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Artificial Intelligence and Intellectual Property Law
Position Statement of the Max Planck Institute for Innovation
and Competition of 9 April 2021 on the Current Debate

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I. Introduction

The digital economy is increasingly shaped by artificial intelligence (AI). To a significant extent, AI is considered a general-purpose technology that permeates the economy and society at large. To fully realise its potential for fostering innovation and welfare, an appropriate legal framework for AI is key.

The question of how AI interacts with intellectual property (IP) law has been raised by European and international policymakers on several occasions.¹ However, before any policy and law-making initiative can be undertaken in this regard, a comprehensive evaluation of the fitness of the existing IP framework is indispensable. While recent discussions have mostly focused on AI-aided and AI-generated output, a more holistic view that accounts for the role of IP law across the AI innovation cycle would be beneficial.

Against this backdrop, this Position Statement aims to present a broad overview of issues arising at the intersection of AI and IP law and to contemplate directions in which solutions can be sought. While the

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¹ See e.g. World Intellectual Property Organization, 'WIPO Conversation on Intellectual Property (IP) and Artificial Intelligence (AI)' WIPO/IP/AI/2/GE/20/1 REV (21.5.2020); European Parliament, 'Draft Report on Intellectual Property Rights for the Development of Artificial Intelligence Technologies' 2020/2015(INI) (24.4.2020); European Parliament, 'A Comprehensive European Industrial Policy on Artificial Intelligence and Robotics' 2018/2088(INI) (12.2.2019), paras 136-137; European Commission, 'Artificial Intelligence for Europe' COM(2018) 237 (25.4.2018), p. 14; European Parliament, 'Report with recommendations to the Commission on Civil Law Rules on Robotics' 2015/2103(INL) (27.1.2017), pp. 11, 21, 28.

analysis is approached mainly from a perspective *de lege lata* (in particular, against the backdrop of EU law), it also identifies questions which require further reflection *de lege ferenda* supported by in-depth interdisciplinary research. The scope is confined to substantive European IP law concerning copyright, patents, designs, databases and trade secrets. At the same time, it is acknowledged that the IP framework needs to be aligned with competition law and other legal regimes, including access-to-data regimes, that affect developments in the field of AI.

This Position Statement builds on the work of the Max Planck Institute for Innovation and Competition (MPI) research group on Regulation of the Digital Economy.² The understanding of technical aspects of AI is based on the workshop held by the MPI on 11 June 2019,³ as well as literature research. While the Statement often refers to AI, most issues are particularly relevant for machine learning (ML).

The overall structure of the Statement follows a technology-oriented, phenomenological approach and maps out IP issues regarding (i) inputs required for the development of AI systems, (ii) AI as a process and (iii) the output of AI applications. Part II summarises current research results in the form of more or less robust insights intended to direct and guide further research and discussion. Part III then explains these insights in more detail. In particular, section ‘IP Law and Access to Data as Input for AI’ reflects on copyright, database sui generis protection and trade secrets as the IP regimes most applicable to training data. Section ‘AI as a Process and IP Means of Software Protection’ focuses on copyright, patent and trade secrets protection for algorithms and models (comprising weights) as the key components of the ML process. It examines to what extent these elements are protected under the existing IP regimes and considers whether a lack of their protection might be problematic. The purpose of the last section – ‘IP Protection for AI-assisted and AI-generated Output?’ – is two-fold: first, to identify implications of the varying degree of human input in assessing eligibility for IP protection; second, to inquire whether the introduction of new (IP-type) forms of protection for AI-generated output could be justified.

² Max Planck Institute for Innovation and Competition, Research project in intellectual property and competition law ‘Regulation of the Digital Economy’, <https://www.ip.mpg.de/en/projects/details/regulation-of-the-digital-economy.html> (accessed 30 Mar 2021).

³ J Drexl, RM Hilty et al., ‘Technical Aspects of Artificial Intelligence: An Understanding from an Intellectual Property Law Perspective’ (2019) Max Planck Institute for Innovation & Competition Research Paper No. 19-13, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3465577 (accessed 30 Mar 2021).

II. Current Findings and Suggestions for Further Research

IP Law and Access to Data as Input for AI

It can be stated that

1. Collections of data used for algorithm training rarely fulfil the criteria for copyright database protection.
2. Collections of data used for algorithm training can be protected under the database *sui generis* regime, but the exact requirements for protection remain disputed and unclear.
3. The system of copyright exceptions and limitations, as harmonised under the InfoSoc Directive and the Digital Single Market Directive, is not flexible enough to enable the use of IP-protected subject-matter for the purpose of developing AI systems.
4. Trade secrets protection can hinder the exercise of the text and data mining exception.
5. Data pooling arrangements are capable of enhancing licensing transactions for IP-protected datasets required for ML model training.
6. Where training data are protected under exclusive IP rights, the current law does not sufficiently account for the need to access and use these data in the public interest.
7. The availability of injunctive relief should be limited where AI inputs protected by exclusive rights are indispensable to downstream innovation.
8. The use of copyright-protected works for AI training can violate the right of integrity.
9. The IP framework has to be systematically aligned with competition law-based, sector-specific or other current and future extra-IP data access regimes.

It is likely that

10. The classification of ML models developed with misappropriated data as infringing goods under the Trade Secrets Directive would, from a welfare perspective, have a negative impact.

Research needs to be carried out

11. as to whether data that are broadly shared through commercial transactions based on non-disclosure agreements should retain their trade secret status.
12. into the potential contractual and other restrictions on the aggregation of IP-protected datasets for ML and whether such restrictions ought to be limited by law.
13. on whether the open-source software licensing model can help facilitate access to and use of IP-protected datasets.

AI as a Process and IP Means of Protection

It can be stated that

14. In situations where inventions claim AI algorithms and models, exclusion from patentability for lack of technical character should be properly applied in the patent examination practice.
15. The widespread assumption that artificial neural networks are ‘black boxes’ does not mean that an invention comprising *inter alia* ML elements cannot be sufficiently disclosed.
16. Algorithms, models and weights are sufficiently protected by extra-IP regimes such as trade secrets, unfair competition law, contract law and technological measures, which should however not be (mis-)used in a way detrimental to overall welfare.

It is likely that

17. Neither ML models nor algorithms fall under the concept of ‘computer program’ within the meaning of the Software Directive.
18. Simple/linear ML models do not qualify for database *sui generis* protection. However, complex, dynamic ML models may need to be differently assessed. Weights, as separable parts of models, do not qualify for database *sui generis* protection.
19. The disclosure function of the patent system retains its relevance and purpose despite the enormous academic publication output in the field of AI.

Research needs to be carried out

20. as to whether, in situations where AI technologies are analogous to research tools, the relevant IP framework should provide for a compulsory licence.

IP protection for AI-assisted and AI-generated output?

It can be stated that

21. Whereas output generated ‘autonomously’ by AI would clearly not be eligible for copyright protection, it is highly case-dependent whether ‘works’ generated with the help of AI tools can meet the protection threshold in view of the human creativity involved.
22. Introducing a new protection regime (e.g. a new related right) for AI-generated output is not justified according to the current state of knowledge.
23. To the extent the collections of data generated by AI-based applications can be eligible for sui generis database protection, a ‘perpetual’ protection of dynamic databases would generate anti-competitive effects, most likely preventing effective data re-use. A protection period of 15 years is too long in such a dynamic environment with fast innovation cycles. The database sui generis regime needs to be adjusted or – even better – abolished altogether.
24. The current use of AI as a tool does not pose a normative challenge to the concept of inventor under patent law.

It is likely that

25. Situations where artificial neural networks can be routinely used in the process of developing an invention might pose a challenge for the assessment of inventive step.
26. The current use of AI as a tool does not pose practical problems regarding the allocation of designer’s rights under design law, but at the same time it may give rise to a theoretical re-assessment of the role of the human designer.

III. Explanations and Reasoning

IP Law and Access to Data as Input for AI

1. Collections of data used for algorithm training rarely fulfil the criteria for copyright database protection.

In theory, collections of training data may qualify for database copyright protection under Article 3 of the Database Directive.⁴ This becomes relevant when particular datasets are ‘selected’ for ‘creative output’ (e.g. AI-generated paintings). However, neither the selection nor the arrangement of training data easily meets the originality criterion, because the selection and arrangement of training datasets for the purpose of ML are predominantly motivated by technical and functional considerations. While it cannot be denied upfront that creative choices might, in some situations, play a role in relation to the selection and arrangement of training data, it so far remains unclear what particular considerations can be relevant and plausible in the context of ML.

2. Collections of data used for algorithm training can be protected under the database sui generis regime, but the exact requirements for protection remain disputed and unclear.

It appears largely uncontested that aggregated data used for algorithm training can be protected under the database sui generis regime. However, in detail, the discussion should focus on what investments in particular are relevant for protection. When pre-existing training data are acquired from third parties, respective costs can qualify as investment in ‘obtaining of the contents’ of a database under Article 7(1) of the Database Directive. Moreover, labelling can be viewed as a way of ‘presenting’ and ‘verifying’ the pre-existing data. Given that labelling costs are usually high, they can meet the substantiality criterion of Article 7(1) of the Database Directive. Alternatively, labelling can be seen as a way of creating new data, which would not be protected according to the established case-law of the Court of Justice of the European Union (CJEU).⁵

The debate on the protectability of training data under the sui generis regime is embedded in the general legal discourse on the vagueness of the legal standards (especially on the object of protection

⁴ Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases, OJ L 77, 27.3.1996.

⁵ First judgments in Cases C-203/02, *BHB Horseracing* [2004] ECLI:EU:C:2004:695 para 31 *et seq.* and C-338/02, *Fixtures Marketing Ltd v Svenska Spel AB* [2004] ECLI:EU:C:2004:696 para 27 *et seq.*

and the substantiality criterion) as well as the surrounding general uncertainty about the functionality of database protection, which has accompanied the Database Directive ever since its enactment. Therefore, the protectability of training data under the *sui generis* regime points to a much greater regulatory issue, namely, the reform of the database protection regime to make it fit for a data-driven economy as such.

3. The system of copyright exceptions and limitations, as harmonised under the InfoSoc Directive and the Digital Single Market (DSM) Directive, is not flexible enough to enable the use of IP-protected subject-matter for the purpose of developing AI systems.

One key objective of copyright exceptions and limitations is to ensure a balance between the protection of private and public interests. Policy documents emphasise the desirability of AI and data-driven innovation and relate these policy objectives to copyright exceptions and limitations.⁶ However, it seems clear that the current system of copyright exceptions and limitations does not provide for such balance in the case of AI systems resulting from the processing of data, including IP-protected subject-matter. Public institutions and individual users still face important barriers to access to information. On the one hand, the use of data for AI-training purposes should not unreasonably restrain right holders' right to normal exploitation. On the other hand, when looking at the two new text and data mining (TDM) exceptions (Articles 3 and 4 DSM⁷), there are too many uncertainties about their requirements and the cases covered that will reduce their usefulness in practice. Furthermore, the effectiveness of these two exceptions can be hindered by trade secrets protection (see paragraph 4 below). Similar uncertainties are faced in an AI context when assessing the application of the exhaustive list of exceptions and limitations established by the under Article 5 of the InfoSoc Directive.⁸ Furthermore, some have proposed the use of statutory exceptions and limitations as independent sources of users' rights based on some of the fundamental rights recognised in the EU Charter.⁹ However, recent jurisprudence of the

⁶ See e.g. Triaille J.P. *et al.*, 'Study on the Legal Framework of Text and Data Mining (TDM)' (European Commission 2014).

⁷ Directive (EU) 2019/790 of the European Parliament and of the Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC, OJ L 130, 17.5.2019.

⁸ 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, OJ L 167, 22.6.2001.

⁹ Griffiths J., 'European Union Copyright Law and the Charter of Fundamental Rights – Advocate General Szpunar's Opinions in (C-469/17) *Funke Medien*, (C-476/17) *Pelham GmbH* and (C-516/17) *Spiegel Online*' (2019) ERA Forum 20, pp. 35-50.

CJEU¹⁰ shows that fundamental rights are not capable of justifying, beyond the mechanisms incorporated in the Copyright Directives, a derogation from the author's exclusive rights. Finally, as the introduction of fair use seems impossible in terms of legal policy, it can be stated that the current system of exceptions and limitations alone cannot solve the unbalance problem in the AI context.

4. Trade secrets protection can hinder the exercise of the text and data mining exception.

TDM is an essential way of gathering large amounts of data, which might then be used for ML purposes. The importance of this type of analysis motivated the introduction of an – albeit too narrow – exception with regard to copyright and database protection under the DSM Directive. Article 3(1) DSM Directive indeed clarifies that TDM conducted by research organisations and cultural heritage institutions for the purpose of scientific research constitutes an exception to the right provided for by the InfoSoc and Database Directives. Article 7(1) of the DSM Directive is furthermore cautiously drafted to avoid the overriding of this exception by contractual means, as it provides that contractual provisions contrary to these exceptions are unenforceable.

However, the copyright legislature did not recognise that right holders may seek to rely additionally on trade secrets law to further prevent TDM. The relationship between the DSM Directive and the Trade Secrets Directive¹¹ (TSD) is not explicitly addressed by either of the two pieces of legislation: while the TSD only states that it 'should not affect the application of any other relevant law in other areas, including intellectual property rights' (Recital 39 TSD), the DSM Directive does not clarify its relationship with the TSD. An interaction between the two directives is yet possible: the data gathered through TDM analysis might indeed be constitutive of a trade secret in the sense of the TSD, if the access to the document that is the subject of the TDM analysis is contractually or technically restricted. In such case, even if access to the protected text or data concerned was authorised by the trade secrets holder, its use might still be considered as a trade secret violation if such use occurred in breach of a contractual duty limiting the use of the trade secret (Article 4(3)(c) TSD).

¹⁰ Namely, judgments in Case C-469/17, *Funke Medien* [2019] ECLI:EU:C:2019:623; Case C-476/17, *Pelham GmbH* [2019] ECLI:EU:C:2019:624; and Case C-516/17, *Spiegel Online v Volker Beck* [2019] ECLI:EU:C:2019:625.

¹¹ Directive (EU) 2016/943 of the European Parliament and of the Council of 8 June 2016 on the protection of undisclosed know-how and business information (trade secrets) against their unlawful acquisition, use and disclosure, OJ L 157, 15.6.2016.

5. Data pooling arrangements are capable of enhancing licensing transactions for IP-protected datasets required for ML model training.

ML relies on the aggregation of diverse datasets and, among other factors, the quality of ML is a function of the diversity of input data. Securing a licence for every dataset used as an input for ML is encumbered by high transaction costs. Data pooling presents itself as a viable solution to help simplify licensing transactions. As experience with technology pools shows, pooling arrangements reduce transaction costs and foster innovation, especially in terms of follow-on innovation. However, it is pertinent to consider data pooling with caution and avoid drawing direct parallels with technology pools. While cross-licensing agreements could lead to exclusive clubs where smaller players would not have enough data to negotiate with big players, the transfer of the concept of licensing on fair, reasonable and non-discriminatory (FRAND) terms to the context of data licensing will raise additional issues that need to be solved. At the same time, radical alternatives such as limiting compensation to no more than marginal costs incurred for reproducing and making available data would ignore the fact that additional remuneration is needed as an incentive to invest in the quality of data.

Given that such datasets constitute the major input for innovation activity potentially resulting from the development and use of ML tools, availability of datasets plays a significant role in fostering innovation. Accordingly, if the desirability of data pooling is not met by adequate private ordering action, there might be need for policy intervention. This, in turn, calls for looking into the disincentives for data holders and addressing the same. Moreover, the experience with technology pools hints at the need to address potential competition law concerns. These concerns can be spotted in the Commission's ongoing investigation against *Insurance Ireland*¹² for a possible violation of Article 101 of the Treaty on the Functioning of the European Union (TFEU). Furthermore, it is to be considered whether the use of IP rights, either copyright or a sui generis database right, by certain right holders would harm competition. The balancing of pro- and anti-competitive effects of data pooling can be a delicate task when framing exemptions under Article 101(3) TFEU for data pooling. Having said that, it is important to be mindful of the lessons from the technology pooling experience and the challenges specific to facilitating availability of data for both downstream and upstream innovation. It is to be considered to what extent Section 4.4 on Technology Pools of the Commission's

¹² Case AT.40511, 'Insurance Ireland: Insurance claims database and conditions of access'.

Technology Transfer Guidelines¹³ can provide guidance in the context of pooling training data for AI systems.

Lastly, in view of the goal of data pooling to avoid the problem of underuse of the concerned datasets, caused in particular by exclusive rights, it could also be worthwhile to see whether alternatives such as data-sharing intermediaries (in line with the proposals in the Commission's Data Governance Act¹⁴) or creation of sectoral data spaces are preferable to data pools. In the proposals, data-sharing intermediaries are envisaged as data trusts distanced from both data holders and data users, making them independent from any player with a significant degree of market power. Thus, facilitation of the pooling of data from various actors managed by such data trusts has the potential to alleviate competition concerns by design, concerns which propelled the Commission's Technology Transfer Guidelines¹⁵ dealing with technology pools.

6. Where training data are protected under exclusive IP rights, the current law does not sufficiently account for the need to access and use these data in the public interest.

To the extent collections of data that can be used for ML training are controlled by copyright or sui generis database rights, the existing IP framework does not provide for a remedy of compulsory licensing of such datasets based on public interest. Access to privately held data could be justified by public interest grounds such as public health, protecting the environment or spatial and urban planning, to name a few. In such instances, it has to be considered whether and under which conditions the government and certain private actors working in the concerned areas, whether for commercial or non-profit purposes, should have access to and should be allowed to use such data.

Discussions on the provision of compulsory licences to balance the incentive–access concerns are not new and date back to the time of the Commission's Proposal for the Database Directive in 1992.¹⁶ Fresh debate in the data-driven economy has ensued on this topic and is highlighted in the Final Evaluation Report on the Database Directive

¹³ Communication from the Commission – Guidelines on the application of Article 101 of the Treaty on the Functioning of the European Union to technology transfer agreements, OJ C 89, 28.3.2014.

¹⁴ European Commission, 'Proposal for a Regulation of the European Parliament and of the Council on European data governance (Data Governance Act)' COM(2020) 767 final, 25.11.2020.

¹⁵ Above (n 13).

¹⁶ European Commission, 'Proposal for a Council Directive on the legal protection of databases' COM(92) 24 final, OJ C 156, 23.6.1992.

released in 2018.¹⁷ The discussion therein considered *inter alia* introducing a compulsory license provision in cases where databases have developed into industry standards or, as emphasised by some scholars, on those considerations concerning ‘sole source databases’.¹⁸ Attention should be drawn to the lack of a provision on facilitating access to datasets on public interest grounds as explained above.

7. The availability of injunctive relief should be limited where AI inputs protected by exclusive rights are indispensable to downstream innovation.

In European IP law jurisprudence, injunctive relief in dealing with purported violations of IP rights has rather been the norm. However, in matters where technology markets are implicated, the CJEU has relied on the concept of abuse of dominance in competition law to control the availability of injunctions. Given the ongoing datafication of the economy, free flow of data is desirable for sustaining innovation. Moreover, with the non-rival nature of data, granting injunctive relief would exacerbate the proprietary nature of protection accorded to datasets, based either on exclusive IP rights or on trade secrets protection. Additionally, legal uncertainty regarding the existence of copyright or sui generis database protection in individual cases increases the potential of adverse effects of claims for injunctive relief on downstream innovation. In that regard, whilst keeping in mind the specificities of data markets, an approach similar to the US Supreme Court’s in the *eBay* case,¹⁹ limiting the availability of injunctive relief as part of IP law, would seem advisable. Accordingly, in moving away from a property rule towards a liability approach, there is a need to explore additional legal doctrines to restrict injunctions, such as the doctrine of abuse of IP rights.

¹⁷ European Commission, ‘Evaluation of Directive 96/9/EC on the legal protection of databases’ SWD(2018) 146 final, 25.4.2018.

¹⁸ *ibid* pp. 76, 80, 82. For a more comprehensive discussion, see Fisher R. *et al.*, ‘Study in Support of the Evaluation of Directive 96/6/EC on the Legal Protection of Databases’ (European Commission 2018), p. 34 *et seq.*; Kur A., Hilty R. M., Geiger C. and Leistner M., ‘First Evaluation of Directive 96/9/EC on the Legal Protection of Databases – Comment by the Max Planck Institute for Intellectual Property, Competition and Tax Law’ (2006) IIC 37(5), pp. 551-558.

¹⁹ *eBay Inc. v. MercExchange, L.L.C.* 547 U.S. 388 (2006).

8. The use of copyright-protected works for AI training can violate the right of integrity.

Moral rights, by and large, have not been harmonised under EU copyright law.²⁰ Taking Article 6*bis* of the Berne Convention as a common reference, authors have the right to claim authorship of the work (attribution) and to object to any distortion, mutilation, or other modification or derogatory action which could be prejudicial to their honour or reputation (integrity). These two rights must be maintained at least until the expiry of the economic rights, and at EU Member State level, additional moral rights may be recognised. Additionally, there is a clear connection between the economic right that regulates creations of adaptations and creative elaborations and the moral right of integrity. However, the former is transferable and the latter is not, which may cause legal uncertainty with regard to the licensing clearance of works for AI training. Thus, the right to integrity can pose limitations to the training and to the creation of outputs by AI, namely, regarding the processing of protected works. Digitisation of works is nothing new to copyright, and it may be possible to do it without the author's permission, for example if its intended use qualifies for an exception under copyright law. However, the processing by an AI system can be quite different from mere digitisation. For instance, the authors of a novel may not want their works to be processed by an AI system, even if the use does not imply communication of the work per se, where such processing could be perceived by them as a derogatory treatment of the work. In this context, the right to object to any change, disfigurement, mutilation or other impairment of the work might become particularly relevant, and it might necessitate the introduction of an exception or limitation at EU level. The extent to which this issue may arise in practice would depend on how many intermediate steps would be necessary for the ML model training. Therefore, the question of whether the use of protected works for ML purposes is prejudicial to the author's legitimate interests opens the door to further discussion.

9. The IP framework has to be systematically aligned with competition law-based, sector-specific or other current and future extra-IP data access regimes.

Rights to data access based both on regimes *de lege lata*, e.g. competition law, and on potentially new, e.g. sector-specific, grounds *de lege ferenda* play a key role in current discussions on regulating the digital economy and realising its full innovative potential.²¹ Such access

²⁰ Nevertheless, the CJEU's judgment in Case C-201/13, *Deckmyn* [2014] ECLI:EU:C:2014:2132 should be mentioned as a case on moral rights (in particular, para 31), even though it dealt with parody as an exception to the reproduction right.

²¹ European Commission, 'A European strategy for data' COM(2020) 66 final, 19.2.2020, p. 26 *et seq.*

regimes have to be systematically aligned with existing IP rights covering certain aspects of the respective data to achieve coherence in the legal order. Such alignment can either happen in the realm of the access regime (by way of stipulating that it prevails over rights of others, including IPRs) or in the realm of other protection regimes (by way of stipulating that their rules do not apply where other parts of the law provide for data access). Where such explicit rules are missing, the same result may also be reached by relying on recognised principles of statutory interpretation. In any case, a holistic and competition-oriented regulatory approach to coordinating access interests with IP protection that balances the need for exclusivity and the need for access would be welcome.

10. The classification of ML models developed with misappropriated data as infringing goods under the Trade Secrets Directive (TSD) would, from a welfare perspective, have a negative impact.

According to Article 4(5) TSD, the commercialisation of so-called ‘infringing goods’ is considered as unlawful use of a trade secret. In this regard, infringing goods are defined as goods, ‘the design, characteristics, functioning, production process [...] of which significantly benefits from trade secrets unlawfully acquired’. Given that data are highly valuable elements of the ML process, an ML model that was developed with the help of unlawfully accessed or used data is hence likely to fall under this definition.

The desirability of such an outcome is, however, questionable from a welfare perspective, since it creates obstacles for the development of AI tools and applications even if the commercialisation of an ML model does not bear a risk of disclosure of the object protected as a trade secret (i.e. the training data). Japan provides an example of how to avoid such obstacles: here, a specific regime has been adopted for data, and the guidelines issued by the government expressly rule out this outcome in the case of the development of new models with misappropriated data.²²

²² Unfair Competition Prevention Act of Japan, Act No. 47 of 1993 (amended in 2018), translation available at <http://www.japaneselawtranslation.go.jp/law/detail/?id=3629&vm=02&re=02> (accessed 30 Mar 2021); Ministry of Economy, Trade and Industry, ‘Guidelines on “Shared Data with Limited Access”’ (23 Jan 2019) https://www.meti.go.jp/english/policy/economy/chizai/chiteki/pdf/guidelines_on_shared_data_with_limited_access.pdf (accessed 30 Mar 2021).

11. Research needs to be carried out as to whether data that are broadly shared through commercial transactions based on non-disclosure agreements should retain their trade secret status.

Research should be carried out on whether it is necessary to include broadly shared data within the scope of trade secrets protection in order to incentivise their sharing. By ‘broadly shared data’ we mean data distributed, for instance, on a non-exclusive basis but still under contractual restrictions concerning their use and further disclosure.

The question of whether such shared data that initially qualify for trade secrets protection should be considered to lose their secrecy status as the result of their commercialisation is uncertain under the TSD. The legal uncertainty that results from the absence of guidance for courts concerning the interpretation of the secrecy requirement under Article 2(1)(a) TSD can be detrimental to the emergence of data-markets.

Furthermore, research should inquire into potential social benefits of additional protection for data holders that would supplement the protection conferred by contract law to incentivise data sharing via the market.

12. Research needs to be carried out into the potential contractual and other restrictions on the aggregation of IP-protected datasets for ML and whether such restrictions ought to be limited by law.

There is a need to pay attention to encumbrances on aggregation of data ensuing as a result of datasets being licensed on restrictive terms regarding how the licensed dataset may be combined with datasets from other sources. Creation of proprietary data silos, whether by way of factual control or *in rem* protection, could cripple further use of data involved. One example concerning such manifestations of data silos can be found in the realm of health data, where the development of a new health product or service requires combination of different datasets from multiple sources. Instances where entities restrict the ability to combine their proprietary dataset with those from other sources impose significant limitations on leveraging the benefits of developing new health-related products and services which rely upon the aggregation of different datasets.

Contractual restrictions, IP rights or data protection rules can constrain the use and distribution of data as well as the pooling with other datasets. Moreover, in such instances it becomes particularly difficult to identify how such restrictions and rights regarding the pre-existing datasets extend to the aggregated data in part or in their entirety.

Whether rights in the pre-existing datasets or restrictions on the aggregation of datasets can impose significant limitations on the development of new ML models still needs to be researched. In this regard, a use-case analysis on industry practices concerning the licensing of datasets and the corresponding restrictions on the aggregation of datasets from different sources might be enlightening. If the problem indeed exists, it should be examined whether specific legal provisions prohibiting restrictions on aggregation of datasets protected under copyright or sui generis database rights need to be introduced.

13. Research needs to be carried out on whether the open-source software licensing model can help facilitate access to and use of IP-protected datasets.

Open-data licensing can assist with realising the potential of the Open Data movement beyond what the Public Sector Information Directive²³ envisions. Such open-data licensing is not only limited to Open Government data; other major issuers of open-data licences are Creative Commons, the Linux Foundation, Open Data Commons and lastly, although rarely, custom-made licences. As an example, the open-data licences issued by Open Data Commons can be broadly categorised as public-domain, attribution, or attribution and share-alike licences. Similarly, the Linux Foundation issues licences under its Community Data License Agreement–Sharing or Community Data License Agreement–Permissive, where the sharing licence embodies the principles of copyleft in a data licence and the permissive licence is similar to the permissive open-source licences.²⁴

The pertinent question is whether an open-data licensing framework could enable access to and use of datasets covered by IP protection and encourage follow-on open-data behaviour in a for-profit business environment. The proliferation of open-data licensing, like its counterpart open-source software licensing, begs the question of what particular licence selection framework – i.e. what kind of licence in what kind of situation – is desirable. Arriving at the most appropriate licence in a given setting is not a simple matter, given other considerations such as data protection and the ever-present need to avoid licence-mismatch, where compatibility issues could arise between the component licence and the final-product licence. Accordingly, there is room for research in ascertaining the criteria for open-data licence selection, as well as the need to look for ways to reconcile the potential challenges mentioned above.

²³ Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information, OJ L 172, 26.6.2019.

²⁴ See e.g. Open Knowledge Foundation, ‘Open Data Commons. Legal Tools for Open Data’, <https://opendatacommons.org/> (accessed 30 Mar 2021).

AI as a Process and IP Means of Software Protection

- 14. In situations where inventions claim AI algorithms and models, exclusion from patentability for lack of technical character should be properly applied in the patent examination practice.**

Algorithms, by definition are sets of instructions as to how to implement a process. To an extent an algorithm is coded as a software program without further technical effect, it is excluded from patentable subject matter.²⁵ AI models are numeric functions, which are also excluded from patentability, if claimed as such. Therefore, an AI algorithm and/or model can be patented only as elements within an invention where they are applied in a specific – technical – use case. Applying the technical character requirement duly means that the specific technical application that confers the required technical character is included in an independent claim and the scope of patent protection is limited to that particular application. A proper application of exclusions from patentability in the case of inventions comprising AI elements would ensure that basic building blocks remain free from exclusivity and can be used to develop AI-based applications without constraints.

- 15. The widespread assumption that artificial neural networks are ‘black boxes’ does not mean that an invention comprising *inter alia* ML elements cannot be sufficiently disclosed.**

An invention has to be disclosed in a way that it can be reproduced by a skilled person without an undue burden.²⁶ Models based on artificial neural networks (ANNs) are often characterised as ‘black boxes’, which implies, in some cases, limited explainability of computational outcomes. First of all, such characterisation should not be generalised across all ANN models, as models vary greatly in their complexity. Further, the comprehensibility of a model depends on whose perspective it is viewed from – for a person who trains a model, the training process is not a ‘black box’. Where the issue of interpretability arises with regard to the correlations ‘predicted’ by a trained model, it concerns the understanding of the *causality* between the data points. However, this problem does not indicate either the absence of human control over the training and application of a model or the fundamental irreproducibility of a model.

Various factors can account for the limited explainability of ANN models, including non-linearity, the complexity of data representations within a network and lack of understanding of the causality of the statistical correlations revealed through training. Not all factors might

²⁵ Article 52(2)(c) of the European Patent Convention.

²⁶ Article 83 of the European Patent Convention.

be material for the fulfilment of the sufficiency-of-disclosure requirement. For instance, where patent claims might be directed at a method of identifying anomalous patterns in data, the reasons behind such abnormalities would not be a material factor for sufficiency of disclosure.

Important is that limited explainability of an ANN model does not mean that it cannot be consistently reproduced. In general, in order to reproduce a model, a detailed specification of the training process, including an algorithm and criteria of data selection, has to be provided. Where randomisation is applied, reproducibility of a model can be achieved if the used random number generator and ‘seeds’ are disclosed. In this regard, ANN models are not comparable to biotechnological inventions, which might not be reproducible due to uncontrollable and unpredictable factors.

The exact reproduction of an ANN model, however, might not be necessary, given that patent disclosure is sufficient if it enables a skilled person to reproduce a technical teaching underlying the claimed invention. A robust ML algorithm will deliver consistent results each time it is executed, i.e. each model trained with that algorithm would perform with the comparable level of accuracy, even if individual weights might slightly differ due to the randomisation. Given that an ANN model is a nonlinear function composed of numeric values (weights), it can constitute part of the so-called ‘mixed’ inventions, where it might or might not be contributing to the claimed technical effect. In this view, the requirement for sufficiency of disclosure would be fulfilled if a skilled person is able to train a model that would perform its function within an invention as a whole. In any case, concerns regarding patents for ‘black-box inventions’ should be viewed as a matter of the proper application of the existing requirements of sufficiency of disclosure and clarity of claims.

16. Algorithms, models and weights are sufficiently protected by extra-IP regimes like trade secrets, unfair competition law, contract law and technological measures, which should however not be (mis-) used in a way detrimental to overall welfare.

Providing for formal IP rights is only one means of remedying market failure in public goods markets through the establishment of artificial exclusivity. To the extent exclusivity can be provided or investments can be protected by other means, lack of IP protection is not detrimental to overall welfare. Such other means include conduct-based tort and (unfair) competition laws, as well as ‘private ordering’ mechanisms such as contracts and technological protection measures. As regards algorithms, models and weights, these alternative regimes appear to be generally working efficiently to address potential market failures. Yet, when one relies on such instruments, they need to be applied in a way

that does not lead to dysfunctional effects due to over-protection. In particular, deliberate and conclusive decisions of the IP framework as to the *non*-protectability of certain subject-matter should not be thus overridden or circumvented.

17. Neither ML models nor algorithms fall under the concept of ‘computer program’ within the meaning of the Software Directive.

The Software Directive²⁷ does not provide a definition of the term ‘computer program’. From a technical perspective, a computer program is a set of instructions written in a programming language that is executable by a computer to perform a task. The CJEU supported this view in its judgement in Case C-393/09, *Bezpečnostní softwarová asociace* [2010] ECLI:EU:C:2010:816, indicating that the protection of a computer program starts from the moment when its reproduction would engender the reproduction of the computer program itself, thus enabling the computer to perform its task. Additionally, and in accordance with the legislation and case-law of the Member States and the international copyright conventions, only the expression of a computer program is protected, and ideas and principles which underlie any element of a program are not. Therefore, as the Software Directive indicates, ‘to the extent that logic, algorithms and programming languages comprise ideas and principles, those ideas and principles are not protected under this Directive’ (Recital 11). This is in line with the basic assumption that the protection of the functionality of a computer program would ultimately lead to the monopolisation of ideas and, in turn, hinder innovation (Case C-406/10, *SAS Institute Inc.* [2012] ECLI:EU:C:2012:259, para 40). However, to the extent that ML models generating an output based on learned patterns can be expressed in a coded form, they could be protected as a computer program. Yet the application of the requirements for protection could be problematic. In the case of originality, although the ‘author’s own intellectual creation’ standard is clear in the Software Directive, and the CJEU has further clarified this notion,²⁸ its application depends on national courts. In the case of authorship, the Software Directive allows for authorship of computer programs to be attributed not only to natural persons but also to legal persons (Article 2) where provided for by national legislation. At EU level, there is no harmonisation of legal rules defining

²⁷ Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs, OJ L 111, 5.5.2009.

²⁸ Cases C-5/08, *Infopaq International v Danske Dagblades Forening* [2009] ECLI:EU:C:2009:465; C-393/09, *Bezpečnostní softwarová asociace – Svaz softwarové ochrany contra Ministerstvo kultury* [2010] ECLI:EU:C:2010:816; C-403/08, *Football Association Premier League and Others* [2011] ECLI:EU:C:2011:631; C-145/10 *Eva-Maria Painer v Standard VerlagsGmbH and Others* [2013] ECLI:EU:C:2013:138; C-310/17 *Levola Hengelo* [2018] ECLI:EU:C:2018:89; and C-683/17 *Cofemel – Sociedade de Vestuário SA v G-Star Raw CV* [2019] ECLI:EU:C:2019:721.

authorship. Based on the Berne Convention, authorship requires both conception and execution of the creative plan for the work. Therefore, depending on how the ML model is trained and the type of human input it may necessitate, even if the ML model can be expressed in coded form and can be executed by a computer, it might be very difficult or even impossible to establish the moment when copyright protection may arise.

18. Simple/linear ML models do not qualify for database sui generis protection. However, complex, dynamic ML models may need to be differently assessed. Weights, as separable parts of models, do not qualify for database sui generis protection.

Simple/linear ML models do not fulfil the requirements of a database. As per the CJEU case-law, which defines the scope of databases outlined in Article 1(2) Database Directive extremely widely, an ML model constituting a database needs to consist of ‘independent elements with autonomous informative value’ that are ‘individually accessible’ (Cases C-490/14, *Freistaat Bayern v Verlag Esterbauer GmbH* [2015] ECLI:EU:C:2015:735 and C-444/02, *Fixtures Marketing* [2004] ECLI:EU:C:2004:697; cf. Recital 17 of the Database Directive). Complex, dynamic ML models may rely on an architecture, which is usually established by a programmer prior to the training process and is composed of layers of neurons that are connected by weights. Each neuron is thereby a mathematical function that transforms inputs (the numeric value of the upstream weights) into an output (the numeric value of the downstream weights). In the case of more complex, dynamic ML models, artificial neural networks for example, the model is composed of the sum of all functions contained in the neurons. These functions embedded in the ML algorithm can be individually accessed and have independent informative value. Yet even though it is questionable whether a registry containing the different elements within the ML model is still needed for fulfilling the database requirements, simple linear ML models, i.e. linear regression for example, seem not to consist of elements that are individually accessible.

The ML model is a direct output and creation of new data. Any investments in this process, i.e. training data, labelling, computing power and knowhow of data scientists, cannot be considered substantial investment as per Article 7(1) Database Directive. This does not exclude the database sui generis right for eligible follow-on investments in the already existing ML models – as long as they do not constitute a new database (see paragraph 23 below). As some ML models are dynamic this may create further difficulties and may even invigorate the discussion on whether sui generis protection needs to be granted in these cases. Another factor that has to be considered is that in Germany, for instance, courts are already diluting the distinction drawn by the CJEU between protection of the creation of data or just the protection

of databases (cf. BGH *Autobahnmaut* Case I ZR 47/08). This again may lead to a different assessment of these cases and thus emphasises the need for legislative action regarding the future of the existing legal framework of database sui generis protection (see paragraphs 1 and 2 above).

Weights do not seem to be protected under the database sui generis regime. Although in the *Esterbauer* decision (C-490/14, *Freistaat Bayern v Verlag Esterbauer GmbH* [2015] ECLI:EU:C:2015:735) the CJEU implemented a ‘sufficient informative value’ criterion for independent elements in the database, weights do not fulfil this criterion. Once detached from the ML model, weights lose their informative value. Weights allow for conclusions on the quality of each ML model. Weights are what determines the loss function and they are needed for improving each ML model. Therefore, any ML model without correlating weights would be valueless for potential free riders. This does not apply the other way around though. Thus, weights are lacking independent informative value and fall outside the scope of the database protection.

19. The disclosure function of the patent system retains its relevance and purpose despite the enormous academic publication output in the field of AI.

The sufficiency-of-disclosure requirement safeguards the fundamental objective of patent law of enhancing the stock of technological knowledge. In view of the enormous academic output in the field of AI, one can question where exactly the contribution of AI-related patents to technological knowledge subsists. In this regard, it is worth emphasising that, as such, mathematical models and computer programs are excluded from patentability²⁹ and, thus, would usually form part of ‘mixed’ inventions that combine technical and non-technical elements. Hence, the contribution of patents disclosing such inventions vis-à-vis academic publications should, in principle, subsist in knowledge transforming the results of upstream research into practical applications in technical use cases.

20. Research needs to be carried out as to whether, in situations where AI technologies are analogous to research tools, the relevant IP framework should provide for a compulsory licence.

AI is often characterised as a ‘general-purpose’ and an ‘enabling’ technology in view of its capacity to enable the development of downstream applications and open up new technological and market

²⁹ Article 52(a) and (c) of the European Patent Convention.

opportunities. This characterisation explains why ML techniques are broadly applicable across the fields of science, technology and engineering. In this regard, ML methods are comparable to research tools. Both ML and research tools can be used as inputs in innovation activity. Vesting exclusive rights in such types of multi-purpose inputs has been highly controversial in IP law and policy due to the concerns that exclusivity can have a ‘stifling effect’ on follow-on innovation. In particular, such concerns arise because the IP right holder might not be in the position either to realise the full potential of a ‘prospect-opening’ invention or to efficiently allocate the use rights in the development of a ‘prospect’ technology. In this regard, some jurisdictions, such as Switzerland, provide for a compulsory licence specifically tailored to biotechnological research tools.³⁰

Whether analogous concerns arise in the case of ML-based techniques requires further examination. On the surface, ML models do not appear to be unique in the same way as, for instance, molecular research tools and resources, such as cell lines or DNA libraries. In principle, it is possible to design an alternative computational model that would perform with a comparable level of accuracy. What usually plays a more decisive role in securing a competitive advantage is the availability and accessibility of training data.

IP Protection for AI-assisted and AI-generated Output?

- 21. While output generated ‘autonomously’ by AI would clearly not be eligible for copyright protection, it is highly case-dependent whether ‘works’ generated with the help of AI tools can meet the protection threshold in view of the human creativity involved.**

Copyright is considered an inherently anthropocentric legal field. In this light and at the same time absent (fully) ‘autonomous’ AI in the current state of technology, the crucial issue from a doctrinal point of view is to determine the exact threshold of human guidance required for protection when using AI tools to create intangible goods that look like works. From a practical point of view, in light of the very diverse fields of AI application, ranging from translation software to computer-generated ‘paintings’, it appears highly case-dependent whether this threshold is met or not. It should be noted that existing copyright law provides for protection under related rights based on the investment-protection rationale rather than on human creativity, such as protection of phonograms under the Rental and Lending Rights Directive³¹ and the InfoSoc Directive. While in some situations AI-generated output can

³⁰ Bundesgesetz über die Erfindungspatente vom 25. Juni 1854, Artikel 40(b).

³¹ Directive 2006/115/EC of the European Parliament and of the Council of 12 December 2006 on rental right and lending right and on certain rights related to copyright in the field of intellectual property, OJ L 376, 27.12.2006.

fall *de lege lata* under such protection, the desirability of such protection can be questioned from a welfare perspective.

22. Introducing a new protection regime (e.g. a new related right) for AI-generated output is not justified according to the current state of knowledge.

There are traditionally two strands of justification for IP protection regimes: the deontological one, relying on the personality and efforts of a creator, and the economic-utilitarian one, relying on remedying a market failure in public goods markets. The former strand is irrelevant for constellations characterised by the very lack or insufficient involvement of a human creator. The latter requires a finding of a market failure. The burden of justification in this regard generally rests upon those advocating in favour of introducing the new right. So far, it has not been substantiated that either of the two justifications can rationalise the extension of the IP system to cover AI creations without human creative input.

23. To the extent the collections of data generated by AI-based applications can be eligible for sui generis database protection, a ‘perpetual’ protection of dynamic databases would generate anti-competitive effects, most likely preventing effective data re-use. A protection period of 15 years is too long in such a dynamic environment with fast innovation cycles. The database sui generis regime needs to be adjusted or – even better – abolished altogether.

Database sui generis protection for the collection of inferred data is confronted with an already existing issue in practice, namely, dynamic databases. As already outlined above (paragraph 18) this may not only impact the question of whether first and foremost a database exists and investments might trigger protection under the sui generis regime, it already further affects the feasibility of the database regime per se. As ML may be a dynamic process which constantly infers new data, the question is whether this process leads to a substantially changed database and thus needs to be considered a new database eligible for the sui generis protection under Article 10(3) of the Database Directive. It is still unclear what the threshold of materiality in the context of new inferred data actually would be. Yet such threshold is typically a *de minimis* threshold and narrowly interpreted as also containing updates on data (cf. District Court München I [2002] Multimedia und Recht 760). Therefore, a collection of inferred data that is just ‘updated’, i.e. containing a more precise correlation between different data points in the learning process, would already constitute a new database. This however does not seem to be justified as granting a new database sui generis right in these cases would further create foreclosure effects and

limit follow-on innovations. This holds even more true with regard to the protection period of 15 years, which would be extended for ever if the ML process constantly created new databases. Such a long period does not reflect the fact that digital markets are typically characterised by faster innovation cycles, and that ML models, once commercialised, are characterised by rather low marginal costs. This reduces the investment protection interests of the database producer and would at least require a novel thorough assessment of the protection period. More importantly, however, the legal uncertainty regarding the creation of new databases needs to be solved. This could be done by transforming the database *sui generis* right into a registered right under which the burden of proof concerning the materiality threshold is on the side of the registrant. By (artificially) introducing further transaction costs this would not only reduce legal uncertainty; it would most likely dispel the omnipresence of the *sui generis* right, which, particularly in sole-source databases, already creates monopolistic effects. Yet this approach has other shortcomings, and, therefore, the abolishment of database *sui generis* protection seems the preferable option (see paragraphs 1, 2 and 18 above).

24. The current use of AI as a tool does not pose a normative challenge to the concept of inventor under patent law.

Claims that AI ‘autonomously’ generates inventions have provoked much controversy. However, the examples of allegedly ‘AI-generated’ inventions presented so far constitute typical cases where computational modelling is applied in the design and engineering of objects with the required properties and functions, be it molecular structures or an electrical, mechanical or optical device.

The contention that AI generates inventions in an autonomous way, whereby a human only states the final goal without providing instructions as to how it should be achieved, is not defensible in light of the technological state of the art. AI techniques, including ANN and evolutionary algorithms, have been applied in solving optimisation problems in technical design and engineering for decades. However, the use of such techniques in research and development still considerably relies on the decision-making of human designers and engineers applying them to a problem at hand. This includes the analysis and formal representation of a problem so that it can be solvable by means of computational modelling, the selection of input data, the definition of an objective function (i.e. a ‘cost function’ in the case of ANN and a ‘fitness function’ in the case of evolutionary algorithms), the design of a new algorithm or the adjustment of an existing algorithm, the interpretation of computational outcomes, etc. Nor can randomisation used in ML – for instance, the initial randomisation of weights in ANNs – be viewed as a sign of ‘self-determining behaviour’ of AI systems, as

it is implemented through specific computer programs (so-called ‘random number generators’).

As long as a human conceives the overall computational process and specifies instructions as to how it should be carried out, computers are tools assisting human inventors. Such assistance cannot be deemed more material for the allocation of inventor’s rights to a human than in situations where other research tools or techniques are applied in the process of developing an invention. What is unclear is what degree of AI involvement can be technologically achieved in the future – a broader dialogue with the scientific and technical community in the field of AI is welcome in this regard.

25. Situations where artificial neural networks can be routinely used in the process of developing an invention might pose a challenge for the assessment of inventive step.

The purpose of inventive-step assessment is to distinguish achievements that lie beyond the reach of an average person skilled in the art. The obviousness of an invention is assessed through the lens of a skilled person who is availed of standard tools and techniques. ML techniques have been applied in various fields of technology and engineering for decades and certainly impacted the level of knowledge and skills, as well as problem-solving practices, of actual practitioners. Given that a notional skilled person can be represented by a team and that AI is considered to be a ‘general-purpose’ technique broadly applicable across technological fields, it is conceivable that, in some cases, a skilled person can be represented by an interdisciplinary team, including a skilled practitioner in the field of AI and a data scientist. Defining an ‘average’ level of knowledge and skills can, however, be challenging given the dynamic nature of research in AI.

Under the ‘problem-solution’ approach currently applied by the European Patent Office, the key question is whether the skilled person would have suggested the claimed technical features distinguishing an invention at issue. While it can be a reasonable assumption that the skilled person *would* have arrived at the claimed features by applying ANNs or other computational modelling techniques, it does not appear straightforward how such a hypothetical can be objectively assessed. First, one can hardly know what training data can be available and accessible to a skilled person, and which particular data sets, among other inputs, would be selected. Furthermore, given that ANNs can be applied in one segment of inventive activity, it might be challenging for the patent examiner to reconstruct the whole sequence of actions from setting up an ML process and obtaining an immediate output of ANN training – i.e. numeric values – to the claimed technical features of an invention. This, however, does not mean that a problem underlying an invention at issue would not have been solved by an average skilled

person, or an interdisciplinary team of practitioners. A more detailed inquiry is necessary to examine to what extent the current test for inventive-step assessment can fulfil its purpose in situations where ML has become a wide-spread approach to solving technical problems. This is necessary because the mere existence of ML techniques does not mean that any technical problem can be solved – the level of professional expertise plays the decisive role. Hence, the goal of the inventive-step requirement – i.e. to distinguish solutions achieved with knowledge and skills above the ‘average’ level – still remains relevant.

26. The current use of AI as a tool does not pose practical problems regarding the allocation of designer’s rights under design law, but at the same time it may give rise to a theoretical re-assessment of the role of the human designer.

Design protection is widely considered a hybrid regime between copyright and patent. Generally, it appears that, like in the patent field (paragraph 24 above), the current use of AI as a tool does not pose a challenge to the allocation of designer’s rights to a human being. Also, in case a design might be generated with insufficient human input needed to acknowledge a ‘designer’, *practical* problems do not seem to arise: Unlike copyright, the protection criteria of design law are purely objective, relying on novelty. Anyone can register a design with IP offices, and where no actual ‘designer’ exists, there will not be a personality rights-based claim for designation. However, from a legal theory perspective, the rise of AI may give reason for a re-assessment of the role humans (should) play in the justification of design law. On the one hand, like patent law, it is centrally entrenched in commercial, economic contexts. On the other hand, in light of its reliance on aesthetics, which impact human emotions, and the creative choices involved in developing new designs, design law bears connections to anthropocentric ideas underlying copyright. In any case, further empirical insights are needed in the use of AI in the development of designs to inform legal and policy analysis.