ECLI:EU:C:2014:25 (**Nintendo**).

⁽⁴²⁸⁾ In the United States, the 9th Cir. Court of Appeal has similarly held that the copyright in a computer-aided design program does not extend to the output produced with the aid of the program. *Design Data Corp. v. Unigate Enterprise*, No. 14-16701 (9th Cir. 2017).

⁽⁴²⁹⁾ CJEU *BSA*. See also Court of Appeal (OLG) Karlsruhe 14 April 2010, case 6 U 46/09, GRUR-RR 2010, 234.

This is not to say that all such systems necessarily generate copyright-protected output in the first place. If an AI system is programmed or instructed to automatically produce content without the content being conceived (phase 1) or redacted (phase 3) by one or more persons exercising creative choices, there will be no work, and no authorship.

3.5.2. Copyright ownership

Copyright ownership follows authorship. It is a universal rule of copyright law that, by default, copyright vests in the person having created the work. This rule, however, is subject to numerous exceptions.⁴³⁰ As we have seen, the EU copyright *acquis* regarding copyright ownership is limited to a small number of rules on computer programmes and databases created under employment, and on joint ownership of the same.⁴³¹ This has left room for divergent approaches to copyright ownership at the national level.

These and other rules on copyright ownership obviously apply *mutatis mutandis* to works created with the aid of AI systems. For example, copyright ownership in an audio-visual works created with the aid of AI will presumptively vest in the film's producer, i.e. the (legal) person initiating, organising and/or financing the film production. Given the flexibility of the notion of "audio-visual work", which according to some national case law includes computer games and the like,⁴³² this rule might become quite relevant for numerous AI productions that can be qualified as such.

Presumption of authorship and ownership

As discussed above⁴³³, the Berne Convention and many national copyright laws provide for legal presumptions of authorship and/or copyright ownership in favour of the person whose name "appear[s] on the work in the usual manner". While these rules are intended to facilitate proof of authorship and ownership, they might in practice be abused to disguise the absence of copyright protection of an AI-assisted output by falsely attributing it to a natural or legal person. The issue has been flagged in the literature,⁴³⁴ but it remains unclear whether it will amount to a serious problem in practice.

Note that falsely claiming copyright protection – also known as "copyfraud"⁴³⁵ – is already a well-known, and growing, problem outside the domain of AI.⁴³⁶ The problem is exacerbated by the rise of "copyright trolls" that extort content providers on platforms such as YouTube by threatening to trigger the notice and take-down procedures that these platforms (automatically) apply.⁴³⁷ In the United States, the fraudulent use of copyright notice is criminally punishable under the U.S. Copyright Act.⁴³⁸ In most EU Member States, no similar provisions exist. Nevertheless, falsely claiming authorship will probably be deemed unlawful and punishable under general criminal statutes. Nevertheless, **it might be useful to consider revision of the legal presumption of authorship enshrined in art. 5 of the Enforcement Directive in the light of possible abuses.**

British and Irish rules on copyright protection of computer-generated works

In some copyright laws of the British tradition – including the UK, Ireland, New Zealand, and South Africa – the requirement of human authorship has been circumvented by establishing authorship of "**computer-generated works**" in cases where no human authorship can be established.⁴³⁹ Under these regimes, **authorship – and by implication copyright ownership – is accorded to the person who undertook the arrangements necessary for its creation.**

⁽⁴³⁰⁾ See previously in this Report 3.3.5.

⁽⁴³¹⁾ *Ibid*

⁽⁴³²⁾ Österreichischen Obersten Gerichtshofs vom 6. Juli 2004 – 4 Ob 133/04v, ZUM-RD 2005, 11.

⁽⁴³³⁾ See previously in this Report at 3.3.5.

⁽⁴³⁴⁾ CLSPA, Bensamoun, and Farchy, "Mission du CSPLA sur les enjeux juridiques et économiques de l'intelligence artificielle dans les secteurs de la création culturelle," 31.

⁽⁴³⁵⁾ See Wikipedia entry on "Copyfraud".

⁽⁴³⁶⁾ See Matthew Sag, 'Copyright Trolling, An Empirical Study', 100 Iowa L. Rev. 1105 (2015).

⁽⁴³⁷⁾ See e.g. W. Worrall, 'YouTube Has a Massive False Copyright Claim Problem', CNN, 13 January 2020, available at <https://www.cnn.com/youtube-has-massive-false-copyright-claim-problem/>.

⁽⁴³⁸⁾ Section 506(c) and 506(e) U.S. Copyright Act.

⁽⁴³⁹⁾ See Guadamuz, "Do Androids Dream of Electric Copyright?" (including a survey of these national laws).

For example, the Copyright and Related Rights Act 2000 of Ireland defines “computer-generated”, in relation to a work, as meaning “that the work is generated by computer in circumstances where the author of the work is not an individual”.⁴⁴⁰ The Irish Act proceeds to define as “author” “(f) 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”.⁴⁴¹

The UK provisions that inspired the Irish regime are similar, but not identical.⁴⁴² If the existence of a “work” is conditional upon human authorship, this statutory language seems to suggest that the Irish and British regimes allocate authorship to productions that would not qualify as “works” according to EU copyright law standards. Whether that is, indeed, the correct reading of these provisions, is however still unclear. Since the introduction of the regime on computer-generated works in UK law in 1988, it has led to just a single court decision, which has not clarified this issue.⁴⁴³

If the British regime indeed protects “authorless” computer-generated works, this would imply that an AI-assisted output that does not meet the standard of originality (and therefore is without an “author”) could nonetheless be accorded copyright protection under Irish and UK law, with the producer (“the person by whom the arrangements necessary for the creation of the work are undertaken”) as its author and copyright owner. Not surprisingly, the British and Irish regimes have been criticised as being incompatible with EU copyright standards.⁴⁴⁴ Indeed, a national rule that accords copyright protection to subject matter that does not meet the standard of “the author’s own intellectual creation” is hard to reconcile with the CJEU’s case law that implies that the notion of a “work” is fully harmonised and therefore does not allow national laws to accord copyright protection under more lenient conditions.⁴⁴⁵ According to some scholars, however, the British regime on computer-generated works is, “in substance”, not a copyright regime at all, but a species of related rights or even unfair competition protection.⁴⁴⁶ Seen from that perspective the British and Irish rules would probably not conflict with EU law, since the EU *acquis* allows Member States to provide for specific related rights in addition to the rights expressly harmonised.⁴⁴⁷

The British approach towards computer-generated works is somewhat reminiscent of a provision that was once included in the draft proposal of the Computer Programmes Directive, but dropped in later versions. Under art. 2(5) of the draft proposal, the natural or legal person who caused the generation of subsequent programs would be entitled to exercise all rights in respect of the programmes.⁴⁴⁸

3.6. Protection of AI-assisted outputs by related rights

Having examined the protection AI-assisted outputs under EU copyright standards, the following section looks into the possibilities of protecting such outputs under the law of related (neighbouring) rights. Since the focus of this Report is on copyright law, this is necessarily a briefer analysis. Related rights are exclusive rights “relating” to (“neighbouring” upon) copyright that provide for copyright-like protection of persons or entities operating in the creative industries that do not qualify as creators of copyright-protected works. The major difference between related rights and copyright in this context is that related rights do not require originality or authorship. Related rights come in many shapes and forms, and differ from one Member State to the other. **EU law** has presently harmonised **six categories of related rights**.

The Rental and Lending Rental Rights Directive harmonises related rights of **performing artists, phonogram producers, broadcasting organisations** and **film producers**. In addition, the CDSM Directive obliges Member

⁽⁴⁴⁰⁾ Art. 2(1) Copyright and Related Rights Act 2000 of Ireland.

⁽⁴⁴¹⁾ Art. 21 Copyright and Related Rights Act 2000 of Ireland.

⁽⁴⁴²⁾ UK Copyright, Designs and Patents Act 1988 (UK, as updated), s178; Lionel Bently et al., *Intellectual Property Law*, Fifth Edition (OUP, 2018), 117–18.

⁽⁴⁴³⁾ Nova Productions Ltd v. Mazooma games. See also Ramalho, “Originality Redux,” 13–14; Enrico Bonadio and Luke McDonagh, “Artificial Intelligence as Producer and Consumer of Copyright Works: Evaluating the Consequences of Algorithmic Creativity,” *Intellectual Property Quarterly* 2 (2020): 112–37.

⁽⁴⁴⁴⁾ See Begoña Gonzalez Otero and Joao Pedro Quintais, “Before the Singularity: Copyright and the Challenges of Artificial Intelligence,” *Kluwer Copyright Blog* (blog), 10 2018. (reporting on the presentation of Professor Lionel Bently); and Bently et al., *Intellectual Property Law*, 118. (“Because the European standard now applies to all works, it must be doubted whether copyright protection (in an European sense) should be regarded as available at all to ‘computer-generated works’... It seems to follow that no computer-generated work can be protected by copyright in accordance with European Law”). On the latter point, see also Ginsburg, “People Not Machines.”

⁽⁴⁴⁵⁾ See, in particular, Case C-604/10 (Football Dataco).

⁽⁴⁴⁶⁾ See Bently et al., *Intellectual Property Law*, 118. On related rights protection for AI outputs, see also later in this report.

⁽⁴⁴⁷⁾ See the discussion of related rights in section 3.6 below.

⁽⁴⁴⁸⁾ Ramalho, “Originality Redux.”

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