EU Copyright Law, Artificial Intelligence and 'Transformative Use' of Works: The Case of 3D Reconstruction

by **Theodoros Chiou and Leander Stähler ***

Abstract: Artificial intelligence (AI) has virtually upended many relevant aspects of EU copyright law. In parallel, three-dimensional (3D) visual content is predicted to be a key contributing factor to the development of new forms of immersive content, much of which is powered by new AI-driven tools. AI-based '3D reconstruction' techniques are unique because, among others, they may autonomously generate an individual piece of 3D visual content, based on specific 2D visual content used as an input. This raises particular copyright questions regarding the copyright-relevant uses of such techniques.

This contribution analyses these forms of use, and the extent to which the acts performed on underlying 2D visual content as training material are copyright-relevant under EU copyright law. In particular, the analysis specifically tackles how those uses interfere with the exclusive right of reproduction, its exceptions and limitations at the input stage, and whether a relation of derivation between 2D and 3D content may be established at the output stage. We highlight avenues through which the training and implementation of 3D reconstruction techniques may in fact not be copyright-relevant and analyse the possibilities through which the implementation of 3D reconstruction techniques may qualify as a form of 'transformative use' of 2D visual content, including whether this can be subject to exceptions and limitations.

Keywords: EU Copyright Law, Extended Reality (XR), 3D Reconstruction, Right of Adaptation, Transformative Use, 3D Content, AI-Generated Content, Text and Data Mining (TDM), Pastiche

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A. Introduction [1]

1 Three-dimensional (3D) visual content in various forms is predicted to be a key contributing factor to the development of new forms of immersive content.[2] This is especially the case in the context

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2 The significance of new three-dimensional content is *inter*

of extended reality (XR) applications which connect virtual reality (VR)[3] and augmented reality (AR).[4] Indeed, digital 3D visual content is essential for XR applications,[5] such as XR experiences, immersive works, or "virtual worlds", also referred to as "metaverses",[6] among others. At the same time, 3D visual content bears its own self-standing value. For instance, 3D models are digital assets that underpin 3D printing technology, whereas 3D assets are at the forefront of conservation and valuation strategies in the cultural heritage sector.[7]

2 While many novel applications for 3D visual content, especially in the context of XR,[8] are at an emerging stage, copyright law remains in application to the 3D visual content fuelling them, including where AI technologies are involved in the generation of such content. Copyright thus plays a crucial role in determining what rights subsist in 3D visual content, who can benefit from use or exploitation of content, and how the content can be further managed and exploited. Indeed, particular copyright issues may arise especially when the generation of 3D content is based on pre-existing 2D content and relies on technologies involving the use of AI, also referred to as '3D reconstruction techniques'. This contribution therefore analyses the main EU copyright law implications in the AI-based generation of 3D visual content by means of 3D reconstruction techniques.

3 3D reconstruction techniques (3DRTs) are generally capable of generating a piece of 3D visual content by way of extracting certain data points from a set of pre-existing 2D visual content. Such 3D visual content can digitally represent a vast range of real-world objects (e.g. buildings, monuments, persons etc). Especially in the context of advancements at the intersection of computer vision and artificial intelligence, including artificial neural networks, novel 3DRTs, such as neural radiance fields (NeRFs) and Gaussian splatting, are emerging as means of AI-generating 3D visual content.[9] Indeed, AI applications that are using such techniques are capable of generating 3D visual content as AI-generated 3D output, when 'prompted' with a small number of 2D inputs, without requiring sophisticated equipment or expertise from the user side (Figure 1). For instance, a few photos of the Brandenburg Gate in Berlin can be used as input in order to generate a 3D visual version thereof by means of NeRF-In-The-Wild technique.[10]

alia addressed by the common European data space for cultural heritage (Commission Recommendation 2021/1970 of 10.11.2021 on a common European data space for cultural heritage C(2021) 7953 final, Recital 11): "3D technologies may also provide increased opportunities for cultural heritage institutions to reach wider audiences with more immersive experiences that include virtual access to places which are normally inaccessible (e.g. underwater) or temporarily closed, or to reach persons with visual impairments by offering, for example, accessible tactile experiences"; cf. Europeana, 'Common European data space for cultural heritage - annual report 2023 – 2024: Deployment of a common European data space for cultural heritage' (*Europeana*, 2 December 2024) <https://pro.europeana.eu/post/common-european-data-space-for-cultural-heritage-annual-report-2023-2024>, accessed 11 August 2025.

3 "A computer-generated simulation of a lifelike environment that can be interacted with in a seemingly real or physical way by a person, esp. by means of responsive hardware such as a visor with screen or gloves with sensors" (*Oxford English Dictionary*, s.v. "virtual reality (*n.*)" December 2024, <https://doi.org/10.1093/OED/1042597194> accessed 13 August 2025).

4 "The addition of computer-generated output, such as images or sound, to a person's view or experience of his or her physical surroundings by means of any of various electronic devices" (*Oxford English Dictionary*, s.v. "augmented reality (*n.*)" September 2024, <https://doi.org/10.1093/OED/1035175074> accessed 13 August 2025); applications drawing upon features from both are referred to as 'mixed reality' (MR; "A medium consisting of immersive computer generated environments in which elements of a physical and virtual environment are combined." (*Oxford English Dictionary*, s.v. "mixed reality (*n.*)" March 2025, <https://doi.org/10.1093/OED/8217707338> accessed 13 August 2025)).

5 See e.g. Theodoros Chiou, Licensing the Creation and Dissemination of XR Content through XReco (XReco Blog, 27 May 2024) <https://xreco.eu/licensing-the-creation-and-dissemination-of-xr-content-through-xreco/> accessed 11 August 2025.

6 On the concept of metaverse see, among others: Isabelle Hupont Torres and others, 'Next Generation Virtual Worlds: Societal, Technological, Economic and Policy Challenges for the EU' (Publications Office of the European Union 2023), 12; Péter Mezei & Gunjan Chawla Arora, 'Copyright and Metaverse' in Michel Cannarsa and Larry Alan Di Matteo (eds), Research Handbook on Metaverse and the Law (Edward Elgar 2024) <https://ssrn.com/abstract=4444608> accessed 11 August 2025, 1.

7 Recitals 9 and 11 Commission Recommendation (EU) 2021/1970 of 10 November 2021 on a common European data space for cultural heritage [2021] OJ L 401/5.

8 The range of potential applications is vast, covering *inter alia* education, health, tourism, cultural heritage, and manufacturing (Isabelle Hupont Torres and others, 'Next Generation Virtual Worlds: Societal, Technological, Economic and Policy Challenges for the EU' (Publications Office of the European Union 2023), 17-31).

9 Ben Mildenhall and others, 'NeRF: Representing Scenes as Neural Radiance Fields for View Synthesis' (arXiv, 3 August 2020) https://arxiv.org/abs/2003.08934 accessed 13 August 2025; Bernhard Kerbl and others, '3D Gaussian Splatting for Real-Time Radiance Field Rendering' (2023) 42 ACM Transactions on Graphics, 1.

10 This is demonstrated at: XReco, '(3D Object) Reconstruction' (*XReco*) <https://xreco.eu/technologies/technologies-3d-object-reconstruction/> accessed 11 August 2025.

4 3DRTs such as those described above mainly involve a set of acts performed on the 2D content as an input during the process, so that a 3D output (3D visual content) is produced. Nevertheless, they can be quite heterogeneous in regard to how the 3D reconstruction technique itself was produced, and what aspects of AI the technique integrates. Some 3DRTs may require independent 'training'[11] and/or the integration of certain technologies that have already been trained.[12] Others may not require this and are readily implementable, akin to well-known Generative AI models.[13] Importantly, however, all 3DRTs – as a specific application of AI techniques – generally 'train' (i.e. generate) a 3D output based on (a set of) specific inputs, i.e. 2D visual content. This should not be confused with the broader phenomenon of 'AI training' as such, but reflects the current term of art in the field of computer vision research.[14] This means that, depending on the features of a given 3DRT, there may be differences concerning the prior training requirements or the implementation requirements at stake. Ultimately, however, the field of such 3DRTs is increasingly diverse, depending also on the needs of individual developers: a visual demonstration of this process from 2D content to manipulatable 3D output is ideal for providing an intuitive notion of such techniques.[15] In general terms, an overview of the implementation of 3DRTs is provided in Figure 1 below.

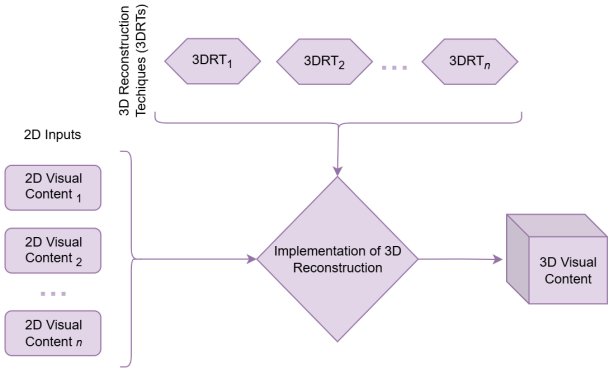

Figure 1: 3D visual content generation by means of 3D Reconstruction Techniques

5 3DRTs and their implementation raise fundamental questions for the EU copyright *acquis*. The use of pre-existing 2D visual content as input/training data may involve the use of protected forms of expression, which raises additional concerns about the relation between 2D content that is used as input and generated 3D content (output). Indeed, on the one hand, a direct and unique connection between the selected 2D inputs and the 3D outputs may be reported, given that the generated 3D content is necessarily (and exclusively) based on that particular 2D content that is used as training data for the training of the 3D reconstruction technique and/or of the AI model. On the other hand, 3D reconstruction involves what can be described as 'dimension shifting', i.e. the rendition of represented objects within the pre-existing 2D content in a visual format featuring an additional dimension. The passage from two to three dimensions involves addition of aspects, views, angles, perspectives with regard to 2D inputs.

6 This raises a set of essential legal questions for assessing the status of rights in the generated 3D content by means of 3DRTs and the legality of their implementation that critically affects the rights management of actors that generate, disseminate or use such 3D content. In light of EU policy, which aims to promote the production and use of 3D and XR media content,[16] especially in the context of

11 Cf. Kalyan Vasudev Alwala, Abhinav Gupta and Shubham Tulsiani, 'Pre-Train, Self-Train, Distill: A Simple Recipe for Supersizing 3D Reconstruction' (*CVF*, 2022) <https://openaccess.thecvf.com/content/CVPR2022/html/Alwala_Pre-Train_Self-Train_Distill_A_Simple_Recipe_for_Supersizing_3D_Reconstruction_CVPR_2022_paper.html> accessed 11 August 2025.

12 For instance, some proposed techniques would harness the use of deep learning methods to achieve better results (cf. Taha Samavati and Mohsen Soryani, 'Deep Learning-Based 3D Reconstruction: A Survey' (2023) 56 Artificial Intelligence Review 9175).

13 This is typically the case for NeRF (cf. Wenhui Xiao and others, 'Neural Radiance Fields for the Real World: A Survey' (arXiv, 22 January 2025)); cf. Instant-3D approaches, see Li S and others, 'Instant-3D: Instant Neural Radiance Field Training Towards On-Device AR/VR 3D Reconstruction', *Proceedings of the 50th Annual International Symposium on Computer Architecture* (Association for Computing Machinery 2023) <https://dl.acm.org/doi/10.1145/3579371.3589115> accessed 11 August 2025.

14 Based on this, but immaterial for the analysis conducted here, each 3D output can also be understood to comprise an independent 'AI model' that is generated based on specific 2D inputs.

15 Various videos are publicly-available on online platforms addressing 'NeRF' or 'Gaussian Splatting' techniques, cf. 'NeRF in the Wild: Neural Radiance Fields for Unconstrained Photo Collections [Updated]' (Directed by NeRF-W, 2021) <https://www.youtube.com/watch?v=mRAKVQj5LRA> accessed 11 August 2025.

16 Commission, 'An EU initiative on Web 4.0 and virtual worlds: a head start in the next technological transition' COM(2023) 442 final; see also the European Commission pilot project WEB4HUB 'WEB4HUB: A Space for the Metaverse – Virtual World and the Transition to Web 4.0 | Shaping Europe's Digital Future' <https://digital-strategy.ec.europa.eu/en/

establishing common European data spaces,[17] it is urgent to consider how the existent EU copyright framework addresses the operation of such 3DRTs and what legal implications (including copyright infringement) affecting the generation and use of 3D content, are stemming from the rights over the pre-existing 2D content. The intersection between copyright law and artificial intelligence development and use has been elaborately discussed and continue to be on the forefront of discussions in light of ongoing developments in legal scholarship,[18] yet literature regarding such specific forms of 3DRTs is practically non-existent,[19] including in the literature focusing on 3D visual content[20] and on the interface between copyright and the 'metaverse'.[21]

7 This paper therefore focuses on essential copyright law questions that lie between input and output considerations of 3DRTs. More precisely, it seeks to investigate the copyright law implications over AI training for 3D reconstruction purposes and to clarify whether the generation of a real-world 3D object through 3DRTs constitutes a type of 'transformative use' of the employed 2D content/inputs, which possibly implies a form of 'derivation' between 2D and 3D. Accordingly, it addresses the

policies/web4hub> accessed 11 August 2025.

17 Common European data spaces for cultural heritage and for media (Commission, 'Commission Staff Working Document on Common European Data Spaces' SWD(2024) 21 final); Commission Recommendation (EU) 2021/1970.

18 Among the vast literature, see indicatively regarding copyright concerns of inputs to train AI: Begoña Gonzalez Otero, 'Machine Learning Models Under the Copyright Microscope: Is EU Copyright Fit for Purpose?' (2021) 70 GRUR International 1043; Eleonora Rosati, 'Copyright as an Obstacle or an Enabler? A European Perspective on Text and Data Mining and Its Role in the Development of AI Creativity' (2019) 27 Asia Pacific Law Review 198; Thomas Margoni and Martin Kretschmer, 'A Deeper Look into the EU Text and Data Mining Exceptions: Harmonisation, Data Ownership, and the Future of Technology' (2022) 71 GRUR International 685; Theodoros Chiou, 'Copyright Lessons on Machine Learning: What Impact on Algorithmic Art?' (2019) 10 JIPITEC 398; European Commission and others, 'Study on Copyright and New Technologies: Copyright Data Management and Artificial Intelligence' (Publications Office of the European Union 2022) <https://data.europa.eu/doi/10.2759/570559> accessed 11 August 2025. Regarding ownership questions of AI and AI outputs: Juha Vesala, 'Developing Artificial Intelligence-Based Content Creation: Are EU Copyright and Antitrust Law Fit for Purpose?' (2023) 54 IIC - International Review of Intellectual Property and Competition Law 351; Christina Varytimidou, 'The New A(I)Rt Movement and Its Copyright Protection: Immoral or E-Moral?' (2023) 72 GRUR International 357; P Bernt Hugenholtz and João Pedro Quintais, 'Copyright and Artificial Creation: Does EU Copyright Law Protect AI-Assisted Output?' (2021) 52 IIC - International Review of Intellectual Property and Competition Law 1190. Regarding questions of copyright liability for AI systems: Eleonora Rosati, 'Infringing AI: Liability for AI-generated outputs under international, EU, and UK copyright law' (2024) 16 European Journal of Risk Regulation 603; Daniel Gervais and others, 'The Heart of the Matter: Copyright, AI Training, and LLMs' (2024) 71 Journal of the Copyright Society 482; Kacper Szkalej, 'Copyright Liability and Generative AI: What's the Way Forward?' (2025) Nordiskt Immateriellt Rättskydd 92. Regarding the impact of the EU AI Act on copyright law: João Pedro Quintais, 'Generative AI, Copyright and the AI Act' (2025) 56 Computer Law & Security Review 106107; Alexander Peukert, 'Copyright in the Artificial Intelligence Act – A Primer' (2024) 73 GRUR International 497.

19 See Cristiana Sappa, 'Participating in Cultural Life via Augmented Reality on Cultural Goods: What Role forCopyright?' (2022) 71 GRUR International 618; Stef van Gompel and Bartolomeo Meletti, 'Code of Best Practices on Creative Reuse for Immersive Experiences' (2022) <https://zenodo.org/record/7180861> accessed 11 August 2025; although research in digital humanities has also stressed legal concerns regarding 3D (Sander Muenster, 'Digital 3D Technologies for Humanities Research and Education: An Overview' (2022) 12 Applied Sciences 2426); a similar issue is discussed concerning the digitisation of cultural heritage in: Thomas Margoni, 'The Digitisation of Cultural Heritage: Originality, Derivative Works and (Non) Original Photographs' (2014) SSRN <http://www.ssrn.com/abstract=2573104> accessed 11 August 2025; cf. Andrea Wallace and Ellen Euler, 'Revisiting Access to Cultural Heritage in the Public Domain: EU and International Developments' (2020) 51 IIC - International Review of Intellectual Property and Competition Law, 823.

20 Thomas Margoni, 'CC-PlusDesign.Eu—Or How to Apply Creative Commons Licences to 3D Printed Products in the Light of the Most Recent Developments of the European Court of Justice Case Law' in Bibi van den Berg, Simone van der Hof and Eleni Kosta (eds), *3D Printing: Legal, Philosophical and Economic Dimensions* (TMC Asser Press 2016); Pinar Oruç, '3D Digitisation of Cultural Heritage Copyright Implications of the Methods, Purposes and Collaboration' (2020) 11 Journal of Intellectual Property, Information Technology and Electronic Commerce Law, 149; Mikko Antikainen, 'Differences in Immaterial Details: Dimensional Conversion and Its Implications for Protecting Digital Designs Under EU Design Law' (2021) 52 IIC - International Review of Intellectual Property and Competition Law, 137.

21 See e.g. Péter Mezei & Chawla Arora, n6; Michaela MacDonald, 'The Intersection between IP and the Metaverse: Preliminary Observations' (Queen Mary Law Research Paper No. 397/2023, January 26, 2023) <https://ssrn.com/abstract=4338884> accessed 11 August 2025; Gaetano Dimita and others, 'IP and Metaverse(S) - an Externally Commissioned Research Report' (Queen Mary Law Research Paper No. 427/2024, February 2024)<https://ssrn.com/abstract=4756583> accessed 11 August 2025, 18 and 44-45.

following research question: **To what extent is the use of pre-existing 2D visual content – as the basis for generating 3D visual content in the 3D reconstruction context – a copyright-relevant ('transformative') use interfering with the exclusive right of reproduction under EU copyright law?**

8 In view of answering this question, copyright-relevant use of pre-existing 2D content during the training of a 3DRT is assessed first (section B). Section C examines the case of non-copyright-relevant rendition of 2D inputs in 3D outputs. For cases where the rendition of 2D inputs may be copyright relevant, Section D analyses the applicability of exceptions and limitations with regard to copyright-relevant 'transformative uses' of 2D inputs within 3D output. Section E concludes.

9 For the purposes of this paper, 2D content is understood to cover *visual* content, broadly comprising images, photographs and frames of a video depicting real-world objects. The material scope of this analysis is EU law addressing copyright and related rights – also referred to as the copyright *acquis*. More specifically, we focus here on the economic right of reproduction.[22] For the purposes of this copyright law analysis, we assume that 2D content used as input enjoys copyright protection. Moreover, this paper does not cover legal issues related to the possible use of a copyrighted or otherwise protected object represented in that 2D visual content.[23] Last, the investigation does not tackle the question of the protectability of the 3D output as such.

10 Regarding the lens of 'transformative use' used here, it should be noted that the EU copyright *acquis* does not recognise a singular concept thereof.[24] In legal scholarship, there have been attempts to connect various forms of use through the idea of being transformative, generally focusing on protected uses for which some form of authorisation is required under the copyright *acquis*.[25] This is relevant for most cases where the non-owner of a given piece of 2D visual content wishes to "transform" the content digitally and make use of it for their own purposes. In that sense, for the purposes of the present paper, we can understand a 'transformative use' of 2D visual content in its literal meaning, encompassing any act performed upon or reuse of a pre-existing 2D visual content that aims at the generation of a new 3D visual output.

B. 2D Inputs and the 'training' of 3D Reconstruction Techniques

I. Overview of the Technical and Legal Background

11 3DRTs are unlike many existing and dominant Generative AI tools. Each piece of 3D visual content generated by the implementation of a 3DRT can effectively be considered as a self-standing 'AI model'[26] that results from training based on 2D inputs.[27] This is true for tools based on the 'NeRF' approach, as well as for those based on more recent 'Gaussian splatting' approaches.[28] There may be

22 Albeit in the context of the certain exceptions and limitations discussed in Section D, the right of communication to the public and the right of making available to the public may also be relevant.

23 This is not intended to prejudice the potential role such rights may play e.g. in the generation of the 2D visual asset in the first place; due to the focus on 2D visual content, the right of extraction in the context of the *sui generis* database right is not addressed here.

24 The word choice of "transformative" is arguably derived from US copyright law and practice, especially as it plays a part in the analysis of the fair use defence; cf. 17 US Code § 107. Its use in this paper is not connected with this concept. Cf. Martin Senftleben 'Bridging the Differences Between Copyright's Legal Traditions—The Emerging EC Fair Use Doctrine' (2010) 57 J Copyright Society USA 521; regarding whether recent technological developments require a new approach, see: Enrico Bonadio, Nicola Lucchi and Giuseppe Mazziotti, 'Will Technology-Aided Creativity Force Us to Rethink Copyright's Fundamentals? Highlights from the Platform Economy and Artificial Intelligence' (2022) 53 IIC - International Review of Intellectual Property and Competition Law 1174.

25 Defining 'transformative use' as "encompassing all derivative creations based on pre-existing works without authorization of the author of the original work, whether they are protected by copyright or not" (Julien Cabay and Maxime Lambrecht, 'Remix Prohibited: How Rigid EU Copyright Laws Inhibit Creativity' (2015) 10 Journal of Intellectual Property Law & Practice 359, 360).

26 I.e. "physical, mathematical, or otherwise logical representation of a system, entity, phenomenon, process or data" (Save general-purpose AI models, AI models have not been legally defined in EU law; the working definition here is drawn from International Organization for Standardization (ISO) definition of 'model' in the AI context (International Organisation for Standardisation, 'ISO/IEC 18023-1:2006 – Information technology' (*ISO*, 2021), 3.1.11)).

27 'AI model' is chosen deliberately as a term of art in the context of 3D reconstruction, but also to distinguish it from the notion of 'AI system' as regulated by the EU AI Act (Art3(1) AI Act). This self-standing AI model generally does not comprise a 'general-purpose AI model' as these do not display significant generality and do not perform a wide range of tasks (cf. Art3(63) AI Act).

28 Guikun Chen and Wenguan Wang, 'A Survey on 3D

variations as to the level of 'supervision', which means that the pre-processed data may need to be annotated by a human in some manner.[29] AI-driven computer vision techniques, such as 3DRTs, need to be trained based on 'cluster analysis' so that they can recognise common features in images.[30]

12 From a legal perspective, specific 3DRTs may not be completely self-standing. Instead, they may be integrated within other, 'trained' software services, and thus require the use of *pre-existing* 2D inputs in order for the technique to be implemented vis-à-vis *specific* 2D inputs selected for the purposes of generating a 3D output. Such pre-existing 2D visual content may be sourced in a variety of ways, which can differ significantly to the sourcing of content intended for use of 3D reconstruction. In that regard, it is crucial to consider the copyright law dimension of 2D visual content as inputs in the process of training 3DRTs in the first place, and whether such a use is interfering in any way with the rights of authorship or any related rights.

13 The training of 3DRTs is a potentially highly input-intensive part of developing 3DRTs. After all, 3DRTs are algorithms, some of which may have benefitted significantly from forms of training. Whereas training is not generally a legal notion of the EU copyright *acquis*, acts comprising training for the purposes of developing a 3D reconstruction technique may interfere with the *acquis*' exclusive rights, especially the right of reproduction in 2D visual content *used as training material*. Adequate authorisations for the training of 3DRTs would be necessary if they are to be implementable, including on the basis of exceptions and limitations.

14 Under copyright law, authorisations for the use of protected content generally originate with the relevant rightsholders. Especially in the context of the right of reproduction, the owner of the copyright or related right enjoys broad discretion in authorising acts congruent with those of a 'transformative use', meaning that a sufficient counter-performance on behalf of the potential licensee will in principle be necessary.[31] At the same time, exceptions and limitations may offer an *ex lege* authorisation covering acts covered by exclusive rights in the protected content. Most authorisations specified by licenses, many of which – although with similar characteristics – are not always readily generalisable.[32] Outside of cases of standardised licenses, such as Creative Commons licenses,[33] licenses can be difficult objects of scholarly legal analysis. For these purposes, the below focuses on authorisations that *are* common to the EU copyright *acquis*: statutory exceptions and limitations to copyright. Specifically, the analysis below considers the temporary and text-and-data mining (TDM) exceptions under the EU copyright *acquis*. Some scholars also refer to exceptions and limitations as means of introducing distinct form of "flexibilities" in the copyright system.[34] We do not directly endorse this conceptualisation of exceptions and limitations, but recognise that they generally facilitate 'unlicensed but lawful' uses of certain content protected by copyright and related rights. Crucially, the three-step test sets boundaries for exceptions and limitations in general.[35] An analysis

Gaussian Splatting' (arXiv, 22 July 2024) <http://arxiv.org/abs/2401.03890> accessed 11 August 2025.

29 Cf. Regarding the need for annotation in natural language processing: Martin Kretschmer, Thomas Margoni and Pinar Oruç, 'Copyright Law and the Lifecycle of Machine Learning Models' (2024) 55 IIC - International Review of Intellectual Property and Competition Law 110, 118-119.

30 Kretschmer, Margoni and Oruç, (n 29) 122-123.

31 This does not of course prejudice acts on behalf of rightholders via the use of open licensing practices, such as by using a Creative Commons (CC) license.

32 As a matter of EU law, the challenges for a harmonised perspective are outlined in Alain Strowel, Solène Festor de Suremain and Bernard Vanbrabant, 'Copyright licensing: A European view' in Jacques de Werra (ed), *Research Handbook on Intellectual Property Licensing* (2nd ed, Edward Elgar 2025).

33 See critically: Zachary Katz, 'Pitfalls of Open Licensing: An Analysis of Creative Commons Licensing' (2005) 46 IDEA: The Intellectual Property Law Review 391.

34 Caterina Sganga and others, 'D2.3 Copyright flexibilities: mapping and comparative assessment of EU and national sources' (reCreating Europe, 16 January 2023) <zenodo.org/records/7540511> accessed 13 August 2025; cf. regarding the use of 'flexibilities' instead to refer to discretion provided to national legislators in light of international norms: P Bernt Hugenholtz and Ruth Okediji, 'Conceiving an International Instrument on Limitations and Exceptions to Copyright' (Amsterdam Law School Legal Studies Research Paper No. 2012-43 Institute for Information Law Research Paper No. 2012-37), 11-26.

35 I.e. the exceptions and limitations can only apply (1) in certain special cases; (2) which do not conflict with the normal exploitation of the work; (3) and do not unreasonably prejudice the legitimate interests of the author; Art9 Berne Convention verbatim states that "[it] shall be a matter for legislation in the countries of the Union to permit the reproduction of such works in certain special cases, provided that such reproduction does not conflict with a normal exploitation of the work and does not unreasonably prejudice the legitimate interests of the author"; it should be noted that although referring to "reproduction", the test is generally applied to all rights under copyright (Stephan Bechtold, 'Directive 2001/29/EC (Information Society Directive)' in Thomas Dreier and Bernt P Hugenholtz (eds), *Concise European Copyright Law* (Kluwer 2016, 2nd ed), 469; further it should be clarified that the CJEU has interpreted the three-step test to not only apply at the stage of Member State transposition, but also in interpreting the application of specific exceptions and limitations (Case C-5/08 *Infopaq I*

of the potential training stage of 3DRTs in light of the aforementioned exceptions and limitations thus sheds light on cases where such training may already be authorised.

II. Applicability of the Temporary Reproduction Exception

15 The temporary reproduction exception[36] may serve a facilitative function for forms of training, including 3DRTs. It is unique as one of few mandatory exceptions to the right of reproduction across the EU as well as for the clarificatory jurisprudence that is has received concerning certain "data capture" practices.[37] It is reminded that under Article 5(1) of the InfoSoc Directive, temporary acts of reproduction which do not infringe the right of reproduction of the rightsholder are at stake where:[38]

(1) the act is temporary;

(2) it is transient or incidental;

(3) it is an integral and essential part of a technological process;

(4) the sole purpose of that process is to enable a transmission in a network between third parties by an intermediary or a lawful use of a work or protected subject matter, and;

(5) that act does not have any independent economic significance.

16 The training of 3DRTs can comprise temporary acts of reproduction of preexisting 2D visual content that fulfil some of the limbs of the exception's requirements. Nonetheless, their cumulative nature, as well as the three-step test, makes it an overall difficult standard to fulfil.[39]

17 At a technical level, the required forms of storage may be difficult to achieve. In particular, 3DRTs may be trained in a variety of ways,[40] all of which may qualify as temporary (reproduction) acts that are integral and essential parts of the technological process of training in line with requirements (1) and (3), the remaining three criteria are especially noteworthy. Firstly, "transient act" means that the duration of any copies of protected content or data made in the course of training should be limited in duration to what is necessary for "proper completion of the technological process in question" such as via automated deletion.[41] This could be the case where 3DRT training extracts features from the underlying 2D visual content and this content is temporarily stored in the temporary memory of the machine performing the training. Accordingly, the training of the 3DRT itself may be transient where it can be properly completed. This also means, however, that 3DRT training needs to be separate from, e.g. the assembly into a database of 2D visual content in order to be transient.

18 Secondly, a "lawful use" must be pursued as the sole purpose of the technological process at stake. In the case of the training of a 3DRT. Lawful use is any use authorised by the rightsholder or "where it is not restricted by the applicable legislation".[42] In that regard, the question of whether the training process itself is restricted or not becomes central. Generally, the training processes involve a 'learning algorithm' being applied to the training data (here: 2D visual content).[43] In many cases, the constitution of the training data may be a custom-made dataset or corpora.[44] This extracts characteristics that are retained by the improved 3DRT's optimisation algorithm, but without producing copies of the content or data. As long as these extracted characteristics do not copy protected expressions or other protected subject matter, such use is lawful. For instance, where only facts or information are extracted,[45] the use is lawful in the sense of the temporary reproduction exception, although such use generally does not require copyright authorisation. By analogy,[46] such a training process

[2009] ECLI:EU:C:2009:465, para 58).

36 Art5(1) Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society [2001] OJ L 167/10 (hereinafter InfoSoc Directive); it must also be interpreted in light of the three-step test (Art5(5) InfoSoc Directive, as interpreted by *Infopaq I*, para 58; Case C-527/15 *Filmspeler* ECLI:EU:C:2017:300, para 63).

37 *Infopaq I*; Case 302/10 *Infopaq II* ECLI:EU:C:2012:16.

38 Article 5(1) InfoSoc Directive; Case C-302/10 *Infopaq II* ECLI:EU:C:2012:16 (*Infopaq II*), para 54.

39 As clarified by the CJEU in *Infopaq I*, para 55-7; *Infopaq II*, para 26-7; *Filmspeler*, paras 61-2; Case C-429/08 *Football Association Premier League* ECLI:EU:C:2011:631 ('*FAPL*'), para 162; Case C-360/13, *Public Relations Consultants Association v Newspaper Licensing Agency Ltd and others* ECLI:EU:C:2014:1195 ('*PRC*'), para 23.

40 The same can also be said of any needed steps comprising "pre-training", not considered here.

41 *Infopaq I*, para 64.

42 *FAPL*, para 169.

43 Thomas Margoni, 'Artificial Intelligence, Machine Learning and EU Copyright Law: Who Owns AI?' (CREATe Working Paper 2018/12, December 2018) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3299523> accessed 13 August 2025, 4.

44 Kretschmer, Margoni and Oruç (n 29) 124-125.

45 Cf. in the context of the TDM exceptions: Margoni and Kretschmer (n 18) 689-691.

46 It should be underlined that the point of this analogy is not

could be seen as akin to the reading of a book[47] – a lawful use of protected works and other subject matter.[48] 2D visual content may thus be 'viewed' and contribute to the development of a 3DRT as a distinct artifact.[49]

19 Thirdly, the issue of the independent economic significance of the temporary reproduction may be a difficult – albeit surmountable – hurdle for the training of certain 3DRTs. In the *Football Association Premier League* case, the CJEU clarified that the temporary reproduction has such independent economic significance where it generates "an additional economic advantage".[50] In that case, this advantage was defined as one "going beyond the advantage derived from mere reception of the broadcasts at issue", as the case concerned the reception of broadcasted football matches. *Mutatis mutandis* for 3DRTs, the court's clarification can be likewise understood to indicate that such an advantage must also go beyond that derived from the lawful use discussed above ('reception') in order to amount to "independent economic significance". Thus, the advantage of the temporary reproduction as part of the *training of the 3D reconstruction technique* as such becomes central. The individual temporary copy that may be used in the process of improving the 3DRTas an algorithm may be marginal,, some benefitting from further training, whereas others change the underlying mathematical optimisation functions.[51] The variety of factors influencing viability of an individual 3DRT notwithstanding, the field of such techniques is observably dynamic, wherein some techniques fail to take off and better ones are continually being created.[52] This makes any assessment as to the role of individual temporary copies in the training of a single 3DRT moot at best.

20 Overall, the temporary reproduction exception was designed to cover copy-reliant acts such as internet browsing and local caching.[53] These acts are certainly excepted from discretionary authorial authorisations, yet are far removed from the specific concerns in the field of 3D reconstruction. Nevertheless, the established notions and practice surrounding this exception may provide valuable guidance on a case-by-case basis,[54] with some commentators arguing that the exception should cover the training of a broader category of AI models and techniques.[55] It should nevertheless be borne in mind that, where it applies to such cases of 3D reconstruction, the temporary reproduction exception must also strike a "fair balance between the rights and interests of rights holders and of users of protected works who wish to avail themselves of those technologies".[56]

III. Applicability of Text and Data Mining (TDM) Exceptions

21 Under certain circumstances, the training of 3DRTs may further benefit from the 'text and data mining' (TDM) exceptions (Articles 3 and 4 CDSM Directive). As two separate provisions, they have different scopes and notions which need to be considered separately, though they also have distinct commonalities. Both

to equate human and machine interaction with protected content, but to highlight a potential convergence of lawful uses.

47 Cf. Niva Elkin Koren, 'Exploring Creative Commons: A Skeptical View of a Worthy Pursuit' in P Bernt Hugenholtz and Lucie Guibault (eds), *The Future of the Public Domain* (Kluwer Law International 2006), 3-4.

48 Viewing "cannot operate to the detriment of [the normal exploitation of the works]" (*PRC*, para 61).

49 This might be a matter of degree, also for instance, depending on the extent to which the training process is supervised or unsupervised (Cf. Kretschmer, Margoni and Oruç (n 29) 118); ultimately, this may require lending credence to the view that all protected content also contains material that is in the public domain, the use of which is lawful, cf. reflexively: "The public domain should be understood not as the realm of material that is undeserving of protection, but as a device that permits the rest of the system to work by leaving the raw material of authorship available for authors to use."(Jessica Litman, 'The Public Domain' (1990) 39 Emory Law Journal 965, 968).

50 *FAPL*, para 177.

51 This is the approach taken e.g. by Neural Radiance Fields (NeRFs): Ben Mildenhall and others, 'NeRF: Representing Scenes as Neural Radiance Fields for View Synthesis' (arXiv, 3 August 2020) https://arxiv.org/abs/2003.08934 accessed 13 August 2025.

52 Cf. "As impressive as those follow-up works on 3D [Gaussian splatting (GS)] are, and as much as those fields have been or might be revolutionized by 3D GS, there is a general agreement that 3D GS still has considerable room for improvement" (Guikun Chen and Wenguan Wang, 'A Survey on 3D Gaussian Splatting' (2024) <http://arxiv.org/abs/2401.03890> accessed 7 January 2025, 13).

53 Recital 33 InfoSoc Directive.

54 Cf. the interpretation in the German *LAION* case: LG Hamburg openJur 2024, 9199 *LAION*, para 57.

55 "The temporary copying exemption lends itself to an interpretation consistent with CJEU case-law that allows reproduction that occurs during the training of neural networks when this is carried out for the purpose of generating non-infringing outputs, provided that all copies made are automatically deleted (and datasets regularly updated if not automatically deleted) and that the outputs produced are non-infringing." (Juha Vesala, 'Developing Artificial Intelligence-Based Content Creation: Are EU Copyright and Antitrust Law Fit for Purpose?' (2023) 54 IIC - International Review of Intellectual Property and Competition Law 351, 360).

56 *PRC*, para 24.

provisions allow a beneficiary that has lawful access to the subject matter, that fulfils the requirements of each provision, to perform "text and data mining" (TDM). It is reminded that TDM is defined as "any automated analytical technique aimed at analysing text and data in digital form in order to generate information which includes but is not limited to patterns, trends and correlations".[57] Generally speaking, Article 3 CDSM Directive only permits TDM for the purposes of *scientific research*,[58] whereas Article 4 CDSM Directive permits TDM for the general purposes with the option for rightsholders to reserve the use of the content ('opt-out').[59] These exceptions have been debated in scholarly discussions of EU copyright reform and its adaptability to current technological developments.[60] In addition, the TDM exceptions re-emerged as a point of discussion in the legislative procedure of the EU's AI Act, which *inter alia* requires general-purpose AI model providers to implement a policy for complying with TDM opt-outs in the context of Article 4 CDSM Directive.[61]

22 The training of 3DRTs were not one of the technological developments explicitly envisioned by the formulation of TDM. Further, although the terms included in the definition of TDM can be understood to cover most areas of AI relying on data analytics,[62] it may yet be the subject of jurisprudence e.g. in what way the training of a technique such as a 3DRT must be 'automated', which could foreclose certain levels of human supervision. These issues notwithstanding, the generously broad definition of TDM is very likely to cover aspects of the training of 3DRTs – as argued by Margoni and Kretschmer: "[TDM] certainly includes most modern, data-driven forms of AI, such as traditional machine learning and more advanced forms of deep learning and neural network structures".[63] Indeed, the TDM exceptions may play an important role for the specific 3DRTs that require training.[64] To be covered by the exceptions, 3DRTs must be designed in such a way that the learning algorithm that is utilised at the training stage meets the standard of an "automated analytical technique", i.e. the automated computational analysis of "information in digital form" that comprises the training data,[65] and the standard of generating 'information'. This is a yet fully-elaborated standard, although one notable national case, the Regional Court of Hamburg's decision in the *LAION* case,[66] has clarified that the "analysis of [an] image file for comparison with a pre-existing image description exemplifies an analysis for the purpose of producing information concerning 'correlations'".[67] By analogy, then, a 3DRT may be improved by the production of new correlation information by virtue of analysing a piece of 2D content such as an image, thus likewise performing TDM.

23 By contrast, the TDM exceptions may not always

57 Art2(2) CDSM Directive.

58 Art3 CDSM Directive; this must be performed by a "research organisation" defined as "a university, including its libraries, a research institute or any other entity, the primary goal of which is to conduct scientific research or to carry out educational activities involving also the conduct of scientific research: (a) on a not-for-profit basis or by reinvesting all the profits in its scientific research; or (b) pursuant to a public interest mission recognised by a Member State; in such a way that the access to the results generated by such scientific research cannot be enjoyed on a preferential basis by an undertaking that exercises a decisive influence upon such organisation" (Art2(1) CDSM Directive) or by a "cultural heritage organisation" defined as a "a publicly accessible library or museum, an archive or a film or audio heritage institution" (Art2(3) CDSM Directive).

59 Art4(3) CDSM Directive.

60 See among others: Kretschmer, Margoni and Oruç (n 29) 110; Juha Vesala, 'Developing Artificial Intelligence-Based Content Creation: Are EU Copyright and Antitrust Law Fit for Purpose?' (2023) 54 IIC - International Review of Intellectual Property and Competition Law 351; Margoni and Kretschmer (n 18) 685; Caterina Sganga, 'A New Era for EU Copyright Exceptions and Limitations?' (2020) 21 ERA Forum 311; Christophe Geiger, Giancarlo Frosio and Oleksandr Bulayenko, 'Text and Data Mining in the Proposed Copyright Reform: Making the EU Ready for an Age of Big Data?' (2018) 49 IIC - International Review of Intellectual Property and Competition Law 814; Rossana Ducato and Alain Strowel, 'Ensuring Text and Data Mining: Remaining Issues With the EU Copyright Exceptions and Possible Ways Out', (February 1, 2021). European Intellectual Property Review, 2021, Available at SSRN: https://ssrn.com/abstract=3829858 accessed 11 August 2025;

61 Art53(1)(c) Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act) [2024] OJ L (AI Act); regarding discussion of this requirements, see Quintais (n 18); Peukert (n 18) 497.

62 Margoni and Kretschmer (n 18) 687.

63 Margoni and Kretschmer (n 18) 688.

64 Leander Stähler, 'The Production of 3D Digital Assets with NeRF: An Opportunity for the EU TDM Exceptions?' (*CiTiP blog*, 29 September 2023) <https://www.law.kuleuven.be/citip/blog/the-production-of-3d-digital-assets-with-nerf-an-opportunity-for-the-eu-tdm-exceptions/> accessed 11 August 2025.

65 Recital 8 CDSM Directive.

66 Addressing the transposed version of Article 3 CDSM Directive, i.e. Section 44b of the German Copyright Act.

67 Author's translation of the following sentence: "Diese Analyse der Bilddatei zum Abgleich mit einer vorbestehenden Bildbeschreibung stellt ohne Weiteres eine Analyse zum Zwecke der Gewinnung von Informationen über "Korrelationen" (LG Hamburg openJur 2024, 9199 *LAION*, para 73).

be applicable to implementations of generating 3D content as a distinct output. For instance, where the 2D inputs are pre-selected and 'analysed' in a non-automated manner, such as where a certain quality of 3D output is envisioned, this process may imperil access to the TDM exception. Further, it is uncertain whether the 'training' of a piece of 3D content fulfils the requirement "to generate information which includes but is not limited to patterns, trends and correlations". While 3D visual content may be interpreted as 'information' in a broad sense, it remains uncertain whether such an interpretation will be followed in the case law.[68] As complex as questions of TDM under the EU copyright law may be, questions of what it means to "generate information" may yet dwarf such considerations.[69]

24 Further, for TDM that does not pursue a research purpose, respecting the reservation (opt-out) by a rightsholder is essential. Such a reservation must be made in "an appropriate manner, such as machine-readable means in the case of content made publicly available online".[70] In the recent case of *DPG v HowardsHome*,[71] the court of Amsterdam found that the inclusion of a robots.txt opt-out for only specific AI bots is an incomplete means of reserving the use for TDM purposes.[72] In that regard, relevant developers of 3D reconstruction must adequately comply with any machine-readable opt-outs, such as those expressed via robots.txt.[73] Where rightsholders have not opted-out from TDM, reproductions and extractions "may be retained for as long as is necessary for the purpose of [TDM]",[74] including where these are used for the training of a 3D reconstruction technique.

IV. Intermediate Remarks

25 There are necessary caveats to the above analysis which relate to factual and doctrinal differences. Firstly, there exists the risk of a mismatch of the economic rights of copyright and/or the related rights from which these exceptions are carved out.[75] Namely, whereas some EU member states distinguish the right of adaptation from the right of reproduction, others treat the right of adaptation as part of the right of reproduction.[76] For the former case, the discussed exceptions may not find applicability where *training* of 3DRTs falls under the right of adaptation. Secondly, given the nature of Directives under EU law, these exceptions are not transposed or implemented in a completely uniform manner across the EU.[77] Surveys of the TDM exceptions, for instance, indicate that some Member States have explicitly authorised uses covered by the right communication to the public or the right of adaptation.[78] Finally, it should be noted that licences continue to offer a vector for the authorisation of 3DRTs training. Licensing practices are not only subject to change under the further development of AI techniques, but in the case of the TDM exceptions, may actually interfere with the applicability of exceptions due to the requirement of 'lawful access'.[79] Licences may be an indication that access to the mined 2D content was lawful.

68 Although patterns, trends and correlations are mentioned illustratively by the CDSM Directive (i.e. "including but is not limited to"), their demonstration clearly appear to strengthen the case for TDM to have generated information (cf. LG Hamburg openJur 2024, 9199 *LAION*, para 73).

69 Cf. from a US perspective: "Non-expressive uses generate information about a work, that information may be useful, it may be valuable, it may even affect the demand for the underlying work, but metadata about a work does not in any way fulfill the public's demand for the author's original expression. Reframing the argument in terms of expressive substitution provides a bridge to the concept of transformative use" (Matthew Sag, 'The New Legal Landscape for Text Mining and Machine Learning' (2019) 66 Journal of the Copyright Society of the U.S.A. 291)

70 Art4(3) CDSM Directive.

71 Rechtbank Amsterdam ECLI:NL:RBAMS:2024:6563 *DPG Media v HowardsHome*.

72 The specific bots specified by the claimants were GPTBot, ChatGPT-User, CCBOT and anthropie-ai (Rechtbank Amsterdam ECLI:NL:RBAMS:2024:6563 *DPG Media v HowardsHome*, para 4.33).

73 Such opt-out solutions are still developing, however, and while robots.txt has been referenced as a "minimum measure to identify and comply with", further forms of reservations are still being developed (See The General-Purpose AI Code of Practice, published on 10 July 2025, Copyright Chapter, Measure 1.3, available at: https://ec.europa.eu/newsroom/dae/redirection/document/118115 accessed 11 August 2025>).

74 Art4(2) CDSM Directive.

75 Cf. Rosati (n 18) 610f.

76 For a brief comparative overview, see Daniël Jongsma, 'Parody After Deckmyn – A Comparative Overview of the Approach to Parody Under Copyright Law in Belgium, France, Germany and The Netherlands' (2017) 48 IIC - International Review of Intellectual Property and Competition Law 652, 666-671.

77 Cf. Eleonora Rosati, 'Are Directives Good for the EU Internal Market? The Case of the Copyright DSM Directive and Its National Transpositions' (2021) 16 *Journal of Intellectual Property Law and Practice* 1027.

78 Italy and Spain respectively, see: Caterina Sganga and others, 'D2.3 Copyright flexibilities: mapping and comparative assessment of EU and national sources' (reCreating Europe, 16 January 2023) <zenodo.org/records/7540511> accessed 13 August 2025, 521.

79 Kacper Szkalej, 'The Paradox of Lawful Text and Data Mining? Some Experiences from the Research Sector and Where We (Should) Go from Here' (2025) 74 GRUR International 307.

26 Ultimately, the relevance of these considerations depends strongly on the protectability of 2D content and data that is in fact utilised for 'training' any 3DRTs. To wit, not all 3DRTs require extensive (if any) training, certainly not necessarily in the sense of e.g. large language models (LLMs) or many generative AI tools. Some techniques are capable of 'training' an individual piece of 3D content based solely on the given 2D content that is the source material. This removes the need for considering the specific copyright-relevant questions concerning training in general. However, especially in light of the ascending role of Generative AI tools, their integration with existing 3DRTs has become a distinct possibility, including under the 'text-to-3D' label.[80] In other words, whereas *certain* 3DRTs may not raise the same or similar legal questions regarding their 'training' as well-known examples of generative AI, those integrating generative AI tools that *have* been trained on vast amounts of data, will.

C. The Case of Non-Copyright-Relevant Use of 2D Inputs within 3D Outputs

I. From Factual Assumption to Legal Validation

27 In the subfield of AI-based 3DRTs, the output question of whether the 3D visual content (output) reproduces or otherwise reuses 2D content used as input/training data presents particular connotations, for the following reasons. On the one hand, a handful of selected and identified 2D content is used as input for the implementation of 3D reconstruction technique (see above Figure 1). On the other hand, the objective of the implemented technique is to generate as an output a 3D version of the 2D content used as input, as faithfully as possible, through the addition of aspects, views, angles etc. of that representation. Indeed, the objective of the process is shifting the represented object contained by the 2D content into a third dimension ('dimension shifting'). At the same time, the AI model will generate the 3D output by solely relying on the visual information contained in that handful of *specific* 2D content used as input to the AI model. Given the above factors, and notwithstanding the variation in technical objectives pursued by any individual 3DRT, it may be assumed, at least from a factual point of view, that 3D content generated by means of 3DRTs *is necessarily based on* specific 2D content and that a 'transformative use'[81] of the employed 2D inputs may be attested.

28 However, from a legal perspective, the mere use of 2D content as inputs within the above context does not lead to copyright-relevant form of 'derivation' or infringement *ipso facto*.[82] In particular, what needs to be assessed here is whether the factual connection between 2D input and 3D output, as described above, may be qualified as a *copyright-relevant* 'transformative use' of the 2D inputs. This requires the assessment of possible *derivation* (in an extended sense[83]) of 3D content from 2D content under EU copyright law and, especially right of reproduction. Only in case of affirmative answer to this question, 2D Content rightsholders would have the possibility to control the generation (creation) and further dissemination/use of such derivative 3D outputs, by implementing their exclusive rights.

II. Legal Assessment of 3D Outputs 'Derivation' under the EU Right of Reproduction

1. Absence of an EU Right of Adaptation

29 Given the above-mentioned transformative dimension of 3D reconstruction, owed to the dimension shifting of 2D inputs, a meaningful starting point for that legal assessment would be the *right of adaptation*. Indeed, in the passage from two to three dimensions, there is a need of modifications in 2D content, involving addition of aspects, views, angles, perspectives. Shifting a visual work into a third dimension may be qualified as an act of *alteration* of the former. However, under EU law and especially under InfoSoc Directive neither a horizontal right of adaptation, nor a general harmonised definition and protection rule for derivative works[84] has

80 See representatively: Chenghao Li and others, 'Generative AI Meets 3D: A Survey on Text-to-3D in AIGC Era' (arXiv, 25 October 2024) <http://arxiv.org/abs/2305.06131> accessed 11 August 2025; Ben Poole and others, 'DreamFusion: Text-to-3D Using 2D Diffusion' (arXiv, 29 September 2022) <http://arxiv.org/abs/2209.14988> accessed 11 August 2025.

81 See Introduction above.

82 Cf. Oleksandr Bulayenko and others, 'AI Music Outputs: Challenges to the Copyright Legal Framework' (2022) <https://ssrn.com/abstract=4072806> accessed 13 August 2025, 45.

83 Meaning that the 3D content in question need not to be an *original* derivative work in itself, but nonetheless make use of pre-existing 2D content for the purpose of its creation.

84 Marie-Christine Janssens, 'The Software Directive' in Irini Stamatoudi and Paul Torremans (eds), *EU Copyright Law: A Commentary* (Edward Elgar 2021), 93: "This is interesting as there exists no general European rule on adaptations as protected subject matter".

been introduced so far[85], in a way that the right of adaptation for visual content such as 2D Content is not part of the *acquis Communautaire*.

30 On the contrary, the right of adaptation and derivative works are regulated under the Berne Convention (in Articles 2 paragraph 3, 8 and 12 thereof).[86] Strictly speaking, the EU has not ratified the Berne Convention. However, since all Member States of the EU are also Members of the Berne Convention, they all provide for such an exclusive right of adaptation for authors,[87] although some have chosen to recognise the right of adaptation as a component of the right of reproduction, such as France, Belgium and the Netherlands.[88] In that sense, the right of adaptation is a common denominator of all EU member states,[89] even if such right has not been typically harmonized.[90] Still, in the absence of an explicit EU right adaptation, legal analysis under EU copyright law is not conceivable.

2. Reproduction as an Implied Component of 'Transformative Uses'

31 A way out from this conundrum may be sought by a deeper assessment of what a 'transformative use' of preexisting works entails. 'Transformative use' as outlined above[91] by definition implies the taking (to variable extent) of (at least) some elements of the pre-existing works (in identical or altered form) that will serve as components (along with other components not connected with those works) for the production of something new. Accordingly, under this approach, taken elements from pre-existing works will be integrated within the outcome of transformative process. In its turn, Article 2 InfoSoc Directive establishes a far-reaching scope for the right of reproduction,[92] which is additionally subject to a broad interpretation by the CJEU.[93] Hence, it remains to be assessed whether the taking of elements of pre-existing 2D content, in the context of their 'transformative use', and their integration within the new object (3D visual content), could qualify as reproduction under Article 2 InfoSoc Directive.

32 Article 2 of the InfoSoc Directive does not define the concept of either 'reproduction' or 'reproduction in

85 For the absence of a harmonised right of adaptation, see e.g. Raquel Xalabarder, 'The Marrakesh Treaty on Certain Permitted Uses for the Benefit of Blind, Visually Impaired and Print-Disabled Persons' Irini Stamatoudi and Paul Torremans (eds), *EU Copyright Law: A Commentary* (Edward Elgar 2021), 625; Irini Stamatoudi and Paul Torremans, 'Digital Single Market Directive' in Irini Stamatoudi and Paul Torremans (eds), *EU Copyright Law: A commentary* (Edward Elgar 2021), 668; Bulayenko and others (n 82) 45. Right of adaptation is recognized only with regards the specific subject matter of computer program and databases. See Article 4(1)(b) Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs [2009] OJ L 111/16 (Software Directive) and Article 5(b) Database Directive.

86 According to Article 2(3) Berne Convention, under the open-ended term "Derivative works" fall (indicatively) translations, adaptations, arrangements of music and *other alterations* of a literary or artistic work. These derivative works "shall be protected as original works without prejudice to the copyright in the original work." (Original) derivative works imply the *creative reuse* of preexisting works. In addition, Article 8 establishes the Right of Translation (Authors of literary and artistic works protected by this Convention shall enjoy the exclusive right of making and of authorizing the translation of their works throughout the term of protection of their rights in the original works) and Article 12 establishes the Right of Adaptation, Arrangement and Other Alteration (Authors of literary or artistic works shall enjoy the exclusive right of authorizing adaptations, arrangements and other alterations of their works).

87 Under national laws, categories of derivative works are usually defined by law and the creation of derivative works is often covered by a separate economic right, usually adaptation or transformation right.

88 Jongsma (n 76) 666-668.

89 Cf. Case C-419/13 *Art & Allposters International BV v Stichting Pictoright* [2015] ECLI:EU:C:2015:27 ('*Allposters*'), para 38: "That finding, as the European Commission correctly states, is supported by international law, and in particular by the WIPO Copyright Treaty, in the light of which Directive 2001/29 must be interpreted as far as possible."

90 Jean-Paul Trialle, 'User Generated Content (UGC) – First PArtDescription of the present legal situation regarding copyright in the European Union' in Jean-Paul Trialle and others (eds), 'Study On The Application Of Directive 2001/29/EC On Copyright And Related Rights In The Information Society (The "InfoSoc Directive") (European Union, October 2013) <https://www.cultura.gob.es/planes-nacionales/en/dam/jcr:b15ddad4-6800-41d8-8b66-96c6d12029fb/131216-study-en.pdf> accessed 13 August 2025, 461; It should also be noted, however, that the letter of the two specific EU legal instruments that introduce a right of adaptation for their specific subject-matter (Software and Database Directives) implies reference to the definitions of Berne Convention (translation, adaptation, arrangement and any other alteration).

91 I.e. any act performed upon or reuse of a pre-existing 2D visual content that aims at the generation of a new 3D visual output, see above under Introduction.

92 Article 2 InfoSoc Directive; Cf. Recital 21 InfoSoc Directive: "This Directive should define the scope of the acts covered by the right of reproduction with regard to the different beneficiaries. This should be done in conformity with the acquis communautaire. A broad definition of these acts is needed to ensure legal certainty within the internal market".

93 *Infopaq I*, paras 41-43.

part' of a work,[94] nonetheless it should be subject to autonomous and uniform interpretation.[95] The meaning and scope of those words must, as the Court has consistently held, be determined by considering their usual meaning in everyday language, while also taking into account the context in which they occur and the purposes of the rules of which they are part.[96] According to the usual meaning in English language in the context of reproduction of works,[97] reproduction may have multiple connotations: it may refer to the *process of copying* something and to the *copy* (i.e. the outcome of the process) itself,[98] to concepts such *as duplicate, replica or close imitation of an existing thing,*[99] as well as to "*a representation, expression, or rendition of the essential features of a quality, mood, or other non-material thing*".[100] In all the above definitions it is implied that the reproduction entails the *production of something new* that *has a certain type connection* with a different object, which, logically, pre-exists. In particular, a reproduction will be at stake insofar the new item shares identical or common aspects or elements with the pre-existing one.[101] According to the multiplicity of concepts covered under the term "reproduction", the connection between the preexisting and the new item in the context or reproduction may take various forms, starting from absolute identity (e.g. replica, when all aspects of both items are exactly the same) until close imitation (when all or some aspects of both items are similar or some are identical and some similar[102]) or rendition of essential features of the preexisting item within the new one (when only some aspects of both items are identical or similar).[103] This means that a reproduction will also be at stake where the new item shares common or similar elements with the pre-existing one but, at the same time, also presents its own individual aspects, which may not be identical nor similar with the aspects of pre-existing item.[104]

33 Following the above, reproduction under Article 2 InfoSoc Directive would cover the taking of elements of a preexisting work and their integration within a new output in the context of 'transformative use'. Which means that 3D reconstruction would involve

94 *Infopaq I*, para 31.

95 *Infopaq I*, para 27: "It should be noted as a preliminary point that the need for uniform application of Community law and the principle of equality require that where provisions of Community law make no express reference to the law of the Member States for the purpose of determining their meaning and scope, as is the case with Article 2 of Directive 2001/29, they must normally be given an autonomous and uniform interpretation throughout the Community (see, in particular, Case C 245/00 *SENA* [2003] ECR I 1251, paragraph 23, and Case C-306/05 SGAE [2006] ECR I 11519, paragraph 31)".

96 Cf. Case C-476/1729 *Pelham GmbH, Moses Pelham, Martin Haas v. Ralf Hütter, Florian Schneider-Esleben* [2019] ECLI:EU:C:2019:624 ('*Pelham I*'), para 28 and case-law cited; *Infopaq I*, para 32: "In those circumstances, those concepts must be defined having regard to the wording and context of Article 2 of Directive 2001/29, where the reference to them is to be found and in the light of both the overall objectives of that directive and international law (see, to that effect, SGAE, paragraphs 34 and 35 and case-law cited)".

97 Reproduction refers also to the biological process by which a new member (or members) of a species is created from a parent (or parents), which is not relevant here.

98 *Cambridge English Dictionary*, s.v. "reproduction *noun* (COPY)", sense C1, <https://dictionary.cambridge.org/dictionary/english/reproduction> accessed 13 August 2025.

99 *Merriam-Webster*, s.v. "reproduction (noun)" <https://www.merriam-webster.com/dictionary/reproduction> accessed 13 August 2025 and *Collins Dictionary*, s.v. "Definition of 'reproduction'" <https://www.collinsdictionary.com/dictionary/english/reproduction> accessed 13 August 2025.

100 *Oxford English Dictionary*, s.v. "reproduction (n.)", sense 2.b., March 2025, <https://doi.org/10.1093/OED/7042576827> accessed 13 August 2025.

101 Cf. *Allposters*, para 27: "However, and without having to interpret the concept of 'adaptation' within the meaning of Article 12, it is sufficient to state that both the paper poster and the canvas transfer contain the image of a protected artistic work and thus fall within the scope of Article 4(1) of Directive 2001/29 as copies of a protected work marketed within the European Union."

102 Cf. Rosati (n 18) 614, referring to "non-literal copying".

103 On that topic, see from a US perspective Oren Bracha, 'Generating Derivatives: AI and Copyright's Most Troublesome Right' (2024) 25 North Carolina Journal of Law and Technology 345, 375: "In modern copyright law, the scope of reproduction stretches beyond literal copying or even copying with trivial changes into a zone of substantial similarity".

104 It is in the same vein that it may be argued that right of adaptation is included within the scope of right of reproduction. See e.g. Stamatoudi and Torremans (n 85) 668: "Although the Information Society Directive does not expressly refer to the adaptation and translation rights, it could be argued that they are included within the scope of the right of reproduction by reason of its very broad definition." Cf. Margoni (n 43) 11; Trialle (n 90) 460, mentioning "strong relationship with the right of adaptation"; Rosati (n 18) 616: "[right of reproduction] applies to instances of literal and non-literal copying and, therefore, also to situations that, formally, might fall under the right of adaptation." Cf. also Green Paper on Copyright in the Knowledge Economy, /* COM/2008/0466 final */ under 3.4.: "Under the Berne convention, a transformative use would be prima facie covered by the right of reproduction and the right of adaptation." Besides, as already mentioned, at the MS level some Copyright Acts systematically classify the right of adaptation as a form of reproduction, see Margoni (n 43) 11.

(but would not be limited to[105]) some kind of (at least partial) *reproduction* of that pre-existing work that would be covered by Article 2 InfoSoc Directive, irrespectively of whether the new output features its own original aspects. As a consequence, given the current status of the EU copyright *acquis*, the basis for assessing copyright-relevant 'transformative use' of 2D inputs for the purposes of 3D Reconstruction within the generated 3D content could be the *right of reproduction*.[106] Consequently, it will be sufficient to state that 3D content *reproduces* 2D content in a legal sense, in order to affirm copyright-relevant 'transformative use' of 2D inputs within 3D output.[107]

3. The Scope of Right of Reproduction in the 'Transformative Use' Context

34 According to interpretation offered by the CJEU, the author's right of reproduction in the sense of Article 2 of the InfoSoc Directive is at stake when *protected elements*[108] of a given work are reproduced.[109] Those elements will be protectable subject matter, i.e. original, insofar they reflect the personality of its author, as an expression of his free and creative choices[110], independently of their size.[111] Accordingly, originality of reproduced work and elements taken therefrom informs the scope of the right of reproduction. Inversely, no reproduction in the sense of Article 2 InfoSoc Directive will be at stake when reproduced elements are not author's own intellectual creation, making part of the *original expression* of the work. This will be the case, among others, when these elements have been dictated by technical considerations, rules or other constraints which have left no room for creative freedom[112]. The same goes for *mere facts and ideas*. Even if EU Copyright *acquis* does not explicitly exclude them from copyrightable subject-matter (as international instruments do[113]), this stems from the idea/expression or fact/expression dichotomy that characterizes also the EU copyright *acquis*.[114]

35 For integrity reasons, the same approach should be followed when assessing reproduction in the context of 'transformative use' that triggers the reproduction right.[115] In light of the above, reproduction will be at stake in the context of 'transformative use' of a work, insofar the elements that are taken (by means of duplication, close imitation, presentation or rendition of essential features) are *protectable elements* of the said work, meaning that they are the expression of author's own intellectual creation. It will be indifferent whether those taken protectable

105 In that regard, transformative uses/adaptation may be qualified as derivative acts vis-à-vis the reproduction acts; from a US perspective, 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 1111, 1119: "Second, unless one is prepared to violate the basic canon of statutory construction that guards against superfluity, the derivative work right cannot have the exact same scope as the right of reproduction. This logically implies that, although the Venn diagram of the two rights would show considerable overlap, some derivative works are not reproductions."

106 Article 2 InfoSoc Directive; in the same vein, re: AI music outputs, see Bulayenko and others (n 82), 46.

107 For a similar approach see *Allposters*, para 27: "However, and without having to interpret the concept of 'adaptation' within the meaning of Article 12, *it is sufficient to state* that both the paper poster and the canvas transfer contain the image of a protected artistic work and thus fall within the scope of Article 4(1) of Directive 2001/29 as *copies of a protected work* marketed within the European Union."

108 Protected elements presuppose their qualification as elements which are the expression of author's own intellectual creation. *Infopaq I*, para 39: "the various parts of a work thus enjoy protection under Article 2(a) of Directive 2001/29, provided that they contain elements which are the expression of the intellectual creation of the author of the work."

109 *Infopaq I*, para 33: "It follows that protection of the author's right to authorise or prohibit reproduction is intended to cover 'work'."

110 CJEU, Case C-833/18, *SI, Brompton Bicycle Ltd v Chedech/Get2Get* [2020] ECLI:EU:C:2020:461 ('*Brompton*'), para 23, citing *Cofemel*, C-683/17, EU:C:2019:721, paragraph 30 and the case-law cited; CJEU, Joined Cases C-580/23 and C-795/23, *Mio AB, Mio e-handel AB, Mio Försäljning AB v Galleri Mikael & Thomas Asplund Aktiebolag and USM U. Schärer Söhne AG v konektra GmbH* [2025] EU:C:2025:941 ['*Mio/Konektra*'], para 61.

111 See *Infopaq I*, para 38: "As regards the parts of a work, it should be borne in mind that there is nothing in Directive 2001/29 or any other relevant directive indicating that those parts are to be treated any differently from the work as a whole. It follows that they are protected by copyright since, as such, they share the originality of the whole work."; Margoni (n 19) 26.

112 See *Brompton*, para 24.

113 See e.g. Article 2§8 Berne Convention: "The 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." Cf. CJEU, Case C-406/10, *SAS Institute Inc. v World Programming Ltd* [2012] ECLI:EU:C:2012:2592, para 33: "With respect to international law, both Article 2 of the WIPO Copyright Treaty and Article 9(2) of the TRIPs Agreement provide that copyright protection extends to expressions and not to ideas, procedures, methods of operation or mathematical concepts as such."

114 See among others Margoni and Kretschmer (n 18) 689-690.

115 See, however, in favor of a differentiated and more flexible approach that takes into account the idiosyncrasy of the right of adaptation, Margoni (n 43): "The more transformative a work is, the less likely a finding of infringement should be, irrespective of how much of the original author's own intellectual creation has been taken."

elements correspond to the whole or part of the pre-existing work or whether those elements constitute literal or non-literal (imitative) (partial) copies of the preexisting work. On the contrary, reproduction of elements of the 2D content within the 3D output which are not the expression of the intellectual creation of the author of the work will not be covered by the right of reproduction. Thus, no derivation in the sense outlined above will be attested between 2D and 3D content, as long as no protectable elements of 2D content are reproduced. In that case, 3D content would be an independent output, notwithstanding the fact that its generation has been based in those specific 2D inputs.[116]

III. No Copyright-Relevant Use of 2D Inputs within 3D Output as a Baseline Scenario

1. Protected and Unprotected Elements within 2D Inputs

36 The assessment for the existence of a reproduction as defined above implies the implementation of a test, according to which the two works are undertaken a comparison, in order to detect whether and to what extent the new item shares identical or common aspects or elements with the pre-existing one.[117] In the context of 'transformative use' of 2D inputs for 3D reconstruction purposes, this test may not be very meaningful, insofar a *prima facie* similarity between 2D inputs and 3D outputs would probably be attested.[118] Thus, it is important to address first what type (semantic or syntactic[119]) of information is distilled in the course of AI training based on 2D inputs depicting real-world objects and taken (reproduced) in the context of 3D output generation.[120]

37 The answer to this issue is crucially affected by the objectives of AI model training in the 3D reconstruction context and, in particular, by the type of inference that the 3DRT is intended to generate. To begin with, 2D inputs that represent real world objects embody elements that are not the author's own intellectual creation, to the extent that they are dictated by the physical reality. For instance, the object itself, as well as data, physical dimensions and structural elements of the represented real-world object, considered in isolation, leave no room for creative freedom to the creator of 2D content.[121] For example, one cannot decide how a photographed person would look like as an aspect of reality, and the facts that describe it. Represented objects within 2D content, if considered in isolation,[122] mainly relate to unprotectable facts/ideas and their representation

116 For a similar conclusion in a different context, see Bulayenko and others (n82) 46: "Take for example a case where and 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. Though it might (also) be a derivative work, this scenario would most likely be litigated as potential infringement of the right of reproduction analysis. Conversely, the reproduction of either ideas or unoriginal elements has no copyright significance."

117 Cf. Rosati (n 18), referring to "test of actionable reproduction". *Adde* A. Strowel & R. Ducato, 'Artificial intelligence and Text and Data Mining. A copyright carol', in E. Rosati, *The Routledge Handbook of EU Copyright Law*, Routledge, 2021, 299 ., 308-309, where a purposive infringement test is provided.

118 Cf. P Bernt Hugenholtz, Copyright and the Expression Engine: Idea and Expression in AI-Assisted Creations (February 27, 2024). Available at SSRN: https://ssrn.com/abstract=4982516 or <http://dx.doi.org/10.2139/ssrn.4982516> accessed 11 August 2025, 19: "Like in the United States, courts in Europe usually infer copying from prima facie similarity. If the defendant's work has an apparent likeness to the plainIff's, the burden of proof is reversed and it is for the alleged infringer to demonstrate that there was no copying – usually, a probatio diabolica."

119 Cf. a similar distinction in Tim W Dornis, The Training of Generative AI is not Text and Data Mining, (October 19, 2024), Eur Intellect Prop Rev 47 (2025), 65; available also at SSRN: <https://ssrn.com/abstract=4993782> accessed 11 August 2025, 5.

120 Cf. for a similar approach, Benjamin Sobel, Elements of Style: Copyright, Similarity, and Generative AI (May 18, 2024). Harvard Journal of Law & Technology, Forthcoming Vol. 38, Cornell Legal Studies Research Paper Forthcoming, Available at SSRN: <https://ssrn.com/abstract=4832872> accessed 11 August 2025, 71: "Art objects have no literal elements, because no series of standardized symbols defines the identity of a painting as the text does for a work of literature. For this reason, it makes little sense to focus on whether generative AI "copies and pastes" images: our focus should not be on how generative AI distills and reproduces salient information from images; it should be on what that information is, and whether it is of a sort that ought to be of consequence for copyright law."

121 Cf. *Infopaq I*, para 46: "Words as such do not, therefore, constitute elements covered by the protection."

122 Cf. in a similar way *Infopaq I*, para 45: "Regarding the elements of such works covered by the protection, it should be observed that they consist of words which, considered in isolation, are not as such an intellectual creation of the author who employs them. It is only through the choice, sequence and combination of those words that the author may express his creativity in an original manner and achieve a result which is an intellectual creation."

cannot be abstractly monopolized[123] as *corpus mysticum*.[124]

38 At the same time, the same 2D content may be qualified as such as an original work, meaning that it is author's own intellectual creation, due to free and creative choices made during its creation by which the author imprinted his personality on the work. Indeed, one may decide to control, regulate and modify a number of parameters, such as the moment, the context and possibly the surrounding where a real-world object will be represented. For instance, in case of 2D content consisting in photographs, the photographer may intervene and make free and creative choices in the preparation phase (choose the background, the subject's pose and the lighting),[125] in the execution phase (framing, angle of view and the atmosphere created) and in the post production phase (selection, corrections etc.). Authorial contributions in 2D visual content rather relate with choices surrounding the *way* this real-world object is represented, i.e. the representation itself, and not the represented object (unless if represented object is also a protectable subject matter in itself). As a consequence, it is possible to typically differentiate between two layers within visual 2D content representing real-world objects: the layer of protectable expression which is to be found in principle in the representation itself, i.e. the visual 2D content *per se*, and the layer of unprotectable facts, which may be associated with the represented real-world object.

2. Focus on Reconstruction of the Represented Object

39 For its part, 3D reconstruction, as a process, targets and focuses on the represented real-world object. Indeed, according to the technical features and objectives of 3D reconstruction, training and analysis of 2D visual content used as input aims at obtaining knowledge about the features and data around the *represented* real-world object and not the representation (i.e. photograph, video frame etc.) itself. One could even argue that 3DRTs intend to bypass the representation layer (and the eventual authorial contribution contained therein), in order to identify certain (factual) data points pertaining to the represented object, enabling different spatial and temporal uses. This is because the objective is not to create a similar type of work (e.g. a photograph or a video) but a different type of creation (3D content) which refers to the represented object.

40 Accordingly, the aim is not the dimension shifting of the 2D content as a representation *per se* but, rather, the generation of a 3D version of the represented object. This becomes clear by the fact that 2D inputs used as training material for the 3DRT cannot be abstract or aesthetic creations but they should represent real-world objects and, more precisely, the same object, possibly from different angles, views etc. Consequently, the pursued and distilled knowledge from training refers to metadata / metainformation contained, as latent facts or data, within the 2D Content that are connected with the represented object. It refers, in particular, to rather valuable information patterns such as certain data points, spatial information and other structural or informational elements including high-abstraction structural elements, or mere physical aspects[126]. This information reflects unprotectable mere facts and data regarding the represented real-world object that are embodied in the 2D content.

3. Reproduction of Unprotectable Metadata

41 In 3D reconstruction context, 3D output will be generated on the basis of this knowledge that will serve as a *matrix* for generating the 3D content from scratch,[127] i.e. by sole reference to the structural and

123 Cf. Margoni (n 19) 14: "3) When an expression is determined by technical or functional rules, such as when there is only one way to express an idea, or the expression is predetermined by a specific goal or constrained by narrow rules which leave no space to free and creative choices no originality can be present."

124 Unless the represented object is protectable subject matter in itself, e.g. a statue, an architectural work, a work of applied art etc., although some of these objects may still fall in the public domain.

125 Margoni (n 19) 28.

126 Bracha (n103) 349 mentioning "metainformation, high-abstraction structural elements, or mere physical aspects" and "informational elements".

127 Cf. Scenario 4 in Gervais (n 105) 1129: "Scenario 4. AI machine produces a painting "based upon" a dataset of five abstract paintings that contain geometric shapes such as circles, squares, and triangles. The main difference between the third and fourth scenarios in terms of the infringement analysis is that common symbols are not protected expression." *Ibid.* p. 1128: "the computer does not in fact derive; instead, it finds correlations and patterns to use as a matrix for its own production."; Bracha (n 103) 382; Bulayenko and others (n 82) 45, citing Daniel Gervais, 'The Machine As Author' (2019) 105 Iowa Law Review 2053: "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."; Bulayenko and others (n 82) 46, citing Maria Iglesias and others, 'Intellectual Property and Artificial Intelligence: A Literature Review' (Publications Office of the European Union 2021) <https://

informational elements deducted from 2D inputs during training. 3D content would thus be based on the 2D content and, more precisely, on the non-protectable layer of information embodied in the 2D content as the level of represented object, and not to the expression of the 2D content itself. In that regard, preexisting 2D Content may be seen as an 'idea' or pure data,[128] an aspect of the reality,[129] or facts concerning the represented object.[130] Under these circumstances, the 2D input serves as *medium* of the visual appearance of the object in question and bears the necessary semantic information related with the represented object for the 3DRT to use when generating a three-dimensional representation of that represented object as output, shifting the output to an additional dimension. Moreover, the elements taken and integrated within the 3D output will correspond to unprotectable facts and not to protectable expression of 2D inputs.

42 In sum, 3D reconstruction at the output stage would entail a *de minimis*[131] use of protected 2D content as input, in the sense that this content would offer the necessary latent/embodied unprotectable information and data, which constitute the 'instructions' for the generation of a 3D object and relate with the represented object of those 2D inputs. In turn, this use would not be qualified as reproduction in the legal sense,[132] but a reproduction of non-protected elements, which remains insignificant from a copyright perspective.[133] As a consequence, 3D output would be an independent work (whether this new (3D) expression of the fact is original, is a different question) and the generation of 3D content based on this 2D content, at least at the output stage, would not amount to copyright infringement.[134] Given the nature and objectives of 3D reconstruction, one may argue that this will be the rule: 2D inputs will not be reproduced in a legal sense within 3D output, as long as the output stage of 3D Reconstruction employs unprotected metainformation embodied in the 2D content and relating with the represented object.[135] Accordingly, 3DRTs would not function as "3D collage machines", but rather as "virtual 3D printers".

IV. Residual Copyright-Relevant Uses

43 However, it cannot be excluded that copyright significant reproductions may take place at the output stage. This will happen at least in two cases:

1. Copyrighted Represented Object

44 As seen above, the generation of the 3D output on the basis of data points, spatial information and other structural, aspectual or informational elements regarding the represented object will lead to the identical reproduction of the appearance of that object along with an additional dimension. In case of copyrighted real-world 3D objects that are represented within 2D inputs (e.g. statues, architectural works and so on), their appearance typically constitutes protected expression under copyright law. As a consequence, 3D reconstruction will lead to copyright-relevant reproduction of that represented object within 3D output.

2. The 2D Content Layer Dictates the Represented Object

45 Another scenario where 3D output may integrate protected elements from 2D input will be where the represented object and its original representation fuse. This will happen when structural, aspectual,

data.europa.eu/doi/10.2760/8600> accessed 13 August 2025: "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."

128 Cf. Gervais (n 105) 1130: "what is "taken" from the painting does not appear in the output. The paintings become pure data, as it were."

129 Margoni (n 19) 51.

130 Cf. Gervais (n 105) 1119-1120: "a zone between (and occasionally "beyond") reproduction, on the one hand, and uses that are inspired by, but not infringing (because they are not "based upon"), an earlier work, on the other hand."

131 Cf. Trialle (n 90) 460: "Apart from the exceptions, there may arguably be some notion of "de minimis": copying and remixing (etc) very small amounts may not always suffice to engage either the reproduction or the right of adaptations."

132 In EU law under Art2 InfoSoc Directive; Cf. Bracha (n 103) 384: "But the output does not incorporate any concrete expression from any specific work."

133 Cf. Bulayenko and others (n 82) 46: "Conversely, the reproduction of either ideas or unoriginal elements has no copyright significance."

134 See Margoni (n 43) 9: "Not every case of creation of a work based on another work constitutes an act of adaptation or alteration requiring authorization. In order to constitute a derivative work the elements constituting the intellectual creation in a primary work need to be reproduced, adapted or altered in the secondary work."

135 This is the opposite conclusion in comparison with transformative reuse of pre-existing works in the context of User Generated content, see Trialle (n 90) 464: "As a summary – and we think that most commentators will agree with it and that this will not give rise to much debates - UGC falls under the scope of altogether the right of reproduction, the public communication/making available right and the (not harmonized) right of adaptation."

or informational elements of the represented object are the outcome of free and creative choices of the creator of the 2D representation and, therefore, make part of the protected expression of the 2D input. These choices may refer e.g. to the subject's/object's pose, setting or background, which are not accidentally or factually dictated by physical reality of the represented object (like in the case of a copyrighted represented object). In these cases, the author of the 2D input (e.g. video, photograph) is not limited to simply produce a representation of the factual reality that is connected with the represented object, but rather determines and impacts (at least to some extent), with his free and creative choices, the appearance of the represented object. Evidently, this will be the case of 2D that presents *high level of originality*,[136] contrary to 2D works that are the outcome of a relatively small number of creative choices. The 3D reconstruction of that protected expression within 3D output would entail a copyright-relevant 'transformative use' of the 2D input and a relation of derivation would be established between said 2D input and 3D output. As a consequence, generation and further use of the 3D output will be subject to rightsholder's authorization, unless if an exception applies (see below, Section D).

V. Synthesis

46 In light of the above analysis, it may be argued that 2D inputs as a form of data will not be typically reproduced within 3D output in the sense of EU copyright law, as long as the output that derives from the implementation of 3D reconstruction techniques reuses unprotectable structural and informational elements referring to the represented object within those 2D inputs. But still, it remains possible that copyright significant reproductions may take place at the output stage, especially when the authorial contributions in the representation layer dictate the form of represented object. Thus, the assessment of whether protected expression elements, stemming from the representation as such, are reproduced within the 3D output will,[137] again, remain a matter of factual analysis on a case-by-case basis. In that regard, legal examination should employ as a starting point the original features of the representation layer and should focus on whether the 3D output reproduces original elements that solely refer to that layer and that are traceable to a specific 2D input.[138] Given the transformative context, the implementation of a recognizability criterion, according to which a partial reproduction would take place if original features ("creative elements") of the representation layer of 2D input *per se* are *recognizable to the sight* within the 3D output, would be relevant.[139] But, after all, further exploration of possible ways of making this (re)use lawful, under current EU copyright *acquis* remains pertinent.

D. Copyright-Relevant 'Transformative Uses' of 2D Inputs within 3D Outputs: Exceptions and Limitations to Copyright

47 Based on the above analysis, it may be the case for many implementations of 3DRTs that there is no copyright-relevant reproduction of 2D inputs within the 3D output. Nevertheless, it cannot be excluded that in some cases, copyright-relevant reproductions may indeed take place at the output stage (see above C.IV.2.). Here again, for acts of reproductions or other acts that affect copyright-protected works, fixations of performances, fixations of films and fixations of broadcasts, the need for some form of authorisation is evident. Further, such consideration may have significant impacts on downstream usage scenarios, such as in the context of XR, MR or virtual worlds.

136 See Lionel Bently and others, 'The Protection of Works of Applied Art under EU Copyright Law – Opinion of the European Copyright Society in Mio/konektra (Cases C-580/23 and C-795/23)' (2024) 56 IIC – International Review of Intellectual Property and Competition Law 798, 820.

137 Cf. Bracha (n 103) 384: "If copyright subject matter restrictions are not to be nullified, the right of derivatives can only apply when specific expression that is traceable to a particular work, rather than unprotectable metainformation, is incorporated into the generated output."

138 Cf. Bracha (n 103) 385: "Filtering unprotectable elements as part of the infringement analysis operates on a complementary level: it ensures that copyright is not extended beyond its domain, even when a work contains protectable expressive elements, by insisting that it is only the taking of protected expression that can be the basis of copyright infringement."

139 See in a similar direction, especially Karina Grisse and Carola Kaiser, 'On the significance of (un)recognisability for the right of reproduction in European copyright law' (2022) 44 EIPR 78, 81; Lionel Bently and others, 'The Protection of Works of Applied Art under EU Copyright Law – Opinion of the European Copyright Society in Mio/konektra (Cases C-580/23 and C-795/23)' (2024) 56 IIC – International Review of Intellectual Property and Competition Law 798, 825; Cf. Case C-580/23 Mio and others [2023] Request for a preliminary ruling; Case C-580/23 *Mio* and others [2025] ECLI:EU:C:2025:330, Opinion of AG Szpunar and already *Mio/Konektra*, para 92, which has been meanwhile issued; *Contra* Rosati (n 18) 618.

48 Authorisations can take the form of a license,[140] the terms of which will be usually determined by the rightsholder(s) in accordance with applicable contract law,[141] or of a type of sub-licensing agreement. In line with the general understanding of authorisations for the use of protected content in section B, the following outlines how the *ex lege* authorisations, provided by statutory exceptions and limitations, may apply to the process of 3D reconstruction that uses 2D content as an input/prompt, corresponding to the 3D visual content as output (*supra* Figure 1).

I. Exceptions and Limitations as *ex lege* Authorisation for 'Transformative Uses' in a 3D Reconstruction Context

49 A few characteristics of exceptions and limitations come into play in dynamics of 2D visual content use implementing 3DRTs. Specifically, any exception or limitation that also covers relevant forms of 3D reconstruction must be consistent with the special cases that the exception or limitation outlines. Exceptions and limitations are specific to certain forms of use, independent of the specific right that is being excepted or limited. As there is no exception or limitation specifically authorising the use of 3DRTs on copyright or related rights-protected content, an interpretation of uses addressed by existing exceptions and limitations is necessary, which needs to be carefully undertaken, especially vis-à-vis the three-step test.[142]

50 A second caveat may emerge from the fact that some exceptions and limitations are subject matter-specific. Not all types of (2D visual) content are certain to fall within their ambit. This is a specific concern where there are multiple layers of rights that cover a single piece of 2D visual content, e.g. where 2D visual content protected by copyright is contained within a database protected by the *sui generis* database right, which each respectively have different (though overlapping) sets of potentially applicable exceptions and limitations. Further still, a 2D visual content may be a still frame from a film covered by the producer's related right. It is therefore not guaranteed that an exception or limitation to one right will cover all (forms of) uses of the content in question.[143]

51 Given these caveats to exceptions and limitations, it follows that not all exceptions and limitations will be available for all variants of 2D visual content in the context of 3D reconstruction. Especially in light of the matrix of copyright and related rights that may reside with 2D visual content outlined above, there may further be a need for multiple exceptions and limitations to address both an author's copyright and a rightsholder's related rights. Appreciating this, the analysis of key exceptions and limitations under the EU copyright law intends to assess whether 3DRTs can be understood to be (part of) a broader paradigm of *ex lege* permitted 'transformative uses'. To that end, the following exceptions were identified as especially relevant for addressing the (transformative) use of 2D visual content within 3D content by means of 3D reconstruction: the quotation exception,[144] and the joint parody, caricature and pastiche exceptions.[145]

II. Applicability of Quotation Exception

52 Formally, the quotation exception is an optional exception *inter alia* to the right of reproduction under the EU copyright *acquis*.[146] It is in the unique position of being mandatory not at the EU level, but via the Berne Convention.[147] In order for the use

140 See section B.

141 In EU legal jurisdiction, copyright license agreements are generally understood to fall under the ambit of the Member State contract law, in conjunction with the harmonised conflict of laws rules (i.e. Rome and Brussels Regulations); *see* however, Art18-23 CDSM Directive.

142 Even if it is up to the court of each case to determine whether the three-step-test is successful in a given case and without ignoring the lack of clarity in its application from an EU Copyright law perspective (Paulien Wymeersch, 'EU Copyright Exceptions and Limitations and the Three-Step Test: One Step Forward, Two Steps Back', (2023) 72 GRUR International, 631–642), it could be already noted that the use of works for the purposes of 3D reconstruction is not commonly exploited by rightsholders (e.g. via established licensing practices and the existence of a market for 2D visual content for 3D reconstruction) and, consequently, it could be assumed that the use of 3DRTs does not in principle run counter to normal exploitation, nor the legitimate interests of authors. This is not to prejudice future changes based on prevailing practices.

143 It should be noted that this is largely a case-by-case contextual concern. For the purposes of the following analysis, the analysis presumes a separation of the layers of rights.

144 Art5(3)(d) InfoSoc Directive. It should be noted, however, that quotation does not typically imply 'transformative use' of the quoted work.

145 Art5(3)(k) InfoSoc Directive. Hereinafter, the term "exception" will be used for reasons of brevity.

146 As well as the right of making available to the public and communication to the public under Art3 InfoSoc Directive (Art5(3)(d) InfoSoc Directive).

147 Art 10(1) Berne Convention.

(reproduction and communication to the public) of a work to qualify as a quotation under Art5(3)(d) InfoSoc Directive, it would need to pursue either the purpose (1) of illustrating an assertion, (2) of defending an opinion or, (3) of allowing an intellectual comparison between that work and the assertions of that user.[148]

53 Although Member States[149] enjoy a quite wide margin of discretion in implementing this exception,[150] it is quite unlikely that most cases of 3D reconstruction would be covered by it. Indeed, the use of 2D content for the reconstruction of 3D visual content is not inherently tied to assertions nor opinions, even where such assertions are expressed in the employed 2D visual content. Whether there is merit in the claim that a comparison between input 2D content and the assertions of the creator of the 3D visual content is limited by the *form* of 3D visual content, this is not necessarily achieved by the relevant 3DRT. This is not to claim that there are no cases where assertions contained by 2D visual content can be quoted in a piece of 3D visual content, yet this is unlikely to occur through the technical reconstruction act.

54 Nonetheless, the quotation exception reflects broader concerns of legal interpretation, but may still be sufficiently "flexible",[151] and thereby relevant for 3DRTs. These include the general principles of EU law,[152] the balance of fundamental rights including the freedom of expression,[153] the objectives of the InfoSoc Directive,[154] and the three-step test,[155] From these perspectives, it is however unlikely to be considered proportional to perceive the transformative use of 2D input within 3D output in the context of 3D reconstruction as a form of quotation, especially where any engagement with potential assertions of 2D visual content is thin. It is also unlikely that the freedom of expression is affected where users do not have access to the exception for the purposes of 3D reconstruction. From a generous interpretation of the scope of 3DRTs, certain 2D inputs may be integrated in a 3D output in such a manner to illustrate certain assertions made by a 2D input – although it must be assumed that would need to be strictly envisioned from the creator of the 3DRT as such, thus shifting consideration to the design and operation of the 3DRT. Further, an intellectual comparison may actually be made more difficult by way of implementation of a 3DRT, whereas – save exceptionally overt cases – defending an opinion should be seen as particularly far-fetched interpretations of the quotation exception. Overall, the quotation exceptions, beyond a few potentially creative applications, is simply not a suitable fit for cases of 3D reconstruction.

III. Applicability of Caricature, Parody and Pastiche Exceptions

55 A case could be made that 3DRTs comprise either forms of caricature, parody and/or pastiche. These three joint exceptions (or 'legal triplets'[156]) are optional exceptions to the right of reproduction under the InfoSoc Directive,[157] which are not subject matter-specific and thus may apply to a broad range of (and various uses of) 2D visual content.[158] Although the literature on this exception highlights that some Member States do not differentiate between the three forms,[159] only the concept of "parody" has been interpreted as an autonomous concept of EU law by the CJEU thus far.[160] Indeed, even at

148 Case C-516/17 *Spiegel Online* ECLI:EU:C:2019:625, para 28.

149 Formally, these are Member States of the Berne Union as well as of the European Union.

150 Case C-469/17 *Funke Medien* ECLI:EU:C:2019:623, para 43.

151 Alan Hui and Frédéric Döhl, 'Collateral Damage: Reuse in the Arts and the New Role of Quotation Provisions in Countries with Free Use Provisions After the ECJ's Pelham, Funke Medien and Spiegel Online Judgments' (2021) 52 IIC - International Review of Intellectual Property and Competition Law 852, 886.

152 *Spiegel Online*, para 34; *Funke Medien*, para 49.

153 *Spiegel Online*, para 38; *Funke Medien*, para 53.

154 *Spiegel Online*, para 35; *Funke Medien*, para 50.

155 *Spiegel Online*, para 37; *Funke Medien*, para 52.

156 Péter Mezei and others, 'Oops, I Sampled Again … the Meaning of "Pastiche" as an Autonomous Concept Under EU Copyright Law' (2024) 55 IIC - International Review of Intellectual Property and Competition Law 1225, 1254.

157 As well as the right of making available to the public and communication to the public under Art3 InfoSoc Directive (Art5(3)(k) InfoSoc Directive); an interesting development concerning this exception in the context of the right to communication to the public is the new regime for online content-sharing service providers under Art17(7) CDSM Directive, which establishes that Member States are required "to ensure users in each Member State are authorised to upload and make available content generated by themselves for the specific purposes of quotation, criticism, review, caricature, parody or pastiche" (Case C-401/19 *Poland v European Parliament and the Council* ECLI:EU:C:2022:297, para 87).

158 It should be noted that parody, in particular, is often closely linked with freedom of expression, meaning that although the exceptions are optional, there are paths available for benefiting from parody exceptions across Member States and, especially, for Member States with a strong fundamental rights tradition in their jurisprudence, cf. Caterina Sganga and others, 'D2.3 Copyright flexibilities: mapping and comparative assessment of EU and national sources' (reCreating Europe, 16 January 2023) <zenodo.org/records/7540511> accessed 13 August 2025, 464.

159 Cf. regarding the French or Italian implementation of the exceptions, Mezei and others (n 156) 1233-1239.

160 Case C-201/13 *Deckmyn* ECLI:EU:C:2014:2132, para 17.

the national level, caricature and pastiche have not been the subject of a substantial number of judicial decisions.[161] Together, these three exceptions – treated separately[162] – may be especially accessible for the implementation of certain 3DRTs.

1. Parody

56 Thus far, only the parody component of these three joint exceptions has been subject to interpretation by the CJEU. Specifically, in the *Deckmyn* case, the Court held that parody has two essential characteristics, namely that the parody: (1) evokes an existing work while being noticeably different from it, and;[163] (2) constitutes an expression of humour or mockery.[164] Despite setting an arguably well-constructed legal standard,[165] this may not be an especially viable exception applicable to 3DRTs. On the one hand, it is unlikely that specific 2D visual content is evoked by a resulting 3D visual content output by the technique. Noticeable differences would, of course, be quite evident – one piece of content is 2D whereas the other is 3D – though this point becomes moot were the relevant 2D visual content used for the 3D reconstruction is not evoked in the first place. In any event, it is highly unlikely that 3D visual content is necessarily an expression of humour or mockery. As the name 3D "reconstruction" would suggest, the idea of such techniques is for the 3D visual content to retain a higher degree of fidelity to the represented object depicted in the 2D input. Although there may be marginal cases were such a change in dimensions occasions a humorous impression, especially where reconstructions are less refined, it is doubtful that these are specific expressions of the implementation of the 3D reconstruction technique, whether these are intended or not.

57 The parody exception seems an unlikely fit for 3D reconstruction. Nevertheless, of the three joint exceptions, there presently exists the highest level of legal certainty at the EU level for parodies, and its jurisprudence may provide important analogous interpretative guidance.

2. Caricature

58 Caricature has received far less scholarly and legal attention than its sibling exceptions – a general understanding of it and how it can apply to 3D content based on 2D visual content is nevertheless helpful. Definitions of "caricature" may include some element of representing an underlying work or subject matter in a ludicrous, grotesque or exaggerating manner.[166] Technical glitches aside, whether a 3D reconstruction is ludicrous or grotesque is difficult to pin down. By analogy, the CJEU reached its definition of parody by determining, on the one hand its evocative characteristics and, on the other, its constitutive-expressive characteristics.[167] The evocative characteristics of a caricature should be similarly ascertainable as for a parody – evoking an existing work. However, caricature is not necessarily an expression of "ludicrousness" nor "grotesqueness" akin to the way a parody is an expression of humour or mockery. Indeed, a caricature may simply be an exaggeration. 3D reconstructions may achieve an expression of exaggeration more readily than e.g. some expression of ludicrousness. This is in the nature of imperfect techniques that, for instance, misinterpret certain spatial dimensions of an underlying object, without there being an expressive element of ludicrousness.

59 Caricature may find application in certain applications of 3DRTs. A parallel may be sought, e.g. in face-manipulation applications, including deepfakes, which may also be used to facilitate the creation of "ludicrous" expressions of underlying 2D visual material.[168] In the absence of authoritative legal interpretation, however, the question of 3D reconstruction as a case of caricature remains moot.

161 Mezei and others (n 156) 1243.

162 We thus align with the interpretation of the European Copyright Society that these sibling exceptions are best given "individual meaning and function" (European Copyright Society, 'Opinon of the European Copyright Society on CG and YN v Pelham GmbH and others, Case C-590/23 (Pelham II)' (*European Copyright Society*, 6 November 2024) <https://europeancopyrightsociety.org/portfolio/ecs-opinion-on-cg-and-yn-v-pelham-gmbh-and-others-case-c-590-23-pelham-ii/> accessed 11 August 2025, 9).

163 Specifically, the parody need not "display an original character of its own" except that it is noticeably difference from the original parodied work (*Deckmyn*, para 21).

164 Case *Deckmyn*, para 20.

165 Jongsma (n 76) 652.

166 Cf. "Grotesque or ludicrous representation of persons or things by exaggeration of their most characteristic and striking features." or "A portrait or other artistic representation, in which the characteristic features of the original are exaggerated with ludicrous effect." (*Oxford English Dictionary*, s.v. "caricature (*n.*), senses 1.a and 2.a," June 2024, <https://doi.org/10.1093/OED/6801039049> accessed 13 August 2025).

167 *Deckmyn*, para 20.

168 Although such applications bear other legal risks, cf. Bart van der Sloot and Yvette Wagensveld, 'Deepfakes: Regulatory Challenges for the Synthetic Society' (2022) 46 Computer Law & Security Review 105716.

3. Pastiche

60 Pastiche may yet be the most promising of the three sibling exceptions. In a request for preliminary rule of 2023, the German Supreme Court has posed two questions to the CJEU concerning the specific provision regarding pastiche.[169] First, it asked whether pastiche is "a catch-all clause at least for artistic engagement with a pre-existing work or other object of reference, including sampling" and whether pastiche is subject to "limiting criteria, such as the requirement of humour, stylistic imitation or tribute". Secondly, it asked whether the pastiche exception requires a "determination of an intention on the part of the user to use copyright subject matter for the purpose of a pastiche".[170]

61 In light of the CJEU's interpretation of parody, pastiche would also need to be interpreted in light of its "usual meaning in everyday language".[171] The European Copyright Society, in its contribution addressing the 2023 preliminary reference, has indicated that there are at least two general English language definitions of the word "pastiche", based on its review of leading dictionaries,[172] i.e.:[173]

- *A work of art that imitates the style of another artist or period;*
- *A work of art that mixes styles, materials, etc.*

62 The former definition must, however, be rejected from the perspective of copyright law. This is despite the fact that this definition seems to be favoured in a footnote by AG Szpunar in *Pelham*, highlighting that pastiche would encompass the "imitation of the style of a work or an author without necessarily taking any elements of that work".[174] On the contrary, as shown by Mezei *et al*. if pastiche were to cover works that incorporate the style of other works, it would be a superfluous copyright exception, not least because style is not copyright-protectable.[175] As highlighted by Casanova "both [pastiche and sampling] refer to a combination of elements that creates something new".[176] Recalling that *Pelham* only addressed a potential application of the quotation exception – rejected because it was not possible to identify the work concerned by the quotation in question[177] – sampling may yet comprise an important case of pastiche.

63 This contextual reading would lead the interpretation closer to the second definition of pastiche highlighted above, specifically the understanding of pastiche as "a work that mixes materials". *Prima facie*, this may be linked with 3DRTs, to the extent that the generation of 3D outputs draws upon a variety of input pieces of 2D visual content, whose expression could be potentially reproduced within the 3D output. There are at least three implications of these considerations applicable to the process of 3D reconstruction.

64 Firstly, as argued in Section C, it should be recalled that such a pastiche-based 'transformative' use assumes that the use of 2D visual content within a 3D output does *not* equate to a use mere facts and data that are contained within that visual content. In addition, as long as a single example of 2D content is rendered unrecognisable by a 3D reconstruction technique, the applicability of an exception may not need to be raised.

65 Secondly and following the ordinary understanding of pastiche as reflected in the second proposed definition above, the pastiche exception covering reproductions[178] could be relevant where the 3D output reproduces parts drawn from a variety of sources, independent of considerations of stylistic incorporations. The "parts" of a singular underlying 2D content that are taken (i.e. reproduced) are the parameters that the 3D reconstruction technique requires and the protected elements that are reused within a 3D output, whereas most current techniques require multiple – and potentially a sufficient variety of – 2D inputs.

66 Finally, and following this understanding of pastiche, further legal questions come to the fore. For instance, the question of what "parts", quantitatively and qualitatively, a new work needs to incorporate in order to be qualified as a pastiche, is not definitively answered. Indeed, the EU copyright *acquis* may be in need of finding further case-by-case guidance, including such that the balancing of fundamental rights at stake or the three-step test are duly taken into account.

67 It should be borne in mind that such an interpretation of pastiche would also avoid inelegant overlaps with

169 Case C-590/23 *Pelham*, also referred to as "*Pelham II*".

170 As highlighted by Mezei and others, it would be highly unusual if such an intention requirement were to be affirmed by the Court (Mezei and others (n 156) 1249-1250); this is not considered here.

171 *Deckmyn*, para 19.

172 The Oxford English Dictionary, the Merriam-Webster English Dictionary and the Collins English Dictionary.

173 European Copyright Society (n 162) 6.

174 Case C-476/17 *Pelham* ECLI:EU:C:2018:1002; Opinion of AG Szpunar, fn. 30.

175 Mezei and others (n 156) 1226.

176 Piero Casanova, 'Permissible Pastiche in Pelham II: A proposed response' (*Kluwer Copyright Blog*, 11 April 2024) <https://copyrightblog.kluweriplaw.com/2024/04/11/permissible-pastiche-in-pelham-ii-a-proposed-response/> accessed 11 August 2025.

177 *Pelham*, para74.

178 And communications to the public.

the extant demarcation of parody. As Mezei *et al.* argue, the InfoSoc Directive "groups the three forms of expression together because of their nature as transformative expressive uses, even though they have *different purposes* and thus *different characteristics*" (emphasis added).[179] By extension, then, pastiche must not pursue the same purposes as parody, and may therefore pursue transformative purposes beyond humour or mockery. The transformation of 2D visual content via a 3D reconstruction technique, even where the protected expression of 2D visual content is recognisable in the output 3D content, especially as it may be implemented for a variety of purposes, may therefore fall under the test of pastiche yet to be determined by the CJEU.[180]

E. Conclusion

68 This paper assessed AI-based generation of 3D visual content as an output, based on 2D content as input(s), by means of 3DRTs from the perspective of the EU copyright *acquis*. In doing so, we argue that, whereas 3D reconstruction techniques may generally involve copyright-relevant reproductions of 2D content/inputs at the training stage (training of a 3D reconstruction technique as an AI model), this is not necessarily the case at the output stage. Indeed, it has been asserted that 3D output is likely an independent, non-derivative output, to the extent that it will routinely reproduce non-protectable information contained in the 2D inputs, especially when 2D inputs' level of originality is low. Accordingly, the position that 3D reconstruction models would not resemble '3D collage machines', but rather 'virtual 3D printers', has been defended, as long as the output stage of 3D reconstruction employs unprotected information embodied in the 2D content and relating with the represented object. In addition, we demonstrate that some exceptions and limitations are of potential merit for covering some reproductions of 2D content undertaken at the training stage (TDM exceptions) and some cases of possible (transformative) 2D content use for 3D reconstruction purposes (pastiche exception).

69 The undertaken analysis and findings denote further open questions and challenges. In particular, the applicability of existing exceptions in novel digital uses, including particular models and techniques of the AI field, such as the examined 3DRTs, is not always straightforward. As both the TDM and pastiche exceptions may be interpreted to benefit such techniques, we may yet observe novel creative uses, especially in the context of virtual worlds and the development of extended reality (XR) technologies. Nevertheless, especially in light of increased regulatory scrutiny of generative tools, including those comprising AI components,[181] as well as the yet uncertain judicial interpretation of these exceptions, these avenues may change in nature in the near future. On top of this, the subordination of 3DRTs under the categories of EU AI Act and the imposition of relevant obligations connected with their deployment and making available to the market needs further assessment.

70 Moreover, copyright law concerns will still govern 3D reconstruction, even if 3D content may be qualified as an independent output, in cases where the represented object within 2D content is *per se* a protected subject matter (e.g. a copyrighted architectural work or a sculpture). This is because the resulting 3D visual content will likely constitute a reproduction of that underlying represented object. These downstream uses raise further questions regarding the lawful implementation of 3D reconstruction techniques and especially, whether any existing exception or limitation could possibly cover this use.

71 Lastly, the unique challenges raised by 3DRTs, as outlined in this paper, may be an important opportunity for addressing the EU copyright *acquis* prevailing uncertainties. In light of ongoing discussion on the future agenda for EU copyright law,[182] difficult cases of 'transformative' use are especially instructive. This should include addressing the fractured position of the right of adaptation and of the concept of transformative use within the EU copyright *acquis*.[183]

179 Mezei and others (n 156) 1228.

180 In the interim, the Advocate General has proposed the definition of 'pastiche' as "an artistic creation which (i) evokes an existing work, by adopting its distinctive 'aesthetic language' while (ii) being noticeably different from the source imitated, and (iii) is intended to be recognised as an imitation" (Case C-590/23 *Pelham II* ECLI:EU:C:2025:452, Opinion of AG Emiliou, para 133).

181 Cf. AI Act.

182 Caterina Sganga, 'Is There Still a Policy Agenda for EU Copyright Law?' (2023) 54 IIC - International Review of Intellectual Property and Competition Law 1407; Caterina Sganga, 'The Past, Present and Future of EU Copyright Flexibilities' (2024) 55 IIC - International Review of Intellectual Property and Competition Law 5; cf. regarding the research-copyright nexus specifically: Martin Senftleben and others, 'Towards a European Research Freedom Act: A Reform Agenda for Research Exceptions in the EU Copyright Acquis' (2025) IIC - International Review of Intellectual Property and Competition Law <https://doi.org/10.1007/s40319-025-01604-6> accessed 11 August 2025.

183 Cf. Péter Mezei, 'Knock, Knock, Knockin' on Tranformativeness' Doors' (2024) 55 IIC - International Review of Intellectual Property and Competition Law 495.