MMR

Zeitschrift für IT-Recht und Recht der Digitalisierung

TK · IT-Security · Medien · Robotik · KI · Datenschutz · Games

In Kooperation mit: Bitkom – Bundesverband Informationswirtschaft, Telekommunikation und neue Medien e.V. · davit im DAV – Arbeitsgemeinschaft IT-Recht im Deutschen Anwaltverein · eco – Verband der Internetwirtschaft e.V. · game – Verband der deutschen Games-Branche e.V. · Legal Tech Verband Deutschland e.V. · VAUNET – Verband Privater Medien

Supplement to MMR 8/2024

EDITORIAL

Dear readers,

When I played chess against a computer for the first time many years ago, I was completely fascinated: Here was a machine that had a good and very good answers ready in response to every one of my moves and usually left me no chance in the end. Checkmate.

I later realized that it wasn't that difficult. The game of chess is based on a few simple rules that a computer can simulate well. A rule-based AI is usually not particularly intelligent, it can just calculate quickly. For many applications – including the development of computer games – this is very helpful, but not groundbreaking. Above all, there is one thing that rule-based AI systems cannot do -learn.

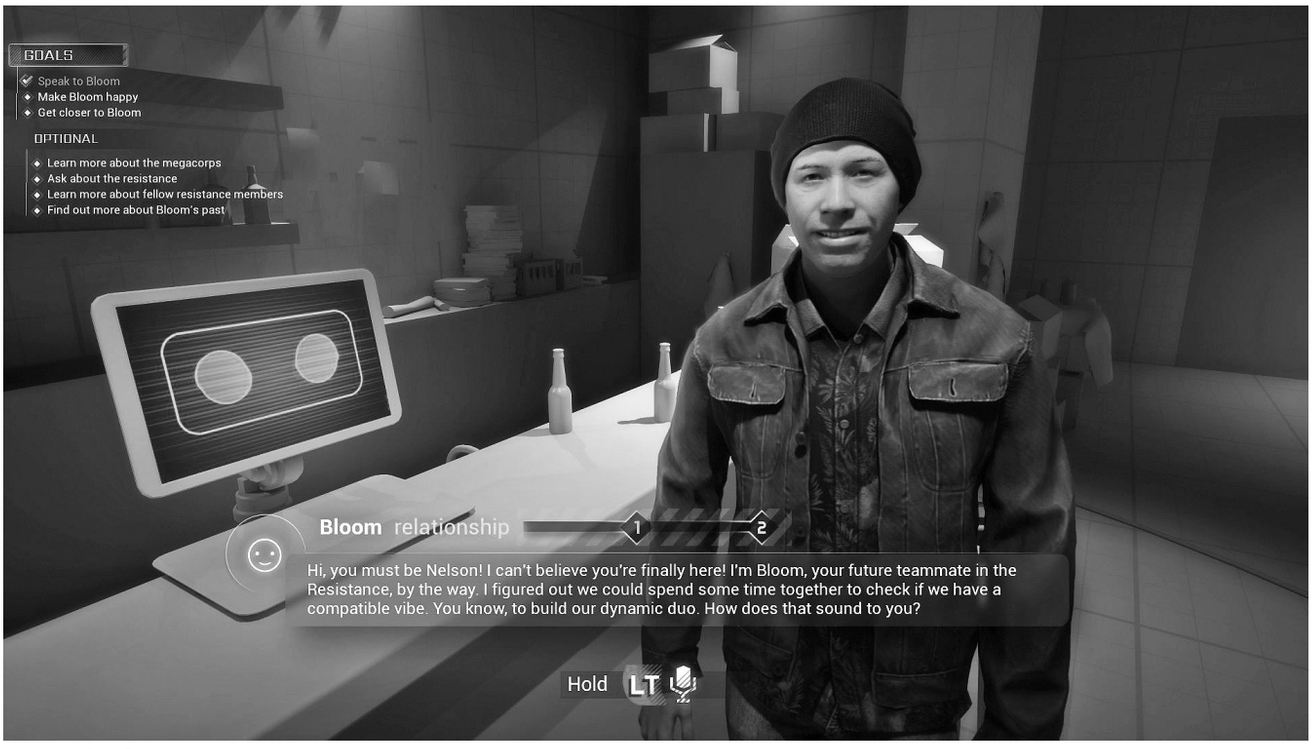
Curtain up for generative AI. Since the browser version of ChatGPT appeared at the end of 2022, everything has revolved around this "new" Artificial Intelligence. What makes ChatGPT and similar programs special, is their ability to learn. Machine Learning (ML), Deep Learning, Large Language Models (LLMs), Neural Networks – these are the keywords we must deal with today because these approaches enable completely new applications that will influence our lives in the medium to long term future.

Computer games are often one of the first applications in which new digital technologies are tried out and brought to maturity. This is not surprising, gamers are the classic "early adopters", computer game developers are high potentials, and the playful and interdisciplinary approach of the games industry is fueling quantum leaps in the further development of theoretical approaches.

Benedikt Grindel

Our Paris-based Ubisoft studio presented an example of the use of generative AI in games at the Games Developer Conference (GDC) in San Francisco in March 2024. The team's goal: to develop truly believable non-playable characters (NPCs), i.e. game characters that are not controlled by humans. This is anything but trivial, as players can act in a wide variety of ways in the game, and believable NPCs must react appropriately to each of these actions. Every scripted dialog, no matter how branched, reaches its limits and at some point, seems predictable or inappropriate.

The team in Paris has now developed a prototype called NEO NPC with the help of Nvidia's Audio2Face application and Inworld's LLM. The approach was not to identify the right text fragments for as many situations as possible and incorporate them intelligently. Instead, the team invested over a year in developing the characters. Detailed background stories were written for each character, describing their personality as accurately



Source: Ubisoft

as possible. With this information, the team trained the AI – using guidance systems, analyzing user input, the 3D environment and textual instructions – so that each NPC would ultimately behave as the game designers intended.

While classic scripting delivers excellent results very quickly for a few situations, there is a lot of trial and error when training an AI. In return, you end up with an NPC that can react flexibly and credibly to every conceivable situation. This is a completely new experience for developers. On one hand, they must learn how to train an AI as effectively as possible, and on the other hand, they must live with the fact that the results – despite all the training – are not 100% controllable. It will be some time before such modules come onto the market in games on a large scale. However, it is already clear that games will gain a great deal of depth and immersion as soon as this technology is ready for the market.

It is difficult to predict how quickly this development will progress, but it is certain that it cannot be stopped. This raises the question of how we can best support research and development. Especially when it comes to generative AI, an intensive exchange with the scientific community is helpful, and it is not always easy to integrate this exchange into product development.

For Ubisoft, an important step in this direction was the creation of Ubisoft La Forge, a team that is precisely the interface between Ubisoft's studios and academic research and teaching. The La Forge team brings together the expertise of our industry with both the university and scientific sectors. The prototypes created here are intended to optimize the work processes in game development but are not directly integrated into the development of a single game. This results in applied research that closes the above-mentioned gap between theory and practice.

Ubisoft La Forge has teams in Canada, France and China. Since 2017, dozens of scientific papers have been published in the areas of Bots & Behaviors, Character & Animation, Environment Graphics & Simulations, Player Experience, Software Engineering and Sound. AI methods are mainly found around Bots & Behaviors, where Deep Reinforcement Learning (an area of ML) is one of the focal points.

The work of La Forge, teams such as the AI team at Ubisoft Paris and other initiatives are giving rise to new tools and methods with the latest scientific findings, which can then be used in the next stage of game development. And here they open completely new possibilities, as with the credible NPCs mentioned above.

Another example where AI tools are already being used within Ubisoft in the development process is in supporting tools for the automatic creation of large game worlds, i.e. open-world games. But let's return to rule-based AI first.

As the name "open-world games" suggests, players can move freely in the game world, there is usually no linear story and no tubular levels, players have the freedom to experience the world as they wish. Open-world games also often have a campaign, but this works differently in that, in addition to the main narrative thread, there are many other activities and smaller adventures (side quests).

Creating such an open world is a lot of work. The world must be credible and interesting; it has to offer exciting challenges and tasks. As the size increases, the effort increases, which ultimately leads to the size subsequently increasing. It is a never-ending circle. Let's take Assassin's Creed as an example. In 2007, the main location in the first Assassin's Creed game, Damascus, was only 0.13 km^2 in size, 10 years later we see in Assassin's Creed Odyssey in Ancient Greece it was over 90km^2 – that's 900 times bigger! This world must be brought to life with high-quality elements (characters, buildings, vehicles, plants, animals, etc.) and exciting interactive content. This takes a long time, and in addition to that, a lot of the work is very repetitive and can be not very creative or fulfilling.

AI-based tools can help with the creation of these worlds. This makes it faster and gives the creative minds in game development more freedom of action and time for creative work. One

example from our German studios is the "Procedural Creation of Game Elements" (PES) project, which we developed from 2016 to 2019 together with the University of Applied Science in Cologne within a EFRE (European Regional Development Fund) funded project. The results found their way from a prototype into a constantly evolving digital tool that can now be used in projects worldwide.

The first version of the tool is still based exclusively on rule-based AI – like the chess computers mentioned at the beginning. The rules here are much more complex than in chess. Biomes are defined using geographical, biological and gameplay parameters. This includes environmental influences, weather conditions and seasons. The tool then creates a world with organically grown landscapes, with forests, rivers, lakes, roads and settlements that provide the right challenges and game situations for the respective game. All this is achieved without input by a level designer to place a blade of grass or tree by hand. This also shows how the work of the developers is changing. The team no longer needs to work separately on the individual elements of a level, which is then assembled, but instead they can define the rules accordingly to the world which is to be created – together in an interdisciplinary team. This is a different and new skill that needs to be developed – like creating the behavior of NPCs in the NEO NPC prototype.

It is worth mentioning that even with meticulously created rules, the results sometimes do not correspond to what the designers expected. You can intervene manually in the creation process and change the levels so that they work and meet the quality criteria. In the current application examples, the PES tool is used to supplement the work of the level artists and level designers.

For some time now, the team has been working on incorporating generative AI approaches into this tool. The expectation is that this technology will eventually make it possible to largely dispense with the input of parameters, because an appropriately trained AI will learn for itself how the level or the biomes of a game work well.

These two examples show what AI is already changing for computer games and will continue to change enormously in the future. Development will become more efficient and faster in many places because AIs will take over tasks that used to take up a lot of the teams' time – be it in programming, creating concept graphics or generating entire game worlds, as in the PES tool. In addition, AI will enable a new level of interaction and gameplay that will make games even more interesting and game worlds even more credible and diverse. From the development teams point of view, repetitive work will decrease, and will allow for more creative work steps to increase during AI training.

Despite the fascination with the many possibilities, there are still important questions to be answered. The disruption caused by AI will really shake up our working reality. Two examples of these are; How should copyright be assessed for elements created with generative AI? And how will we train the employees of the future if generative AI applications take over many tasks that have traditionally been performed by entry-level employees? We need good answers to these and other questions when AIs begin to play a greater role.

It will probably be a while before this development reaches its full speed. Generative AI will not bring us a new reality tomorrow, we shouldn't underestimate the impact it will have in the long term. You can ask ChatGPT if it has more information on this. They will probably realize that generative AI still has its limits, at least today – at least I haven't yet found any insightful answers to these questions. Perhaps we just need to train the tool better. We can only wait and see.

One thing for sure is certain, it remains exciting.

Düsseldorf, August 2024

Benedikt Grindel
As one of Ubisofts Zone Managing Directors, Benedikt Grindel manages the game development of Ubisoft's studios in Bulgaria, England, Germany, Serbia, and Ukraine.

BEITRÄGE

CHRISTIAN-HENNER HENTSCH / ANSELM RODENHAUSEN

Fields of application of AI in games

Games and the AI Act – an overview

AI-Applications

AI has been widely used in the games industry for a long time. Games companies use AI applications primarily to increase efficiency in the production process, but also to improve the gaming experience and for quality assurance. The games engine itself is not an AI because it functions on the basis of rules in a predefined playing field. Therefore, games are usually only 'users' and hardly 'providers' of AI. Apart from that, games companies primarily use AI as producers, and only rarely as consumers. Accordingly, the new AI Act only applies to games to a limited extent. In order to comply with the new transparency obligation, which is intended to prevent deep fakes, information in the credits should generally be sufficient, as games are obviously artistic, creative or fictional works.

reading time: 18 minutes

I. Introduction

Since the chatbot ChatGPT became available to the general public last year, the debate about the possibilities of artificial intelligence (AI) has gained considerable momentum. AI is – at least so far – primarily an application for machine learning. This means that patterns and schemas are derived from a data corpus in order to offer a solution variant in response to an input command (prompt). Depending on the area of application, some astonishing and quite usable results are already being achieved. In the games industry, AI applications can be used in image generation, for example, to create templates for the design of a new game world. Here, the working time of a designer for a graphic can be reduced from several days to a few hours without any noticeable loss of quality. Such AI applications can therefore help to speed up and improve games development while reducing costs at the same time. The use of such programs therefore offers a great opportunity for Germany as a development location to become more competitive internationally compared to countries with lower wage levels. Whether this opportunity can be realized depends, among other things, on whether and how the legal framework for the use of AI is structured.

This supplement takes a look at the current legal framework for the use of AI in games production and distribution. The articles were presented and discussed in a workshop organized by the industry association game – Verband der deutschen Games-Branche e.V. in cooperation with the European federation Video Games Europe. They reflect the current use of different AI applications in the games industry. After the editorial by Ubisoft manager Benedikt Grindel and a general overview and classification of the recently adopted AI Act by the authors of this article, Patrick Mitsching and Benjamin Sach from German games developer Innogames, together with their external lawyer Christian Rauda, give a very clear introduction to the areas of application of AI in games[1] and discuss what they see as the seven most important AI use cases in the production and marketing of games. This is followed by deep dives by Adrian Schneider into AI-assisted coding[2] , by Kai Florian Furch on voice localization[3] and by Julian Klagge and Duygu Üge on trade secret protection[4] .

This introductory article will first deal with the areas of application and the definition and subsumption of AI applications in the games sector under the AI Regulation[5] (also known as the AI Act). This article aims to make it clear that applications referred to as "AI" are not always – or even in very few cases – AI. This is because "hard", i.e. truly self-learning AI is probably not realistic at present, but is also not the subject of regulation under the AI Act. The AI Act uses a risk-based approach and regulates so-called "weak AI", which generally uses machine learning (ML) to solve a problem according to the risk of its use. Particular attention is also paid to generative AI in the form of Large Language Models (LLMs), which is referred to as "General Purpose AI" (GPAI) in the AI Act. Games as a whole, with their open game worlds and their realistic representation of objects and people, especially with the new possibilities of interacting with NPCs (non-playable characters)[6] , as described by Benedikt Grindel, act as a model AI. Yet the game engines that control these games are precisely the opposite of a self-learning AI, because the story and the framework are predefined. Instead, games are simulated AIs that largely exclude open development and therefore bias in favor of the game design – i.e. the rules of the game. Ultimately, players expect an open story with a lot of freedom of choice, but one that follows reliable rules – and, of course, controllable and defeatable 'AI opponents'. With a real AI that quickly learns any patterns and rules of the game and can act accordingly, human players would always lose out and the fun of the game would be gone.[7] Apart from the games engine, which is therefore not an AI, other AI applications are used widely and routinely in the games industry and are presented and categorized below.

II. Fields of application of AI in games

With regard to the various fields of use of AI applications, the main focus is on supporting AI tools in games development and applications to improve the user experience, i.e. the gaming experience. However, AI applications are also used as test platforms. These fields of application are presented as examples and it is discussed in each case whether the AI Regulation applies here. To this end, the AI Regulation is briefly introduced in advance and the area of application is discussed.

1. AI regulation and games

In March 2024, the European Parliament adopted the AI Regulation after more than three years of consulations. It has thus launched one of the first AI-specific laws in the world.[8] The original aim was to create a technology-neutral, uniform definition of AI that can also be applied to future AI systems in order to ensure that AI used in the EU is safe, transparent, traceable, non-

1 See Mitsching/Rauda/Sach MMR 2024, 718 – in this issue.
2 See Schneider MMR 2024, 724 – in this issue.
3 See Furch MMR 2024, 728 – in this issue.
4 See Klagge/Üge MMR 2024, 733 – in this issue.
5 European Parliament resolution of 13.3.2024, COM(2021)0206 – C9-0146/2021 – 2021/0106(COD.
6 See Grindel MMR 2024, 711 – in this issue.
7 Schlereth, FAZ of April 20, 2024, is also very clear on this; available at: https://www.faz.net/aktuell/wirtschaft/kuenstliche-intelligenz/warum-ki-und-gaming-sich-gegenseitig-vorantreiben-19656953.html.
8 China already has a sector-specific set of rules for AI; see O'Shaughnessy/Sheehan, available at: https://carnegieendowment.org/2023/02/14/lessons-from-world-s-two-experiments-in-ai-governance-pub-89035.

discriminatory and environmentally friendly in the long term. In the course of the consultation, the spread of ChatGPT and other generative AI applications has brought new issues into focus, some of which are still included in the AI Regulation – even if the original structure of a product liability law is only suitable for this to a limited extent. However, this explains why the AI Act is limited to general obligations and why copyright issues, for example, have been largely ignored. Instead, a risk-based approach was chosen, which divides AI applications into four risk groups: The higher the risk, the more regulation. [9]

- The first group includes unacceptable applications that are prohibited by Art. 5 AI Act; these include, for example, the use of AI to predict the likelihood of crimes being committed (Minority Report sends its regards), the categorization of persons according to biometric data, but also manipulation through subliminal practices (see II.2.a)).
- The second group includes high-risk applications in certain sectors, the detailed regulation of which makes up the majority of the AI Act; the games industry is clearly not included.
- For the third group of applications with limited risk, Art. 50 AI Act defines transparency obligations (see II.2.b)).
- The fourth and final group includes applications with minimal or no risk that are not subject to any special regulations under the AI Act.

First of all, it is striking that the AI Act does not mention games at all. They do not appear once in 112 articles and 180 introductory paragraphs. However, there was one reference to games during the legislative process: when presenting the first draft, the EU Commission cited "AI-supported video games" as an example of applications with minimal risk, the free use of which the AI Act should enable.[10] In the later presentation of a risk pyramid, which the Commission used to visualize the risk groups, AI-supported games were also classified in the fourth, i.e. lowest, risk group.[11] From the games industry's perspective, this classification is to be welcomed and is also factually correct, as video games do not in fact pose any risks that are comparable to the use cases of the other groups (such as the use of AI in critical infrastructure, robot-assisted surgery or the automated examination of visa applications).

Does this basic classification in the fourth group mean that the AI Regulation would not apply to games at all? This conclusion should not be drawn prematurely. This is because the EU Commission's classification refers specifically to the use case of "AI-supported video games" – what exactly is covered by this does indeed leave room for interpretation. The AI Regulation always depends on the specific use case to determine which of its provisions are applicable. Each games company must therefore check on a case-by-case basis whether a specific AI application falls under individual provisions of the AI Act during development or marketing.

2. Games development

The most obvious area of application for generative AI applications in games is "procedural content generation" (procedural synthesis)[12] , a method for generating program content such as textures, 3D objects, music and even virtual worlds in real time and during the execution of the software, without this content being permanently created by the developer before use and passed on to the user in its final form. The content is by no means generated randomly; instead, the generation follows deterministic algorithms in order to be able to generate the same content again and again under the same initial conditions. This gives the developer the opportunity to develop and distribute extremely extensive and complex content in a time and space-saving manner. This makes it possible to create extensive and complex worlds and landscapes that look the same every time the game is started, but can also be easily changed and expanded using the parameters. In concrete terms, this means that the very laborious task of placing trees in an open world by hand can simply be replaced. Meanwhile, details such as the falling of leaves in the fall or the rustling of the wind in the trees can be simulated in detail and on a massive scale. The game Minecraft, for example, works with procedural synthesis, using other procedures such as the Perlin Noise function to create a theoretically unlimited game world. The procedural content generation is limited here only by a random value based on the time and various variables. The procedural synthesis can also save a lot of memory space on the one hand and, on the other, give the game individuality through the unpredictable worlds. Ultimately, a computer program is created from an algorithm in the respective game engines, a special framework for controlling the course of the game and for the visual representation of the gameplay. However, on closer inspection, this is not a machine-based system that is designed to operate autonomously to varying degrees, that can be adaptable after its introduction and that produces explicit or implicit results from the input received, such as predictions, content, recommendations or decisions that can influence physical or virtual environments (definition of an AI system in Art. 3 No. 1 AI Act).

However, genuine generative AI applications (GPAI) are also used in games development, particularly in the creation of graphic design, texts and translations (see the detailed article by Mitsching/Rauda/Sach[13]) and not least in writing code (AI-supported coding, see the article by Adrian Schneider[14]). Even if these applications were not originally intended to be addressed by the AI Act, these "AI models with a general purpose" are now indisputably covered by Art. 3 para. 63, 55 et seq. AI Act are now indisputably covered by the Regulation. However, these models are only used by the games developers, but not offered within the meaning of Art. 3 No. 3 AI Act.

In the game itself, there is often an "enemy AI", i.e. NPCs that are controlled by an AI. These function according to their own rules, but can now also adapt to player behavior. The players' behavior can be analyzed via neural networks[15] and the level of difficulty or even the course of the game can be influenced as a result. The racing game Forza Horizon 5[16] , for example, features rubberbanding: depending on the position in the driver's field, the game modifies some of the performance characteristics of the opposing cars to prevent the gaps from becoming too large. So if one driver clearly dominates the race, opposing drivers can be given more power so as not to fall too far behind. In addition, a driver AI in Forza Horizon 5 uses a neural network to evaluate driving data from players, from which an AI is trained to correctly predict driving behavior in new situations. The "Drivatar" generated in this way also appears in other players' races and the player's strengths and weaknesses are mapped. So if you regularly brake too late in hairpin bends, the AI will also behave accordingly. However, limits are also deliberately set here and, for exam-

9 For a more in-depth overview of the AI Regulation that is not focused on the games industry, please refer to existing articles such as Becker/Feuerstack MMR 2024, 22 et seq.; Bomhard/Siglmüller RDi 2024, 45 et seq.; Hacker/Berz ZRP 2023, 226 et seq.

10 European Commission, PM of 21.4.2021, available at: https://ec.europa.eu/commission/presscorner/detail/de/IP_21_1682.

11 See https://digital-strategy.ec.europa.eu/de/policies/regulatory-framework-ai.

12 Glassner/Rehm, Procedural Content Generation by Algorithms in Games in Zydorek, KI in der digitalisierten Medienwirtschaft, 2022, pp. 111-131.

13 See Mitsching/Rauda/Sach MMR 2024, 718 – in this issue.

14 See Schneider MMR 2024, 724 – in this issue.

15 A neural network is an artificial intelligence model that consists of interconnected neurons and is used for pattern recognition and prediction.

16 See Reismann, Künstliche Intelligenz in Spielen – KI als Tester und Weltenbauer, available at: https://www.netzpiloten.de/kuenstliche-intelligenz-in-spielen-ki-als-tester-und-weltenbauer/.

ple, overly aggressive driving behavior is excluded so as not to spoil the enjoyment of the game too much. The Drivatar AI is therefore given guidelines within which it acts and therefore also adapts to the selected level of difficulty. In other games, a neural network analyzes the player's behaviour in such a way that it acts as an invisible scriptwriter that determines the course of the game session and influences the variety of outcomes. In these cases, a dedicated AI may be developed and used for a game. However, this does not constitute an GPAI because it is used specifically for this game and does not have "significant general usability" (Art. 3 No. 63 AI Act). In addition, the risk of harm is negligible here because in the game – unlike perhaps in autonomous driving in the real world – no person would ever be harmed.

It can therefore be stated that various AI tools are used in game development, which can speed up the process considerably and significantly improve the results. The production of games generally does not use its own AI systems; instead, industry-standard or even very general offerings are used. In this respect, the industry is an intensive user, but not a provider of AI. Even if proprietary algorithms are used in isolated cases, these have so far only been used for the operation of the specific game and are therefore, if at all, "low risk" AI.

3. Games publishing

As soon as game development is complete and the game has been released, there are many ways in which AI can be used to enhance the user experience – in some cases even before this. Other fields of application in the operation of a game include data cleansing and bug tracking as well as tools for anti-fraud prevention and cheating detection, content moderation and live translations of in-game chats.

Even before release, games are extensively tested to see whether the "balancing" – i.e. the rules of the game – is even. An imbalance in certain vehicles, units, buildings, weapons or skills often only arises in practice when a large number of players continue to push the mechanics to their limits. AI tools can simulate this and even play against each other in multiplayer games in order to improve each other, as each AI wants to be better than the other and must therefore constantly adapt to the strategies of the other AI. However, some "weaknesses" are also deliberately retained in order to make the game or the behavior of an NPC appear more human. In a strategy game, an AI theoretically always has the entire map in view and can act on all fronts at the same time. In a shooter, weapon recoil or zoom is not a real factor for perfect AI. A comparison in the test with human players then puts the results in a much more realistic ratio. The evaluation of the players' game data by an AI can also be helpful here in order to identify weak points. This is also done using either AI systems that are available on the market or proprietary – i.e. modified AI systems – so that the developer of a computer game is not an AI provider in any case.

AI applications are also used for bug fixing and quality control. Runtime monitoring, for example, automatically monitors the game flow (passive testing). This is significantly faster and more powerful than the mere verification of pre- or post-conditions within function bodies, as dependencies between sequences of method or function calls can be expressed and enforced here. For example, in an open source reimplementation of the popular platform game Super Mario World, the game's properties were expressed as rules that were constantly evaluated during gameplay.[17] One of these rules was that the player's character (Mario) could not jump for a longer period of time (more than two seconds), and another stated that Mario's jump height could not exceed five units. If one of these rules is violated, the engine warns the user and in some cases attempts to change the game and reset it to a consistent set of values. Here, too, AI is now being used successfully across the board in games – but only used and not offered within the meaning of the AI Act.

To detect cheating[18] (manipulation of game rules), there are numerous AI applications on the market that are used more or less intensively by game developers and publishers. In some cases, there are proprietary solutions that are not offered to third parties. Here too, games companies are users, but not providers of AI applications.

In multiplayer games that also offer chat, AI tools are also used as live translators and, above all, as support for content moderation. There are certain risks here, both in terms of a possible incorrect or even offensive translation and overblocking of permissible opinions, which must be taken into account when using AI. The obligations for this already arise in part from other laws such as the DSA or the German UrhDaG, which generally provide for a final decision by a human reviewer. In this respect, separate regulations and obligations are neither necessary nor envisaged in the AI Act. It remains to be seen whether adjustments will be necessary – in any case, there are currently already requirements for users of AI who are providers of the game, but usually not providers of the AI.

Here, too, it can be seen that there are now numerous fields of application for AI applications in games that improve the gaming experience and at the same time protect against fraud and toxicity in the game. However, existing AI solutions are generally used and, in exceptional cases, proprietary systems are developed that are based on AI applications on offer but are not passed on to third parties. Although there may be risks in the application, these are considered to be low and are largely already covered by existing regulations in the DSA or in copyright law.

4. Games as test platforms

However, games are now also being used as a test platform for obtaining training data for AI systems and applications. For example, the fictitious state of San Andreas from the game Grand Theft Auto V provides the testing ground for autonomous driving in an AI research project at the University of Darmstadt.[19] The self-driving neural network learns how to deal with road traffic in the game world. Games can therefore be test platforms for non-endemic AI applications and, due to their spill-over effects, can also be technology drivers for other industries.

IBM's chess computer Deep Blue, which defeated the world champion chess player Garry Kasparov over 20 years ago, is perhaps the most famous example of an early AI. Since then, there have been many other applications: in 2012, two AI-controlled game bots managed to pass the "Games Turing Test" in the game Unreal Tournament 2004. The "Games Turing Test" is a variant of the Turing Test in which viewers of the game have to correctly guess whether an observed game behavior in a game corresponds to that of a human or an AI-controlled bot. Most recently, eSports professionals competed against an AI from Google subsidiary Deep Mind in the real-time strategy game Starcraft.[20] This was trained in advance in collaboration with the game producer Blizzard on the basis of a database of games played by humans. In the game, the human still came out on top, unlike in the game played by a bot from OpenAI. The bot

17 See Varvaressos/Lavoie/Massé/Gaboury/Hallé, Automated Bug Finding in Video Games: A Case Study for Runtime Monitoring, p. 2 ff.

18 On the legal classification of cheating Lober/ Conraths K&R 2019, Issue 7-8, Supplement, 37 et seq.

19 Bonke, GTA 5 – Grand Theft Auto 5: Cars learn autonomous driving in the open world, available at: https://www.pcgames.de/GTA-5-Grand-Theft-Auto-5-Spiel-4795/News/Autos-lernen-in-der-Open-World-das-Autonome-Fahren-1207858/.

20 Bonke, GTA 5 – Grand Theft Auto 5: Cars learn autonomous driving in the open world, available at: https://www.pcgames.de/GTA-5-Grand-Theft-Auto-5-Spiel-4795/News/Autos-lernen-in-der-Open-World-das-Autonome-Fahren-1207858/.

uses machine learning to play Dota 2. Every day, the bot can play games against itself over a period of 180 years, learning successful playing styles and already defeating professional players. By using the technologies in training, eSports professionals can also benefit by adapting the bot's successful strategies. The findings from the games are also used in research to further improve the algorithm, which can also be applied to other areas.

This makes it clear once again that many AI applications are now being used in and around games. In most cases, however, this is purely the use of existing AI models or AI models are trained in games. Only in a few cases do games companies offer their own AI and could therefore fall under the requirements of the AI Act.

III. Games according to the AI Act

If games companies do not offer AI and therefore do not fall under the special obligations of the AI Act, there are however other provisions in the AI Act that may apply when using existing or proprietary AI applications. The following section provides an initial assessment of this.[21]

1. Prohibited practices

As shown above, the vast majority of practices prohibited by Art. 5 AI Act are clearly outside the scope of activities of games companies. This does not come as a surprise, as the development and marketing of games does not represent a high risk in terms of the AI Act.

Therefore, only one of the prohibited practices of the AI Act shall be considered below in more detail: Article 5(1)(a). This provision prohibits "the placing on the market, the putting into service or the use of an AI system that deploys subliminal techniques beyond a person's consciousness or purposefully manipulative or deceptive techniques, with the objective, or the effect of materially distorting the behaviour of a person or a group of persons by appreciably impairing their ability to make an informed decision, thereby causing them to take a decision that they would not have otherwise taken in a manner that causes or is reasonably likely to cause that person, another person or group of persons significant harm". It is notable that this wording is not only intricate but also expansive in scope.

Therefore, it cannot be ruled out that certain game mechanics, for example in the context of an in-game transaction, could fall into the in scope of this broad wording in individual cases. Game developers should keep this in mind. At the same time, the European Commission is also advised not to interpret this provision too broadly. This is required by the very nature of Art. 5 AI Act as a prohibition provision without exceptions.

2. Transparency obligations

The first four paragraphs of Art. 50 AI Act prescribe four different information obligations, whereby a distinction is made between providers and users of AI systems.[22] As shown above, very few games companies will qualify as 'providers' within the meaning of the AI Act – although it is always advisable in the individual case to look at the definition of 'providers' in Art. 3 (3) AI Act.[23] Most games companies will have to deal mainly with Art. 50 para. 4 AI Act. According to this provision, users of AI systems that generate deep fake[24] content must disclose that this content has been artificially generated or manipulated. With regard to 'how' to do such disclosure, Art. 50 para. 5 AI Act states that this must be done in a clear manner and at the latest at the time of the first interaction. If interpreted strictly, this would mean display such information during or at the beginning of the game. However, para. 4 sentence 3 of Art. 50 AI Act must also be taken into account – according to which, in the case of obviously artistic, creative or fictional works, the obligation under para. 4 sentence 1 is limited to disclosure in an appropriate manner that does not hinder the enjoyment of the work. For games, information in the credits or similar should therefore generally be sufficient. But more clarity on this, for example through guidance by the Commission's new AI Office, would be desirable.

At the same time, it is questionable if games constitute deep fake content within the meaning of the AI Act. In most cases, this will have to be answered in the negative, as games as fictional works do not harbor the risk of being mistaken for authentic or truthful depictions. However, clarification in this regard would be desirable as well.

3. Miscellaneous, implementation and outlook

As regards AI and copyright, the obligations for providers of universal AI models should be mentioned (Art. 53 AI Act). According to Art. 53 para. 1 lit. c, such providers must develop a policy on compliance with copyright law and, in particular, on the exception of Art. 4 para. 3 of the DSM Directive.[25] The fact that the AI Act refers to the existing legal framework is laudable, as the existing regulation on text and data mining does indeed provide a sufficient framework.[26]

Although many applications of games will not fall under the AI Act, Art. 95 AI Act opens up the possibility of voluntary compliance with the stricter standards of the higher risk groups, and provides the possibility to get this certified. Currently, however, this may only be interesting for a few games games, e.g. for companies with games in the school sector or with state customers.

More relevant for all games companies is the disclosure obligation under Art. 50 para. 4 AI Act and, in individual cases, the prohibition under Art. 5 para. 1 lit. a AI Act. Due to the broad wording of these two provisions, one can only hope that the European Commission will shed more light on this soon.

IV. Summary and conclusion

In summary, although the games industry uses many AI applications, in the vast majority of cases game companies are not a 'provider' of AI systems. This means that most of the obligations of the AI Act will have little application to games. However, there might be an indirect impact with regard to information and documentation obligations. In this respect, the games industry should not be strongly affected by the AI Act. However, as intensive and experienced users of many different AI tools, the games industry is very interested in a clear and practice-oriented legal framework for AI applications, so that such offerings can continue to develop rapidly and efficiently. This should be considered in particular with regard to the upcoming – purely copyright-related – debate on the remuneration or license obligation of AI applications for the training of copyright-protected content, a topic that would deserve an essay on its own.

21 This section is essentially based on the position of Video Games Europe (VGE) on the topic of AI. The author would therefore like to expressly thank his colleagues who helped to develop these positions: Manuel Fragoso Mendes (Senior Manager Legal & Policy at VGE) and Dara MacGreevy (Legal Consultant to VGE).

22 See the published English version, available at: https://www.europarl.europa.eu/doceo/document/TA-9-2024-0138_EN.html.

23 See Art. 3 (3) AI Act: "'provider' means a natural or legal person ... that develops an AI system or a general-purpose AI model or that has developed an AI system or a general-purpose AI model and places it on the market or puts the AI system into service under its own name or trademark, whether for payment or free of charge".

24 See Art. 3 para. 60: "'deep fake' means AI-generated or manipulated image, audio or video content that resembles existing persons, objects, places or other entities or events and would falsely appear to a person to be authentic or truthful".

25 Directive (EU) 2019/790 of 17.4.2019 on copyright and related rights in the digital single market and amending Directive 96/9/EC and Directive 2001/29/EC.

26 More on this in the VGEposition paper of 17.4.2024, available at: https://www.videogameseurope.eu/policy/ip-content-protection/.

Quick read ...

- AI has been used very widely in the games industry for a long time.
- Games companies are usually users of AI applications, and only rarely providers.
- The AI Act should apply to games only to a very limited extent.
- In order to comply with the transparency obligations in the AI Act, information in the credits should generally be sufficient, as games are obviously artistic, creative or fictional works.

Prof. Dr. Christian-Henner Hentsch, M.A., LL.M.,
is Director Legal & Regulatory Affairs at game – Verband der Deutschen Games-Branche e.V., Managing Director of VHG – Verwertungsgesellschaft für die Hersteller von Games mbH as well as Professor of Copyright and Media Law at the TH Köln and co-editor of MMR.

Dr. Anselm Rodenhausen, MJUR (Oxford),
is Vice President Legal & Policy at Video Games Europe in Brussels.

PATRICK MITSCHING / CHRISTIAN RAUDA / BENJAMIN SACH

The seven most important AI use cases in the games industry

Practical examples of the use of machine learning in the production and marketing of computer games

AI production process

Machine learning ("ML" or "artificial intelligence" or "AI") has long been an everyday tool in the development and marketing of computer games. So far, however, there have been hardly any articles that clearly illustrate the diverse use cases in the games industry. This article aims to close this gap. It first provides an overview of seven selected areas of AI applications in the games industry and then deals with the resulting legal issues. It explains the use of AI throughout the entire game production process, starting with project planning and game design, through the creation of dialogues, graphics, program code and game opponents, to language localization and software testing. It shows that the use of AI enables major increases in efficiency and at the same time requires a new awareness of the associated legal risks. reading time: 21 minutes

I. Introduction

There are few fields that have developed as dynamically in the last five years as ML. While the general public only became aware of the topic in November 2022 with the launch of ChatGPT, Google Trends has been showing an increase in search queries on AI since mid-2017[1] . Many legal articles[2] have been published since then, highlighting references to various areas of law, including some relating to computer games[3] . However, you will search in vain for an article that deals intensively with the problem of the use of AI in the development of computer games and in marketing for computer games, highlighting specific use cases.

Its use in the various areas of computer game development has led to a significant increase in efficiency: The same results can be achieved in less time. Depending on the field of application, savings of between 10% and 80% can be achieved. At present, it is rarely the case that content generated with AI tools is transferred to computer games as is without modification. However, AI often shortens the concept phase and means that you do not start from a "blank screen"[4]. AI therefore significantly supports game development without making game developers redundant. Efficiency gains through technology have been taking place continuously since the beginning of mankind and are one of its hallmarks. Software has always automated processes.[5] The fact that AI support delivers results more quickly means that it is also easier to recognize whether you are "on the wrong track" and should stop development. AI therefore makes it possible to recognize and decide earlier which projects are promising and should be developed further. The time from development to publication ("time to market") is reduced, thus minimizing the overall economic risk.

The faster implementation of game ideas also helps game studios raise capital from publishers because pitches for games that have not yet been developed can communicate more precisely how the finished game is envisioned. Seven possible uses of AI are presented below as examples.

II. Use cases

1. Remix!: AI images in the games industry

AI-generated images (AI images) are now ubiquitous: AI images have been awarded prizes,[6] they have been sold at auctions,[7] have been widely shared on social media and discussed by the general public. The use of AI images is therefore the most obvious use case for AI in the games industry. Images are used in the development process, e.g. as mood boards to communicate ideas visually effectively to the team, in the game itself to make the game world appealing and actively draw the player into the

1 Available at: https://trends.google.de/trends/explore?date=all&q=ki.

2 Examples of articles published in 2024 are Thoms/Mattheus ESG 2024, 69 et seq.; Reus NZG 2024, 369; Klein GRUR-Prax 2024, 125 et seq.; Hördt ArbRAktuell 2024, 108 et seq.; Lühmann/Görgülü/Marciniak BKR 2024, 175 et seq.; Kugelmann/Buchmann GSZ 2024, 1 et seq.; Ibold GSZ 2024, 10 et seq.; Werner GRUR-Prax 2024, 57 et seq.

3 E.g. by Walter MMR-Beil. 8/2021, 22.

4 We used to say "from a blank sheet of paper".

5 Just imagine the hurdles and loss of time that would be involved if you had to manage your current workload without emails.

6 Klatt, AI-generated image wins art competition, available at: https://www.forschung-und-wissen.de/nachrichten/technik/ki-generiertes-bild-gewinnt-kunstwettbewerb-13376617.

7 Is artificial intelligence set to become art's next medium?, available at: https://www.christies.com/en/stories/a-collaboration-between-two-artists-one-human-one-a-machine-0cd01f4e232f4279a525a446d60d4cd1.

game world (e.g. as background images for landscapes, icons for items in the player inventory) or in marketing to get someone interested in the game (e.g. as advertising banners).

Generally speaking, images created by AI are suitable for any purpose for which they would be used in the games industry.

However, this comes with an addition: the current image generation programs such as DALL-E or Midjourney are currently not precise enough in terms of implementing the user's ideas to transfer an AI image unedited – i.e. as generated by AI – directly into a game or to use it for the marketing of a game, for example. In the games industry, images – unlike art, which is mainly about expressing the personality of the creator – always serve a specific purpose namely either to improve the game or to increase sales. Due to this purpose, images must have the intended effect on the viewer, created by a precisely coordinated composition of selected and specific image elements. It is simply not yet possible to create an image with AI alone that corresponds exactly to the user's expectations and also fulfills the intended purpose of the image. By entering the prompt (text command for the program with specifications for the AI as to what the image to be created should contain), the user has only limited control over the final result. Results that can actually be used by the AI are more dependent on chance than on the user's control. The AI usually has to execute a prompt several times until it produces something useful, and entering a prompt several times sometimes produces very different results. Although it is now possible to readjust individual parts of an image with the help of the AI in many AI programs,[8] this takes time and often does not deliver the desired results.

To compensate for the current lack of control over the creation of an AI image, the so-called photobashing technique is applied. The user employs an image generation AI to execute one or more prompts repeatedly and "cuts" the element (e.g. a ship, a building, etc.) that they want to use from the images created in this way. Due to the different prompts, these image elements usually do not have the style of the game. This is where other AI programs come into play, e.g. Scenario, an image generation AI specialized in the gaming sector, which – in addition to image generation – is able to convert the cut-out image elements into a uniform art style. In this process, also known as "fine-tuning", images with the desired style are uploaded as a reference for the AI and the AI is trained to a specific style. The program uses these uploaded images and the style they contain as a template to adapt other images – which are either also uploaded or generated – to this style. This makes it possible to create a uniform style for the individual selected image elements. The image elements adapted in this way are then put together in an image editing program, e.g. Adobe Photoshop, and further edited "by hand" by the artist. In this step, a "generative fill" function such as Adobe Photoshop[9] is often used in addition, i.e. the AI is assigned a free area on the composite image, which it then fills with further details either based on a prompt or from the context of the overall image. For example, the AI could add a cow to an empty meadow assigned to it on a composite image of a farm.

In connection with AI images, it should not go unmentioned that AI is now able to generate 3D models[10] and videos[11] . However, the 3D models and videos generated by AI are not yet widely used in the games industry as far as we know, as the generated 3D models and videos are currently not of the quality required for the development of games.

2. A constant conversation partner: the use of AI in game design

The activities of a game designer are diverse.[12] A game designer must be able to create appealing game worlds and carry out market research and research on a wide variety of topics that their game world comes into contact with. They must be able to combine the game world they create with game mechanics that are fun and compatible with the game's planned monetization model.

Large Language Models (LLMs) such as ChatGPT are ideal for use in game design, as – unlike a Google search – you can ask precise questions.[13] AI is able to take on any role assigned to it (so-called role prompting)[14] and provide answers to complex questions from this context within a short period of time. If the results of the AI contain facts, these should of course – due to the known susceptibility to hallucination of LLMs[15] – always be viewed with a certain degree of reservation and verified through research. In addition to idea generation and research, AI can be used in game design to test game mechanics and to write short texts for in-game descriptions, abilities, quests, etc. For example, by prompting the AI to ask critical questions or make suggestions for improvement, game mechanics can be tested for weaknesses and optimized. The AI is also capable of organizing large amounts of data based on parameters specified either by a human or by the AI itself, thus creating an overview for game designers. In the not too distant future, direct generation of the game by the AI is also conceivable. Interactive stories[16] and simple "jump and run" games[17] can already be created by AI.

3. Digital puppet theater: AI plays non-player characters

Many game worlds are populated with NPCs (non-player characters)[18] with whom the player can interact. Their behavior and conversations with the NPCs – programmed or scripted by game developers – contribute significantly to making a game world feel "real" for the player and allowing them to immerse themselves in the game world (so-called immersion).

In the future, these NPCs could be controlled directly by an AI, as an AI can react dynamically to the player and play different roles assigned to it.[19] If the player speaks to an NPC, they speak to an AI, which responds in the role of the respective NPC. Companies such as Ubisoft[20] and Nvidia[21] are currently working on linking AI with NPCs. The demands on the AI for this role-playing game

8 See e.g. for DALL-E, available at: https://help.openai.com/en/articles/9055440-editing-your-images-with-dall-e.
9 Available at: https://helpx.adobe.com/de/photoshop/using/generative-fill.html.
10 Nordenbrock, This AI transforms images into 3D objects in just a few seconds, available at: https://t3n.de/news/ki-verwandelt-bilder-3d-objekte-1588462/.
11 Kühlberg, consequences not foreseeable: AI software creates deceptively real videos, available at: https://www.ndr.de/kultur/film/Sora-KI-Software-von-OpenAI-kreiert-taeuschend-echte-Videos,sora100.html.
12 England, "The Door Problem" of Game Design, available at: https://www.gamedeveloper.com/design/-quot-the-door-problem-quot-of-game-design.
13 Available at: https://openai.com/index/chatgpt/.
14 Available at: https://llama.meta.com/docs/how-to-guides/prompting/.
15 Gallotta et al., Large Language Models and Games: A Survey and Roadmap, ArXiv (2024), available at: https://arxiv.org/pdf/2402.18659, p. 9.
16 Wilde, I saw the first major 'AI game' coming to PC, and it convinced me of its potential for storytelling, available at: https://www.pcgamer.com/hidden-door-ai-game-narrative-rpg/.
17 Heaven, Google DeepMind's new generative model makes Super Mario-like games from scratch, available at: https://www.technologyreview.com/2024/02/29/1089317/google-deepminds-new-generative-model-makes-super-mario-like-games-from-scratch/.
18 See Grindel MMR 2024, 711 – in this issue.
19 Gallotta et al., Large Language Models and Games: A Survey and Roadmap, ArXiv (2024), available at: https://arxiv.org/pdf/2402.18659, p. 4.
20 Karg, Project Neo NPC: How Ubisoft wants to make conversations with non-player characters better, available at: https://t3n.de/news/projekt-neo-npc-ubisoft-unterhaltungen-nicht-spieler-charaktere-besser-machen-1614799/.
21 Burnes, Introducing NVIDIA ACE For Games – Spark Life Into Virtual Characters With Generative AI, available at: https://www.nvidia.com/en-us/geforce/news/nvidia-ace-for-games-generative-ai-npcs/.

can be very high – the more important an NPC is for the game. In order not to disturb the immersion of the player, the AI must be provided with the background story and motivation of the respective character to be played and the game world, rules for interaction, etc. as part of its role assignment, remember previous conversations and react to events in the game world according to its role. The NPCs must therefore appear as lifelike as possible to the player, but at the same time they must also fulfill their function in the game design, namely to guide the player along the path of the game.

Despite these high requirements, the advantages are obvious. An AI could react directly to the player and you would have a game world that reacts dynamically to the player. As the interaction is no longer pre-programmed, but can go in different directions – just like in a real conversation – every player would have a unique gaming experience.

4. The code whisperer: code completion assistants

Code completion assistants such as GitHub Copilot and Tabnine are increasingly used when programming games. They are part of the integrated development environment (IDE) or are integrated into it via an application programming interface (API) and can therefore be used directly during programming. Behind this are LLMs such as OpenAI Codex and Deepmind AlphaCode.[22] They are trained with code from public code databases such as GitHub. Coding assistants generate new program code, repair code (debugging) and comment on unknown code. They use the context of the existing code to suggest a solution for the desired task. In this respect, they are similar to a word processing program that suggests words or sentences to complete a letter based on the context.

Above all, they save developers research work. Before the introduction of coding assistants, it was common for developers to have to spend time researching code/syntax, application examples for code or ideas for algorithms on the Internet.[23] The assistant takes over this work by analyzing the problem to be solved with every keystroke and suggesting suitable solutions. The developer simply checks whether the suggested code meets their expectations and modifies it according to their needs. A study on the use of AI assistants shows that, on average, developers accept over 30% of the suggested code.[24] Conversely, however, some developers are skeptical of code assistants because the suggested code does not meet their functional or non-functional requirements or they do not have sufficient control over the output.[25]

For complex problems, developers also use several AI models in parallel. For example, it is common for a developer to present the same problem to coding assistants such as GitHub Copilot and Tabnine and general chatbots such as ChatGPT, Claude or Gemini.[26] Different AI models have different strengths. The developer compares their proposed solutions and selects the one that best suits their use case. Meta assistants such as TypingMind are therefore increasingly being used. These offer several AI models to choose from within one user interface. They also make it easier to formulate the prompt, for example by providing a persona from whose perspective the query is made (e.g. customer advisor, product manager, company lawyer) or a search function with which the AI model can use an external internet search engine and thus research further information on a daily basis.

5. The march of the test robots: AI-based software tests

The "little sister" of software development is software quality assurance ("QA"). Software testers test a game for functionality and record errors (bugs). Their tasks include creating test plans, executing the tests, creating error reports and analyzing and eliminating the causes of errors. In the case of games, complex game behavior – such as the movement of the game character in the game world – must also be tested in addition to the basic functions of the software. QA bots based on AI models help to automate test execution and error logging. For example, a software tester starts 100 copies of the game and 100 copies of a QA bot at the same time. The QA bots run through the game and document any errors found. The tester can thus run many tests simultaneously and quickly move on to analyzing and correcting errors. Here are three examples of use cases for such tests:

Visual tests are used to find graphic errors in a game, for example to search for faulty textures in a 3D game world. Normally, human testers would have to run through the game world very often to find faulty textures. Recently, it has become possible to train QA models using supervised learning with sample images from a game so that they can distinguish between correct and incorrect textures.[27] The basic principle of such texture analysis models is similar to radiology models, which are trained to find medical abnormalities in CT, MRI and X-ray images using catalogs of sample images. Texture error search models now deliver high hit rates of over 80% with a low false positive rate.

Gameplay tests are used to find errors that unintentionally hinder or shorten the progress of the game (blockers or exploits). QA models can be trained to find such errors themselves through reinforcement learning. For example, the AI model is conditioned to achieve the highest possible score in the game. An example of this is the case of the boat racing game "Coast Runners":[28] The QA bot, which was trained to maximize points, left the race track in order to drive continuously in circles at a remote location, where it rammed other boats and collected bonus points for doing so. Although the QA bot left the race track, damaged its boat and collided with other boats, it ultimately scored 20% more points than would have been possible if it had completed the race track according to the rules. The QA bot thus found an exploit that had remained hidden from human players.

Map tests are about finding errors that restrict the accessibility of the game world or allow players to leave the game world unintentionally. Automated map tests by bots with random movement patterns have been around for some time. However, map coverage decreases with increasing map complexity. Previous bots had no sensors and were therefore barely able to overcome bottlenecks, height differences and similar obstacles. New QA bots are equipped with visual encoders that make it possible to capture the game world. In one study, QA bots were rewarded for the constant novelty of their actions, so that they showed "curious" behavior when exploring a complex 3D world.[29] For

22 Sarkar et al., What is it like to program with artificial intelligence?, ArXiv (2022), available at: https://arxiv.org/abs/2208.06213, p. 1.

23 How AI assistants are already changing the way code gets made, MIT Technology Review (2023), available at: https://www.technologyreview.com/2023/12/06/1084457/ai-assistants-copilot-changing-code-software-development-github-openai/.

24 Ziegler et al., Productivity assessment of neutral code completion, Proceedings of the 6th ACM Sigplan International Symposium on Machine Programming (2022), available at: https://dl.acm.org/doi/10.1145/3520312.3534864, pp. 21-29.

25 Liang et al., A Large-Scale Survey on the Usability of AI Programming Assistants: Successes and Challenges, ArXiv (2024), available at: https://arxiv.org/abs/2303.17125, p. 4.

26 Moussiades/Zografos, OpenAI's GPT4 as coding assistant, ArXiv (2023), available at: https://arxiv.org/abs/2309.12732, p. 8.

27 Garcia Ling et al., Using Deep Convolutional Neural Networks to Detect Rendering Glitches in Video Games, Proceedings of the AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (2020), pp. 16, 19, 66-73, available at: https://ojs.aaai.org/index.php/AIIDE/article/view/7409.

28 Clark/Amodei (OpenAI), Faulty reward functions in the wild, available at: https://openai.com/index/faulty-reward-functions/.

29 Gordillo et al., Improving Playtesting Coverage via Curiosity Driven Reinforcement Learning Agents, IEEE Conference on Games (2021), available at: https://arxiv.org/abs/2103.13798.

example, 320 of these reinforcement-trained QA bots were able to traverse around 90% of a complex 3D map within 24 hours, while simple QA bots covered less than 50%.

6. Unbeatable (amounts of fun): AI opponents

Games have always been a benchmark for the level of development of AI research: AI models are now mastering more and more board and computer games as well as human players. Models based on reinforcement learning successfully master chess[30] and Go[31] , but also Breakout, Pong and Space Invaders[32] . Strong AI opponents are important for game development, as they significantly determine the level of difficulty and therefore the fun of the game. Modern AI models combine methods of reinforcement learning and deep learning. The AI agent is placed in a game world, receives sensors to check its status and can perform actions like a human player. The agent tries out actions, expands its control scale through error learning and strives to maximize its reward.[33] Through deep learning, it can also quickly record a lot of data, e.g. all the pixels of a game screen.

Until a few years ago, AI models were not able to learn modern real-time strategy games at a high level. One obstacle was the complex game logic based on hundreds of thousands of lines of code as well as the challenges typical of games in terms of real-time reactions, incomplete game information and long time horizons.[34] This limit has now also been exceeded: In the real-time strategy game Starcraft 2, an AI agent trained in games with humans was able to achieve a rank in the top 0.2% of all players.[35] In the real-time strategy game Dota 2, an AI agent trained through independent play (self-play) even defeated the reigning world champion team.[36] The costs and time required to train powerful AI opponents are still too high for normal game development. To train the OpenAI Five AI model to defeat the Dota 2 world champions required thousands of graphics processing units (GPUs), 10 months of training time and a staff of scientists.[37] However, there are now widely available commercial solutions for training AI agents, such as Unity Machine Learning Agents and Amazon Sage Maker, which can be used to train AI opponents with a reasonable investment.

7. The universal translator: language localization through AI

An important aspect for the international marketing of games is localization, i.e. the translation of the written and spoken language within the game and the advertising material outside the game into the languages of new markets. Machine translation programs such as DeepL and Google Translate are used for this. They can be operated as stand-alone software or integrated into the game developer's translation tools via APIs. Earlier machine translation models used grammar rules and dictionaries to transfer text from one language to another. These systems were often inaccurate and could not deal with linguistic nuances.[38] Modern systems, on the other hand, use artificial neural networks that recognize and learn linguistic patterns from a large amount of sample data.[39] In recent years, their quality has risen to a level that is considered on a par with human translation for certain languages.[40]

The localization of games is particularly challenging because, in addition to the usual pitfalls in the translation of creative works, the interplay of visual and verbal elements must be taken into account.[41] An ideal translation is therefore not only based on the text alone, but also on the translator's experience of playing the game. Every game has its own "tone". For example, a game in a medieval setting may contain a formal address from the player ("Your Highness"), while a game in a fantasy setting may contain a freely invented language (e.g. the Dovahzul language in Elder Scrolls V: Skyrim). One solution to this problem is to store separate glossaries for each project, which is possible in DeepL and Google Translate. A more advanced approach is to train translation models using complete translation files from similar computer games (in-domain data).[42] The advantage of such models is that they better reflect the characteristics of the game world than DeepL or Google Translate in their pure form.

III. Central legal issues in the use of AI in game development and marketing

Key legal issues are the topic of ancillary copyright under Section 94 UrhG (see III.1.), the impending "copyleft effect" when code is created by AI (see III.2.) and liability for AI-generated content (see III.3.).

1. Copyright and ancillary copyrights

There is broad agreement that content generated solely by AI tools is not eligible for copyright protection under German law[43] because there is no personal, intellectual creation;[44] there is also no specific ancillary copyright.[45] Unlike a human being, an AI does not need to be incentivized to create works. There is therefore no need for an intellectual property right[46]. This could mean that a game developer would be unprotected to the extent that third parties would be allowed to use content from the game without sanctions as long as this content was created using AI tools. However, this conclusion would be premature, as the game studio is entitled to its own ancillary copyright to the game as a whole as a motion picture in accordance with Sections 94, 95 UrhG due to its organizational and economic performance around the computer game. The ancillary copyright arises irrespective of whether the parts integrated in the motion picture enjoy their own protection under copyright law as a "work". The extraction of unprotectable parts can also be prohibited by invoking motion picture protection. BGH and ECJ have ruled for the ancillary copyright of the producer of sound recordings that even the extraction of the smallest fragments of sound is sanctioned.[47]

30 Silver et al., Mastering Chess and Shogi by Self-Play with a General Reinforcement Learning Algorithm, ArXiv (2017), available at: https://arxiv.org/abs/1712.01815.

31 Silver et al., Mastering the game of Go with deep neural networks and tree search, Nature 528, 484-489 (2016), available at: https://www.nature.com/articles/nature16961.

32 Mnih et al., Human-level control through deep reinforcement learning, Nature 518, 529-533 (2015), available at: https://www.nature.com/articles/nature14236.

33 Sutton/Barto, Reinforcement Learning – An Introduction, 2nd ed., 2018.

34 Bener et al. (OpenAI), Dota 2 with Large Scale Deep Reinforcement Learning, ArXiv (2019), available at: https://arxiv.org/abs/1912.06680.

35 Vinyals et al. (DeepMind), Grandmatser level in Starcraft II using multi-agent reinforcement learning, Nature 575, 350-354 (2019), available at: https://www.nature.com/articles/s41586-019-1724-z.

36 Bener et al. (OpenAI), Dota 2 with Large Scale Deep Reinforcement Learning, ArXiv (2019), available at: https://arxiv.org/abs/1912.06680.

37 Bener et al. (OpenAI), Dota 2 with Large Scale Deep Reinforcement Learning, ArXiv (2019), available at: https://arxiv.org/abs/1912.06680, p. 7.

38 Wang et al., Progress in Machine Translation, Engineering 18 (2022), available at: https://www.sciencedirect.com/science/article/pii/S2095809921002745, pp. 143-153.

39 Available at: https://www.deepl.com/de/blog/how-does-deepl-work.

40 Hassan et al., Achieving Human Parity on Automatic Chinese to English News Translation, ArXiv (2018), available at: https://arxiv.org/abs/1803.05567.

41 Hansen et al., A Snapshot into the Possibility of Video Game Machine Translation, ArXiv (2022), available at: https://arxiv.org/abs/2209.08827.

42 Hansen et al., A Snapshot into the Possibility of Video Game Machine Translation, ArXiv (2022), available at: https://arxiv.org/abs/2209.08827.

43 This does not seem to be clear in UK law, as there is an ancillary copyright for "computer-generated works", sec. 9 (3), 12 (7), 178 CDPA.

44 Raue MMR 2024, 157 (160) mwN.

45 Maamar, The computer as creator, 2021.

46 Raue has rightly pointed out that this creates "congnitive dissonances": "Why should the Pope's photo or the Theatre D'opera Spatial not be protected, but the man-made splash photo of the then Minister of Defense Scharping with Countess Pilati be?" (Raue MMR 2024, 157 (160)).

47 An overview of the legal dispute between Kraftwerk and Moses Pelham, which lasted over 20 years, can be found in Krätzig ZUM 2024, 1 et seq.

This finding is also transferable to the ancillary copyright of the computer game producer. The exciting question is whether this will remain the case if more and more parts of a computer game contain assets generated with AI tools in the future. The reason for granting the ancillary copyright pursuant to Sections 94 and 95 UrhG lies in the need to protect the entrepreneurial performance.[48] According to case law, no minimum effort is required here.[49] This could theoretically change with the massive introduction of AI into production. However, this is not to be expected, as in film law even amateurs and occasional filmmakers are granted the ancillary copyright regardless of the lack of entrepreneurial effort.[50] The same (low) standard also applies to producers of sound recordings.[51] It is therefore to be expected that a game studio will continue to be protected against extractions in the future if the extracted content was AI-generated.

2. Copyleft effect

If AI assists in programming by creating lines of code, game studios must question whether the algorithm of the AI tool only reproduces a "learned" code. Certain source code that is publicly available on the Internet is subject to an open source license with a copyleft effect[52]. The source code may be used freely, but the user undertakes to place the software containing the licensed code under the same – permissive – license.[53] This means that the user's own code is infected by the latter through the enrichment of code with a copyleft effect. Endres and Mühleis rightly warn that the threshold for infection is "conceivably low".[54] The consequence is that the game manufacturer loses legal sovereignty over its game, must disclose its source code and allow anyone to use the game's source code. This is an economic disaster, as the investment costs can no longer be recouped. Only some AI tools allow the user to search for the sources and thus check whether the code generated by the AI is under an open source license with a copyleft effect. Part of the time saved by using AI should therefore definitely be used for research in order to avoid unpleasant surprises. However, it is not certain whether the copyleft effect occurs at all, because it can be argued that this arises due to a contractual obligation, but the user of an AI tool has not entered into a contractual relationship with the rights holder of the code used.

3. Liability for infringements

There is a risk that the output will infringe pre-existing works, not only in the case of software code, but also in the case of other content generated by AI tools. The greater the amount of training data in the relevant area, the lower the risk that an AI tool will generate a result that is so similar to a work from the training data that copyright is infringed.[55] The more exciting question is therefore whether the user can be held liable for the mere use of an AI tool if the provider of the AI system has developed its algorithm with training data to which it has no rights. As long as the user of an AI tool does not perform any act of use under copyright law in relation to the underlying training data, they are not infringing any copyrights. This also applies if the tool itself has been created by infringing rights. There is no attribution of the infringement committed by the provider of the tool. This means that the user is only liable if the output generated by the AI essentially corresponds to an existing copyrighted work and the user exploits it.

IV. Conclusion

The article shows that each use case must be considered individually and poses its own legal challenges. It is therefore essential that game studios keep an eye on the individual legal difficulties and provide employees with targeted training. This is a major challenge in practice, as employees working at game studios typically have no prior legal training. Topics such as data protection, trade secrets, the AI Act, personality rights, copyright and contract law must therefore be simplified so that employees can observe the rules in their day-to-day work. For this reason, some of the time and costs saved by using AI should be reinvested in training your own employees and reviewing the content.

Quick read ...

- AI tools are used throughout the entire production and marketing process, from project planning and game design to the creation of dialogues, graphics, program code and game opponents through to language localization and software testing.
- The greatest advances can currently be seen in 2D graphics creation, programming and game design, where large language models (LLMs) are used as idea generators and research assistants to speed up processes.
- Game producers are protected by the ancillary copyright under Sections 94, 95 UrhG against the extraction of AI-generated parts of the game, even if this content would not be individually protectable due to the lack of human creators.
- It is unclear whether a so-called copyleft effect can arise when adopting open source code from AI code assistants. The lack of a contractual relationship between the game developer and the open source author speaks against this.
- Game manufacturers are only liable for copyright infringements when using AI tools – even if the AI was unlawfully trained by the AI provider with copyrighted works – if the output generated by AI essentially corresponds to an existing protected work and the game manufacturer exploits it.

Patrick Mitsching, LL.M. (Durham), M.A. (London),
is the head of the legal department at InnoGames GmbH in Hamburg.

RA Professor Dr. Christian Rauda
is a specialist lawyer for IT law, a specialist lawyer for copyright and media law, a specialist lawyer for intellectual property law and a partner in the law firm ARTANA. He is also a professor of computer games law and entrepreneurship in the games industry at HTW Berlin.

Benjamin Sach
is an in-house lawyer at InnoGames GmbH in Hamburg.

48 Dreier/Schulze, UrhG/Schulze, 7th ed. 2022, § 94 marginal no. 20
49 OLG Hamburg MMR 2010, 778 – Konzertfilm; Wandtke/Bullinger, Urheberrecht//Manegold/Czernik, , 6th ed. 2022, Section 94, para. 23; aA Fromm/Nordemann, Urheberrecht/J. Nordemann, 2018, Section 94, para. 18: "quantitative and qualitative minimum effort"; Dreier/Schulze, UrhG/Schulze, 7th ed. 2022, Section 94 para. 7: "sufficient performance".
50 Wandtke/Bullinger, Urheberrecht/Manegold/Czernik, 6th ed. 2022, UrhG § 94 para. 49.
51 "Anyone who goes into the forest with a tape recorder and records birdsong is just as much a producer of sound recordings as someone who produces orchestral recordings lasting several hours in an elaborate recording studio. Furthermore, it does not matter whether he is commercially or non-commercially active" (Dreier/Schulze, UrhG/Schulze, 7th ed. 2022, Section 85 para. 24).
52 See in detail Endres/Mühleis MMR 2023, 725 et seq.
53 See in detail Endres/Mühleis MMR 2023, 725 et seq.
54 Endres/Mühleis MMR 2023, 725 (727).
55 Käde answers the question "When and why do AI models reproduce training data?" ZUM 2024, 174 (177 ff.).

ADRIAN SCHNEIDER

AI-supported coding in game development

Copyright consequences for the games industry

Software development

Generative artificial intelligence (AI) is changing entire industries, including, of course, the games industry. More than almost any other industry, it creates value with digital works: digital worlds, characters, sounds and, last but not least, software. The development of all these digital works can be supported, and in some cases even replaced, by generative AI. This article specifically examines the development of software using generative AI and the resulting copyright issues for the games industry.

reading time: 16 minutes

I. AI-supported coding in practice

There are currently various forms of AI-supported software development in practice. Many Large Language Models (LLMs) such as ChatGPT (Open AI) or Luminous (Aleph Alpha) can generate code as well as text. But there are also various solutions on the market that offer AI assistants specifically optimized for software development to easily generate code from common development environments for integration into software projects. Common examples of such AI assistants include "Amazon CodeWhisperer" and "GitHub Copilot".

Almost all AI assistants work in a similar way and can essentially generate code in two ways:

1. Code generation via prompt

Developers can use a prompt to issue a specific instruction as to which code is to be generated. Instead of writing a function themselves to validate an email, for example, the creation of such a function can be delegated to the AI assistant with a prompt, e.g. "Write a function to validate an email address". A corresponding code is then generated, which can be checked manually and potentially accepted. In addition, the code can be revised manually or the prompt can be specified, e.g. "Write a function to validate an email address according to RCF 5322".

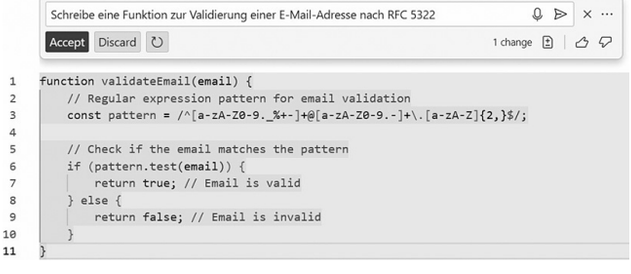


Fig. 1: Code generated by GitHub Copilot based on a prompt. The generated code can be accepted by clicking on the "Accept" button.

2. Code generation via autocomplete

Both Amazon CodeWhisperer and GitHub Copilot also support code suggestions via autocomplete. With this feature, code is not generated based on an explicit prompt, but the AI assistant autonomously suggests the potentially relevant code based on the current context. For example, if the developer enters the name of a function (e.g. "validateEmail(email)"), the AI assistant suggests code that is likely to be relevant for this function name. The code suggestion can then be accepted by pressing the Tab key.

Fig. 2: Suggested code by means of autocomplete in GitHub Copilot. The suggested code can be accepted by pressing the Tab key.

3. Functionality of AI assistants for software development

The way common AI assistants for software development operate is – as far as publicly known – similar. In order to generate relevant code, the current development context, i.e. parts of the code already written before and after the cursor in the respective file (sometimes also in other open files[1]), is transmitted to the provider.[2] In the case of code generated via prompt, the respective prompt is also transmitted. This context is required in order to be able to create code suggestions by means of autocomplete even without the prompt explicitly specified by the developers and to ensure that the generated code is not only executable on its own, but also in the context of the respective software in which it is to be used. For example, existing variable or function names can be adopted and the generated code can be integrated into the existing code base.

The context and the transmitted prompt are then filtered, for example to remove irrelevant requests or prevent hacking attempts.[3] Based on this filtered data, the final code is generated using an LLM.

Before the code is sent back, the output is filtered again. It can be filtered – by the provider – for known vulnerabilities, for example.[4] To prevent the identical adoption of existing code, both GitHub and Microsoft offer functions to recognize code that has already been used in other known data sources.[5] Identical code can either be blocked or the reference to the original source can be made transparent.

However, with the most common AI assistants for software development on the market, Amazon CodeWhisperer and GitHub Copilot, it is not known in detail on which database the data models were trained. Amazon merely states that it uses a basic

1 Cf. Configuring content exclusions for GitHub Copilot, available at: https://docs.github.com/en/copilot/managing-github-copilot-in-your-organization/configuring-content-exclusions-for-github-copilot.
2 About GitHub Copilot, available at: https://docs.github.com/en/copilot/copilot-individual/about-github-copilot-individual; Amazon CodeWhisperer – Frequently Asked Questions, available at: https://aws.amazon.com/de/codewhisperer/faqs/.
3 Cf. How GitHub Copilot handles data, available at: https://resources.github.com/learn/pathways/copilot/essentials/how-github-copilot-handles-data/.
4 Cf. How GitHub Copilot aids secure development, available at: https://resources.github.com/copilot-trust-center/; Security scans, available at: https://docs.aws.amazon.com/codewhisperer/latest/userguide/security-scans.html.
5 Establishing trust in using GitHub Copilot, available at: https://resources.github.com/learn/pathways/copilot/essentials/establishing-trust-in-using-github-copilot/; CodeWhisperer documentation, code references, available at: https://docs.aws.amazon.com/codewhisperer/latest/userguide/code-reference.html.

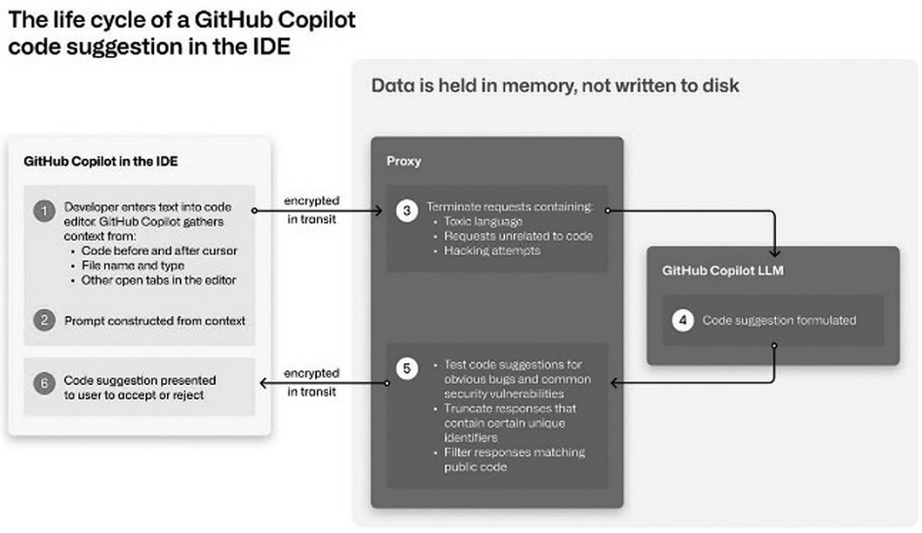


Fig. 3: Data flow for the generation of code using the example of GitHub Copilot, as of 9.4.2024, source: https://resources.github.com/learn/pathways/copilot/essentials/how-github-copilot-handles-data/

model trained from "various data sources", including "Amazon and open source code".[6] GitHub's AI assistant Copilot is also said to be based on a GPT data model in the Microsoft Azure cloud,[7] which was trained on the basis of training data in human language and source code from "publicly available sources", in particular code from public Git repositories on GitHub.[8] However, details of the sources are not known in either case.

II. Legal issues

AI-supported coding raises a number of legal issues, four of which are examined in more detail in this article. In addition to the permissibility of training data models using publicly available source text, the legal issues also concern the liability for unlawful training, the protectability of generated code as well as the reproduction of protected code.

1. Training of data models

At first, the question arises as to what extent the training of data models on the basis of publicly available source texts is permissible. For clarity, this article does not attempt to assess the permissibility of the training practices of the two providers of AI assistants mentioned as examples, but rather examines the general legal framework.

Since the training material must be copied and stored at least for the training process, but regularly also beyond this for the purposes of fine tuning and quality assurance, the training of data models first requires the permissibility of reproducing the training material used.

Pursuant to Section 44a of the German Act on Copyright and Related Rights (UrhG) (Art. 5 para. 1 of the Copyright Directive 2001/29/EC), temporary reproductions may be permissible. However, the provision will not be applicable in many cases, as the training data generally has to be stored for a longer period of time and is therefore not only of a temporary nature.[9] In addition, Section 44a UrhG requires that the reproduction does not have any independent economic significance. This is doubtful in the case of training data models, as it has a concrete impact on the functionality and purpose of the AI system.[10]

However, reproduction may be justified under Section 44b (2) sentence 1 UrhG (Article 3 para. 2 of the DSM-Directive (EU) 2019/790). Accordingly, the automated analysis of individual or multiple digital or digitized works is permitted in order to obtain information, in particular about patterns, trends and correlations (text and data mining).

The current prevailing opinion in German legal literature correctly assumes that this also includes the training of generative AI systems.[11] In contrast, it is occasionally argued that the provision of Section 44b UrhG, which is based on Directive (EU) 2019/790 (DSM Directive), is not applicable to generative AI systems, as the EU legislator did not consider generative AI systems when creating the provision and therefore did not intend it. [12]

However, this argument is not convincing. Section 44b (1) UrhG defines the permissible use in a technology-neutral way. The legislator's aim was precisely to make copyright-protected content usable for the desired innovative technology in the EU.[13] The use of training data to develop statistical algorithms in the field of AI is a long-established technology that was also known to the legislator when the DSM-Directive was adopted. The AI Act in the version adopted by the European Parliament also presupposes in several places that the training of the AI can take place on the basis of Art. 3 of the DSM-Directive (implemented in Section 44b UrhG), for example in recitals 104, 105 and 106 of the AI Act.

However, the applicability of Section 44b (3) UrhG presupposes that the works used are lawfully accessible and that the owner of the rights has not effectively reserved the right of use in a "machine-readable" format. In addition, the works must be deleted in accordance with Section 44b (2) sentence 2 UrhG if the purpose, in this case the training of the data model, has been achieved.

The machine-readability of the reservation of rights poses a particular challenge in practice. The exact meaning of "machine-readable" is debated. According to a convincing opinion, the term is to be interpreted uniformly under European law. According to recital 35 of Directive (EU) 2019/1024 (PSI-Directive), machine-readability requires information to be in a format "structured in such a way that software applications can easily identify,

6 Amazon CodeWhisperer – Frequently Asked Questions, available at: https://aws.amazon.com/de/codewhisperer/faqs/.
7 GitHub Copilot – November 30th Update, available at: https://github.blog/changelog/2023-11-30-github-copilot-november-30th-update/.
8 What data has GitHub Copilot been trained on?, available at: https://github.com/features/copilot.
9 v. Welser GRUR-Prax 2023, 516 (517).
10 Siglmüller/Gassner RDi 2023, 124 (126).
11 Maamar ZUM 2023, 481 (483); Siglmüller/Gassner RDi 2023, 124 (126); Pesch/Böhme GRUR 2023, 997 (1006).
12 v. Welser GRUR-Prax 2023, 516 (518); Schack NJW 2024, 113 (114).
13 Recitals 8 and 11 of the DSM-Directive; Eichelberger/Wirth/Seifert, Urheberrechtsgesetz/Wirth, 4th ed. 2022, Section 44b UrhG para. 1; Heine GRUR-Prax 2024, 87 (88).

recognise and extract specific data".[14] A reservation of rights in human language in a legal notice or terms of use is therefore not sufficient. Instead, it must be stored in a format that can be interpreted by software.[15] However, due to a lack of common standards, a reservation of use is currently difficult to implement unilaterally.

2. Liability for unlawful training

Users of AI assistants are generally unable to assess which data was used to train the data model they are using and whether the provider complied with all legal requirements during training. This applies not only to the question of whether the provider has complied with the requirements of Section 44b UrhG. In addition to German or European copyright law, practically any legal system in the world can be relevant for training with large amounts of data. It is practically impossible for the user to check whether all applicable restrictions have been observed during training.

The question therefore arises as to whether the potentially unlawful training of a data model by the provider leads to liability on the part of the user, who benefits from the trained data model by entering and transmitting the prompt. The starting point for imputation could therefore be the use of a (potentially) unlawfully trained model which the user benefits from. Liability as a (successive) offender or participant is conceivable, which presupposes the user's own contribution to the infringing act before the act of reproduction[16] is completed. Since the training with the illegal data and thus the commission of the offense of the provider has already been completed at the time of the code generation, both successive offense and participation are ruled out. The same argument can also be used to deny liability for interference. In addition to a deliberate and adequate causal contribution to the infringing act, this also requires a breach of conduct obligations, in particular inspection obligations.[17] However, since the training with the copyright-infringing training data has already been completed, there is no such causal contribution. As a result, neither liability of the user as an offender or participant nor liability as a disturber can be established.

3. Protectability of generated code

The question also arises as to the extent to which code generated by an AI assistant can be protected as a computer program pursuant to Section 69a paragraph 1 in conjunction with paragraph 3 sentence 1 UrhG (Art. 1 of the Computer Program Directive 2009/24/EC). Eligibility for protection requires a personal intellectual creation, i.e. the personal creation of a human being. The code generated by an AI assistant could lack such a human creative activity.[18] For this reason, the protection of AI-generated source text is sometimes rejected across the board.[19] However, this is too short-sighed. The mere fact that a work is ultimately not manifested by a human being, but by a machine, does not exclude copyright protection per se. After all, every digital work is ultimately a computer's interpretation of a person's input. Every keystroke triggers an electrical signal that is reproduced or stored by a computer in a format that can be perceived by humans. The decisive factor is therefore not whether a work is created by a machine, but rather whether the creation – i.e. the intellectual content – is determined by a human being.[20] A machine-generated work must therefore be distinguished from works in which a person merely uses a computer to implement their creative activity.[21]

The same applies to the generation of code by AI assistants. The decisive factor for the existence of an intellectual creation is whether a human being has made a contribution through their actions. This contribution must have controlled the generation of the code by the AI assistant in such a way that the generated code embodies the personal creation of the human being.[22] The work generated by AI is then the realization of creative human activity.[23] In other words, if a developer uses the AI assistant as a tool in order to have their own intellectual work implemented by the AI assistant using specific parameters, the generated code is considered a personal creation of the developer.[24]

Some argue that the human user cannot influence the actual implementation of a machine-generated work.[25] However, this is not a decisive point. Even in traditional art forms, the concrete result of the creative process is not necessarily predictable for its artists.[26] In fact, a partial loss of control by human artists can be part of the creative achievement, for example in the fields of performance art or electronic music.

However, the more specific the human specification in the form of a prompt is and the less creative leeway there is in the implementation of the prompt by an AI assistant, the closer the correlation between the human contribution and the result and the higher the probability that the result is actually the result of human creativity.[27] In concrete terms, in software development this likely means that if the specific intellectual problem solving is done by humans (e.g. description of the exact approach) and it is only implemented with machine support, there is a high probability that the work produced is an expression of the intellectual output of a human. On the contrary, if the problem is only described by a person and the solution is left to the machine, it is more likely that the work is not a human creation.

Nevertheless, the distinction is difficult in practice. On the one hand, it will not always be possible to draw a clear line between the generation of code through a creative and a non-creative activity. Even in traditional software development, a significant part of the development work can be purely manual activities, where there is already little scope for creativity. On the other hand, one can't tell by looking at software whether it was written by a human or generated by AI. Also, the prompt with which a code was generated is not documented per se.

4. Reproduction of protected code

It cannot be ruled out that code generated by AI already exists. Whether the generated code infringes the copyright of a third party depends on whether the generated code constitutes a reproduction within the meaning of Section 16 UrhG. According

14 BeckOK Urheberrecht/Bomhard, 41st ed., UrhG Sec. 44b marginal no. 31.
15 BeckOK Urheberrecht/Bomhard, 41st ed., UrhG Sec. 44b marginals no. 32 et seq. on various technical implementation options in detail.
16 Successive perpetration or participation is possible after completion of an offense, but no longer after completion, cf. MüKoStGB/Joecks/Scheinfeld, 4th ed. 2020, German Criminal Code (StGB) Sec. 25 para. 206.
17 BeckOK IT-Recht/Paul, 12th ed., UrhG Sec. 97 marginal no. 19; Fromm/Nordemann, Urheberrecht/Nordemann, 12th ed. 2018, UrhG Sec. 97 marginal no. 154.
18 Schricker/Loewenheim, Urheberrecht/Spindler, 6th ed. 2020, Sec. 69a marginal no. 15.
19 Siglmüller/Gassner RDi 2023, 124 (130); Wandtke/Bullinger, Urheberrecht/Grützmacher, 6th ed. 2022, Sec. 69a marginal no. 34; Hetmank/Lauber-Rönsberg GRUR 2018, 574 (577).
20 Similarly, Schricker/Loewenheim, Urheberrecht/Spindler, 6th ed. 2020, Sec. 69a marginal no. 15, which draws the line where the parameters themselves are determined by AI.
21 Hoeren/Sieber/Holznagel, HdB Multimedia-Recht/Ernst, 60th ed. October 2023, Part 7.1 marginal no. 4.
22 Käde MMR 2024, 142 (145).
23 Specht-Riemenschneider WRP 2021, 273 (275); also for patent law BGH, decision of 11.6.2024 – X ZB 5/22, which assumes inventor status in the case of significant human influence on the overall result even when using AI.
24 Cf. Papastefanou WRP 2020, 290 (292); Schricker/Loewenheim, Urheberrecht/Spindler, 6th ed. 2020, Sec. 69a marginal no. 15; Schneider/Kremer ITRB 2020, 166 (170).
25 Schippel ITRB 2023, 216 (219).
26 Lauber-Rönsberg GRUR 2019, 244 (247); Specht-Riemenschneider WRP 2021, 273 (275); Sesing-Wagenpfeil DSRITB 2022, 655 (663).
27 This is probably also the case with Sesing-Wagenpfeil DSRITB 2022, 655 (666).

to the ECJ, the decisive factor is the recognizability of the original work. Only if the work of the third party is recognizable in the generated work is it a reproduction.[28] The recognizability of an identical code is undoubtedly to be affirmed. It is therefore a case of reproduction if a code is generated that is identical to an already protected code that was part of the training material. [29]

If, on the other hand, the generated code was not part of the training material and the similarity of the code is due to coincidence, this coincidental similarity to the pre-existing code of a third party is comparable to a dual creation, which would not constitute a copyright infringement.[30] Dual creations are recognized in particular in cases that are on the borderline of protectability, especially where the design is limited by technical constraints and predictable design possibilities.[31] Whether the generated code is actually a personal intellectual creation (e.g. due to a specific prompt determining the design) or a non-protectable code generated autonomously by the AI assistant is irrelevant. The term "dual creation" is therefore misleading in this context.

The training material used is therefore decisive for the distinction between copyright-infringing reproduction and admissible coincidental similarity. This poses practical challenges for all parties involved: For users, it is almost impossible to ensure that generated code is not an unauthorized reproduction without knowing the training material. At the same time and for the same reason, it is almost impossible for the owners of the rights to prove whether a generated code is a duplication or a coincidental similarity.

Notwithstanding the aforementioned, it is also difficult for users to identify whether there is any similarity at all between generated code and existing code. However, AI assistant functions can help determine which is the case: Both GitHub and Amazon offer special functions to identify code components that exist identically in the training material. In the case of GitHub, the "Duplicate Detection" function filters out such generated code components,[32] while Amazon's CodeWhisperer-Reference-Tracker recognizes whether a code proposal could be similar to certain open-source training data from CodeWhisperer and identifies it.[33] At least on a practical level, these features can help to significantly reduce the likelihood of adopting existing code.

III. Outlook

AI assistants in software development are raising fundamental copyright issues that were thought to have been resolved long ago.

For the future of software development, the uncertainty regarding in particular the protectability of AI-generated computer programs may mean that the protectability and intellectual value of computer programs can no longer be assumed to be as certain as it was in the past. According to the German Federal Court of Justice (BGH), there is a factual presumption that complex computer programs show sufficient individuality for copyright protection.[34] Should AI assistants for software development become widespread, it is at least questionable whether such a factual presumption can still be upheld.

This can have massive economic consequences for companies. The sensitive use of AI assistants in software development is therefore advisable. While their use in the development of prototypes, internal tools or everyday trivial code will be practically unproblematic, their use in business-critical and particularly value-creating software components can lead to considerable uncertainty when it comes to determining value and enforcing exclusive rights.

However, specifically for the games industry, it must be taken into account that computer games are by no means just computer programs. Rather, they are hybrid works that consist not only of computer programs, but also of a large number of creative and protectable parts that share in the originality of the overall work.[35] Therefore, even if individual software components of a computer game are AI-generated and do not enjoy copyright protection, protectability can still arise from other creative components of the computer game for the work as a whole.

The development of generative AI systems does not stop at other creative achievements. AI can already be used to generate 3D models, characters, sounds and music. And hardly any other industry has been using AI for as long as the games industry. But good games thrive above all on originality – exciting stories, new worlds and attention to detail. AI is certainly a tool that will also change the game development process. However, it is doubtful that the games industry will one day be able to manage without human creativity.

Quick read ...

- The spreading of AI assistants for software development raises new and old copyright issues.
- The training of data models may be justified under Section 44b (2) UrhG.
- However, it is difficult for users to assess whether the requirements have been met.
- Even if generated computer programs can be protected by copyright, the distinction is difficult to make in practice.

Adrian Schneider
is a lawyer and partner at Osborne Clarke in Cologne.

28 ECJ MMR 2019, 596 marginals no. 31 et seq. with comments from Apel – "Metall auf Metall".
29 Also according to Schack NJW 2024, 113 (114) in the case of similarity of the output with protected text modules or images; Pesch/Böhme GRUR 2023, 997 (1005), who, however, see an exception if the output is permanently unsuitable for reconstructing the training material.
30 Baumann NJW 2023, 3673 (3677).
31 Dreier/Schulze, Urheberrechtsgesetz/Schulze, 7th ed. 2022, Sec. 2 marginal no. 17 with further references.
32 Finding public code that matches GitHub Copilot suggestions, available at: https://docs.github.com/en/copilot/using-github-copilot/finding-public-code-that-matches-github-copilot-suggestions.
33 Amazon CodeWhisperer – Frequently Asked Questions, available at: https://aws.amazon.com/de/codewhisperer/faqs/.
34 BGH MMR 2005, 845.
35 ECJ MMR 2014, 401 marginal no. 22 with comments from Oehler.

KAI FLORIAN FURCH

Voice Localization of Games

Speech Synthesis in Practice

Digital Voices

With the rapid development of AI applications, a large number of speech synthesis tools have become generally available, which can be used to generate low-threshold, fast and good artificial voice and speech output. Since then, the effective use of artificially generated voices as part of the localization or production of games has become possible. At the same time, this development has significantly shaken up the market relationships between game developers in the games industry and producers of other audio-visual media on the one hand and voice actors, actors and (dubbing) studios on the other. In particular, the question of the legitimate use of digital voices or the creation of voice clones for this purpose has already led to uncertainty and initial disputes about the possibilities and limits of using speech synthesis. With this in mind, the following section will first describe the development and functionality of speech synthesis and then discuss use cases for game developers in the localization of games. Finally, the rights that need to be considered and clarified by the game developer in order to make sensible use of speech synthesis in their own localization or production will be elaborated. reading time: 22 minutes

I. Development of Speech Synthesis and Effects on the Market

1. Development

The creation and use of artificial voices has been possible for years, as demonstrated by a large number of voice assistants, read-aloud functions and comparable digital solutions.

However, despite continuous improvements, however, the cost and time required to achieve a reasonable (i.e. consistently good) quality of speech synthesis was often too high to allow its widespread use in creative media productions such as films, series or games. As a result, it was only used in selected productions. In the production of the Star Wars series "Obi-Wan Kenobi" (2021/2022), for example, the voice of actor Hayden Christensen was to be replaced by the voice of James Earl Jones (94 years old), who has given the role of Darth Vader his distinctive voice since 1977, starting with the film "Star Wars – A New Hope", with the help of the Ukrainian company Respeecher. For this, however, almost 10,000 (!) audio files had to be polished and edited for the adaptation of the dialog and the necessary fine tuning of the so created recordings.[1] Shortly before, Respeecher had also completely voice-synthesized (cloned and rejuvenated) the voice of a younger Luke Skywalker for the production of the finale of the 2nd season of the series "The Mandalorian", as the current voice of actor Mark Hamill (72 years old) was no longer age-appropriate for the role. However, this was only met with a mixed reception from the audience at the time, as it was received as still sounding too flat or too technical.

With the further development of the applications now available, however, not only has the quality and consistency of the results improved considerably, but also the usability in production processes in terms of time and quality.

Games can particularly benefit from this technology, as their asset structure is usually more modular and they are generally not fixed in a static linear fashion, as it is the case with film and series productions. In addition, it is not always necessary to adapt the mouth movements or lip sync in games depending on the game design or look and feel and, if it is, it is certainly easier to implement than it would be the case with a film or series.

2. Effects on the Market

With the enhanced usability of speech synthesis, particularly in the period following the turn of the year 2022/2023, an intensive discussion has emerged between market stakeholders and authorized parties concerning the boundaries of speech synthesis utilization in productions.

Ever since the controversies surrounding the release of digitally created music, in which the voices of Drake, Kurt Cobain and Tupac Shakur were synthesized or the voice of the late Hans Clarin (in consultation with his family) was used in the current "Pumuckl" series production by RTL (a German broadcaster and streaming service) significant turmoil arose within voice acting, dubbing and music industries and among its talents. The heated discussion about so-called digital replicas (which covers the image and voice together or separately)[2] or the cloning, replacement or alteration of voices has and is the subject of negotiations and even strikes between associations and trade unions in many countries, such as last year's strike by SAG-AFTRA on behalf of actors and its termination by the conclusion of consent and remuneration rules, at least in connection with the use of digital replicas for their members vis-à-vis the major film studios[3]. In July 2024, SAG-AFTRA also announced to initiate a strike against major video game publishers in the U.S.A over the lack of an agreement regarding the use of AI, also including voice and speech synthesis, and appropriate compensation[4].

As with all AI applications, the initial focus is on the one hand on which pre-existing voice recordings a voice model has generally been trained by the provider until it is ready for the market, and on the other hand whether and under what conditions users (e.g. game developers) can use voice profiles or digital voice clones of real people, in particular speakers and celebrities, or have them created for this purpose.

It goes without saying that a general market practice for appropriate remuneration has not yet developed. Furthermore, there is currently a lack of correspondingly specific case law. Accordingly, many market participants are concerned, which affects the drafting of contracts with participants. In its recommendations on "Contracting AI" from the beginning of 2024, for example, the Verband Deutscher Sprecher:innen e.V. expressly warns its members against "careless handling" in connection with productions in which the synthesis of voices using AI is in-

1 "How Obi-Wan Kenobi Blended Hayden Christensen & James Earl Jones to Make Darth Vader" v. Thompson, available at: variety.com, https://variety.com/video/obi-wan-kenobi-hayden-christensen-james-earl-jones-darth-vader-artisans/.

2 Handout SAG-AFTRA "Regulating Artificial Intelligence – TV / Theatrical 2023, available at: https://www.sagaftra.org/files/sa_documents/AI%20TVTH.pdf.

3 Hansen ZUM 2024, 111 et seq. on the results of negotiations between SAG-AFTRA and WGA with the major studios in the USA.

4 SAG-AFTRA's announcement of the "Video Game Strike" against major video games publisher https://www.sagaftra.org/videogamestrike

tended and the possible associated "complete loss of a voice actor's market effectiveness and self-determination over the voice actor's own voice"[5] .

At the same time, there are already disputes with various providers of speech synthesis tools in the USA. One example of this is the Lehrman and Sage vs. Lovo Inc. proceedings, in which two professional voice actors objected to the use of their voice profiles in the "Lovo.ai" application, as they claim to have neither given their consent nor received remuneration that would justify their voices being used in an AI application for millions of voice-over productions and Lovo.ai would unlawfully claim to be entitled to use and distribute their voices[6] .

In addition, Scarlett Johansson, as a prominent example, is taking legal action against OpenAI because the voice profile "Sky" made available with the update to ChatGPT released in May 2024 sounded so much like her voice in the 2013 film "Her" that neither close friends nor press representatives would have been able to recognize whether she herself or a voice-synthesized recording was to be heard.[7]

Accordingly, a practical and legal classification of speech synthesis is necessary in order to discuss the applicability of this technology in the context of game localization and/or production and to shed light on its limitations.

II. Speech Synthesis – Function and Technical Development

1. Definition of Speech Synthesis

Speech synthesis is the artificial generation of the human speaking voice. Text-to-speech (also known as TTS) technology is used to convert continuous text into an audible voice output.

As mentioned in the introduction, the creation and use of synthesized voice reproduction has been possible for years, e.g. for navigation software, voice assistants, for automated voice announcements, e.g. in public transport, in read-aloud functions for browsers/apps and other technical digital solutions. Reading machines for the visually impaired were also a significant preliminary stage of application.

However, TTS has made enormous leaps forward in recent years. This is particularly due to the use of deep neural networks (DNNs), which have made it possible to process large quantities of speech recordings for training in a relatively short time. This process is also known as "deep learning speech synthesis".

2. Definition: Voice Models and Voice Profiles

With this deep learning approach, it is possible to develop language models capable of analyzing and interpreting input linguistically and contextually in the respective trained language and then – depending on the quantity and quality of the voice recordings used for training and the linguistic expertise of the language model developer – create high-quality speech output with a selectable output voice or voice profile (see below).

In this first step, learning refers to the development of the language model itself as well as the corresponding fine-tuning and differentiation of language features and grammar so that the language model can generally analyze input linguistically and contextually and implement the sound of the respective language or accent.

In the second step, characteristic voice models or profiles (AI Voices) are developed or trained, which can be used based on the respective voice model to create a speech output individualized with the selected voice.

3. Generation of Output

In the past, the output of the synthesized voice was initially generated by means of "signal modelling", in which speech samples of different sizes (from sounds, syllables or whole words) were combined or concatenated. In current applications, however, all sounds (phonemes) are generated digitally and the modelling of word and sentence accent, speech and sentence melody, intonation, speech tempo and rhythm and the duration of speech sounds (collectively called prosody) is usually also done completely digitally.

While the older signal modelling method could still produce output speech recordings which could contain components/fragments or samples of pre-existing training recordings in the generated output itself, such (sound) fragments are no longer included in the output results of current applications.

The more recent method also overcame the obstacle of the often robotic and monotonous sounding output of speech of the past to now successfully achieving a good sound quality combined with a relatively natural prosody for many applications.

A natural prosody and high quality of the output recording reduces the possibility of distinguishing a speech-synthesized voice reproduction from a human voice. The more natural the prosody (i.e. colloquial sound and expression, intonation and tone of voice), the better and longer a listener can absorb the spoken content and the less often or later a so-called listening fatigue occurs, which can reduce the listener's comprehension and receptiveness and quickly reduce their interaction or reaction to what they hear.[8]

This is an essential feature in order to be able to use speech synthesis also creatively in a game without significantly impairing the ambience, context and/or dramaturgy of the game and/or its game world, i.e. the entire player experience, through technical limitations.

4. Voice Cloning

Another useful function is the option to create so-called voice clones or custom voice models (hereinafter referred to as voice clones) according to customer or user specifications.[9] Voice clones are voice models or profiles that have been trained for the respective application on pre-existing voice recordings of a specific person to produce synthetic output that sounds like the original voice. Depending on the type and quality of the pre-existing recordings and the output quality requirements, only a few minutes to several hours of pre-existing voice recordings are needed to train the voice model. This means that a game developer is not necessarily limited to the voice profiles pre-produced by the respective provider of the speech synthesis software and can train and use voice clones specifically and appropriately for the requirements of the specific production.

With a well-trained voice profile (whether pre-produced by the provider or created as a voice clone at the request of the game developer), either a completely new voice recording can be cre-

5 VDS contract terms AI (updated at the beginning of 2024), available at: https://www.sprecherverband.de/wp-content/uploads/2024/02/VDS-Vertragsbedingungen_Sprachsynthese_Generative-KI_03.pdf.

6 PAUL LEHRMAN and LINNEA SAGE v. LOVO INC., Class Action, United States District Court Southern District of New York, filed May 16, 2024.

7 Scarlett Johannson Says She Was 'Shocked' and 'Angered' Over OpenAI's Use of a Voice That Was 'Eerily Similar to Mine' v. Spangler, article from May 20, 2024 in variety.com, available at: https://variety.com/2024/digital/news/scarlett-johansson-responds-shocked-angered-openai-chatgpt-her-1236011135/.

8 Microsoft, What is speech synthesis (as of January 22, 2024), available at: https://learn.microsoft.com/en-us/azure/ai-services/speech-service/text-to-speech.

9 E.g., Reespecher, available at: https://www.respeecher.com/voice-cloning, ElevenLabs https://elevenlabs.io/, Speechify https://speechify.com/de/.

ated based on text or the sound of a voice in a pre-existing voice recording can be replaced by the sound of the voice profile or voice clone. Many providers of speech synthesis applications now also offer the option of changing the output language while retaining the sound of the selected voice.

In this case, translation tools are used embedded within the provider's service, but the game developer should still verify that the automated translation is correct for the use in the game. To ensure the quality of the translation, it is still advisable to first translate the text itself and then set up the speech synthesis based on this text, as it has been done in the past in in connection with the localization anyway.

5. Modifiers (Mood or Emotions and Tonality)

For the output, the mood of the respective spoken output can often be changed using modifiers. For example, in the tool Revoicer the following modifiers can be selected for the mood of the voice recording to be generated: normal, friendly, hopeful, unfriendly, cheerful, sad, excited, angry, scared, shouting or whispering.[10]

6. Exportable Audio Tracks or Audio Files

As a common feature of all relevant speech synthesis tools that the resulting audio tracks or files can be exported and further edited using standard video and audio editing programs. This means that these assets can be edited and integrated into the production workflow for the game just like a studio recording of human speakers.

III. Current and Future Use Cases for Games

For the games industry, this development opens up the following use cases for the localization of games:

- **NPC dubbing and corresponding localization**

A standard use case for the use of speech synthesis in localization is probably the quick and easy implementation of localization and dubbing with speech output derived from pre-existing written texts (e.g. quest texts) and dialogs of large numbers of NPCs (non-player characters)[11].

This is facilitated by the fact that a large amount of dialog and information in games is either originally only written text or is also available as subtitles, at least in the original version. Since, as described in Section I, the language models are generally based on TTS applications, it is relatively easy to translate these texts (possibly also with the help of common AI tools) and then synthesize voice recordings with a large number of selected voices, which can be integrated as sound assets in the game for the respective language version.

This not only makes it possible to convert the voice output of all NPCs in a game world with spoken dialog into a new language, but ultimately also makes it more economically attractive to add spoken dialog to many more NPCs that would otherwise not have been assigned their own voice output, thus making the game worlds more consistent, realistic and ultimately more atmospheric regardless of the language. This should significantly increase the production value of many games.

- **Use of fewer speakers for a variety of speaking roles**

If the voice recording or dubbing of characters, whether for the original version or its localization, still requires voice actors in the studio due to the dynamics or emotionality and the artistic performance required during the voice recording, there are still ways to streamline the process by using speech synthesis to generate an adequate voice recording that captures the intended mood and artistic expression. It is possible to reduce the number of human voice actors and have them record a large variety of roles or characters, and then exchange or vary the voice profiles of these creative recordings. This means that fewer voice actors are needed to realize creative and emotional voice recordings on an artistic level for a large(r) number of voices. This means on the one hand that the voice actors booked will have a wider range of work to do and a larger assignment than if they were only doing a few voices, which on the other hand will ultimately allow the game developer to make better use of the contributors in terms of scheduling. This also saves time and money for the studio, as coordination becomes easier and downtime can be reduced.

- **Simplified patch and update localization**

It should also be possible to shorten the otherwise tedious process of creating voice recordings in the studio and make it more economical to add characters with spoken dialog and/or quest text in patches and updates, especially for content updates. The same applies to (minor) corrections to existing dialog or bug fixes.

- **Signature voices, digital fixed voices, voice cloning**

The opportunity of creating voice clones allows additional production and localization approaches. Game developers and publishers could already define signature voices during the production, which can then be used as voice profiles or voice models for all local versions of the game. In this way, a voice or voice profile would not only be available for the original language version, but also for the localization of the game in ither languages. In this case, the corresponding character would have the same voice in each language version but would speak different languages.

It is also possible to maintain a consistent voice for all possible prequels, sequels, spin-offs of a game, and other related productions. This is particularly interesting if the role or character is created in such a way that it should not change over the years, e.g. should not age (analogous to James Earl Jones or Hans Clarin).

If prominent voice talents, e.g. actors, have been contracted for various voice performances in the production, it is also possible to clarify at an early stage whether a voice clone can be created based on the original, with which localizations can also be implemented.

IV. Legal Classification from the Perspective of Game Developers and Publishers

1. Preliminary Consideration

For the above-mentioned use cases and the use of speech synthesis software and tools, it is important to understand, from the perspective of the game developer using speech synthesis, which rights may be affected by their use and which rights may need to be clarified.

In the following, the focus is on the user perspective, i.e. on the use by the game developer, but not on the general aspects of the lawful use of pre-existing data of any kind for the prior training of the general language and speech model developed by the respective provider of the speech synthesis tool. In general, it should be noted that according to the prevailing opinion, the collection of training data by the provider or developer of commercial AI models should generally be subject to the text and data mining (TDM) limitation of Sec. 44b German Copyright Act (hereinafter referred to as GCA").[12]

Accordingly, from the point of view of a game developer or publisher, it is important whether the output created with a speech

10 Revoicer, available at: www.revoicer.com.
11 See Grindel MMR 2024, 711.
12 See also Heine GRUR Prax 2024, 87 para. 12.

synthesis tool infringes (pre-existing) rights or whether the output can be used freely.

2. Rights to Pre-existing Recordings

■ **No direct impairment of the output recordings due to rights to the training data used by the provider (pre-existing recordings)**

As explained under II.3., speech output generated by current deep learning speech synthesis products no longer contains any components/fragments or samples or (sound) fragments of pre-existing training data.

Therefore, the neighboring rights of performing artists pursuant to Sec. 73 et seq. GCA or neighboring rights of producers of sound recordings pursuant to Sec. 85 et seq. GCA or, as the case may be, neighboring rights of film producers pursuant to Sec. 94 GCA to or in connection with the pre-existing training data used by the provider of the speech synthesis software are usually not directly affected by the creation and exploitation of an output synthesized/created using a neural speech synthesis application.

The same applies to any rights of authors or lyricists pursuant to Section 2 (1) No. 1 GCA to linguistic works that have been incorporated in the pre-existing recordings later used as training data, since the spoken content, i.e. the spoken words, of the speech synthesized output is determined solely by the user's input.

■ **Pre-existing recordings or texts used by the game developer**

However, if the game developer uses pre-existing recordings in order to modify or edit these using voice synthesis tools (e.g. by completely replacing the voices with a different voice and/or language), the game developer must first obtain the usual rights to the pre-existing recording, in particular the general editing, dubbing and translation rights to the corresponding pre-existing works, as is common for any localization performed by human speakers. However, since game developers typically work with in-house or commissioned content and use extensive rights catalogs, these should be available on a regular basis.

3. Speaker Voices – Selection of the Voice Profile

The use of the voices of living persons, however, affects an essential right of the vocally recognizable persons concerned and requires mandatory consent to use the voice-synthesized recording for the localization of a game. The same applies, albeit for a limited period of time, to deceased persons and therefore post-mortem, i.e. at least 10 years after their death, but in individual cases also significantly longer:[13]

a) Right to one's own voice – Personal Rights

A person's voice is a personality trait that is highly individualizing and characterizing, so that a person is very easily recognizable by it. Accordingly, despite the absence of specific statutory provisions under German law, such as those governing the right to one's own name (Sec. 12 BGB, i.e. the German Civil Code, hereinafter "GCC"), the right to one's own likeness (Sections 22 et seq. KUG) or the provisions of Section 823 GCC, case law has confirmed that the human voice by the virtue of these very characteristics, is equivalent to the personality traits described in specific case law as a unique identifying feature.

In its "Marlene Dietrich" ruling, the German Federal Court of Justice (BGH) stated that, in addition to likeness and name, the voice is another or further characteristic or trait of the personality, which, like the aforementioned, can also "have a considerable economic value", "which is generally based on the person's recognition and reputation in the public – usually acquired through special achievements, for example in the field of sport or art. The well-known personality can commercially exploit this popularity and the associated image by allowing third parties to use their likeness or name, but also other characteristics of the personality that enable recognition, in the advertising of goods or services for a fee."[14]

Furthermore, the Federal Court of Justice stated in its decision that the protection of the right of personality in all of its manifestations serves "not only idealistic but also the commercial interests of the personality". In this context, the right to one's own voice is not protected by analogous application of the protection granted for under the special statutory provision on the likeness of a person's pursuant to Sec. 22 et. seq. KUG[15] but, according to the prevailing opinion, as a special right of personality (personal right) of its own kind.[16] Unauthorized use of a voice or voice profile is therefore an infringement of the right to one's own voice. The person concerned can defend himself against such an infringement by asserting a claim for injunctive relief under Sec. 1004 GCC and a claim for damages under Sec. 823 GCC.

b) Consequence for the Implementation of Localization

Therefore, prior consent is required before an AI voice profile can be used for localization in games. Of course, if the provider of the speech synthesis software provides pre-existing voice profiles, the need to obtain consent to create and use a particular voice profile is in the responsibility of the provider of the AI software and not in the sphere of the game developer using it. However, if there is no consent to use a person's voice to the extent that the provider is entitled to offer it for use by many clients and their products, this deficiency also affects the lawful use of the client's (i.e. the game developer's) projects localized with or otherwise using this specific voice profile.

As the recent examples of Scarlett Johansson and Lovo.ai (see I.2.) show, the existence of the necessary consent cannot simply be assumed. Therefore, before selecting a voice profile for localization, especially if, according to the provider of the speech synthesis software, officially claims that it is a clone a publicly or professionally known person or sounds strikingly similar to such a person, it should be questioned whether the provider has necessary consent or could have obtained it at all. It is also advisable to check the provider's information on company ethics as well as its general terms and conditions with regard to the rights and consent related warranties and any indemnification provisions in favor of the game developer or publisher using the assets created with the AI tool.

However, if the game developer itself wishes to clone the voices of voice actors or celebrities, i.e. to create voice clones for the current production and possibly also for the use in future productions, the need for comprehensive clearance and the obligation to obtain consent for the commercial exploitation of the right to the voice of the person concerned lies solely with the game developer.

c) Obtaining Consent

In principle, such consent can be obtained by individual contract or by general terms and conditions. However, for the consent to be effective, it must be an "informed declaration" of consent, i.e. a declaration made with positive knowledge of all circumstances relevant to the decision of the consenting person. In par-

13 BGH GRUR 2000, 709 (711) – Marlene Dietrich.
14 BGH GRUR 2000, 709 (712) – Marlene Dietrich, see in more detail Schwarz, HdB für Filmrecht/Höss, 6th ed. 2021, para. 8 with further references.
15 Minority opinion represented, e.g. von Lausen ZUM 1997, 86 (90).
16 Götting/Schert/Seitz, HdB des Persönlichkeitsrechts/Schierholz, 2nd ed. 2019, Section 16 para. 22.

ticular, this means that the purpose, nature, scope and thematic context in which the voice or the voice profile (voice clone) is to be or may be used must be very clearly stated. In general, consent may also be given conclusively or tacitly and is open as to interpretation with regard to its scope (meaning and purpose of the underlying agreement and the specific clause).[17] However, due to the rapid development of AI applications, we are in a field in which many developments are not foreseeable for the consenting party per se, so that a very restrictive interpretation of the contractually agreed upon must be assumed due to the highly personal nature and the high level of protection of the special personal right to one's own voice, especially when consent is given in a general terms and conditions. Very general consents that are intended to cover all future uses of a cloned voice are likely to be problematic if not void as per Sec. 307 GCC (law on general terms and conditions). A high degree of transparency is therefore advisable for all parties.

If the game developer wishes to use the voice of a voice actor (in particular as so-called permanent or signature voice) or of a celebrity for the purpose of voice synthesis, the consent must not only relate to the use of the then digitally created voice in the game itself, but also – at least if the game developer initiates the creation of the voice profile or the voice clone – to the transfer, i.e. the upload, of the already existing voice recordings of the person's voice to the provider of the speech synthesis software for the purpose of training or the creation of a voice clone.

The traits and characteristics of a person's voice are likely to be considered 'personal data' of a 'data subject' as defined in the Art. 4 GDPR. Therefore, in parallel to the personal rights related consent for the intended commercial use as explained above, either (i) an informed consent for the processing of such personal data is required under data protection law for the upload and processing necessary for the creation and use of the voice clone or (ii) the processing of the personal data would have to be lawful pursuant to Art. 6 para. 1 lit. b GDPR (i.e. "necessity for the fulfillment of the contract"). In order to establish the lawfulness of the processing under Art. 6 para. 1 lit. b GDPR, the contractual provisions themselves would have to be sufficiently transparent – as before. In addition, it should be clearly defined how long the game developer has access to the voice clone and when and if it has to be deleted.

d) Limited Usability of old, pre-existing Recordings of the Game Developer for the Creation of Voice Clones

For clarification: If the game developer has recordings from previous productions or from the current production to be localized, that contain the voice of a contributor (e.g. voice actor, narrator, performer, actor), and if the game developer owns all rights to those recordings and performances, i.e. the unrestricted and comprehensive right of exploitation in edited or unedited form in all media for future productions, even if these include unknown types or kinds of use, this grant of rights is limited to the recording itself and the specific performance of the contributor as perceptibly included, i.e. fixed, in the already existing recording, pursuant to Sec. 73 et seq. GCA.

An extended interpretation of such a grant of rights to the effect that the voice itself with its features and characteristics, detached from the content and performance perceptibly fixed in the original recording and including the sounds (phonemes) and prosody typical of the contributor and thus the characteristics of the contributor's voice, could also have be included in such a grant of rights and therefore cloning the voice would no longer require separate consent, obviously goes too far and would not meet the above legal requirements.

Such grant of rights would only allow the processing of the specific recording, possibly also with AI tools, but not the "extraction" of the voice characteristics itself or the creation of a voice clone for the use it in another context or production. Any further use would therefore require qualified consent.

4. Parallel International Developments

Because of its special position as an identifying feature, the right to one's own voice is also protected in the USA by the extensive case law on the "right of publicity", which grants protection in addition to the "right of privacy".[18] The aforementioned disputes between the speakers Lehrmann v. Sage and Lovo Inc. and Scarlett Johannsson v. OpenAI are also ultimately based on these rights.

Even in China, in April 2024, the Beijing Internet Court upheld the lawsuit of a professional voice actress against the provider of an AI text-to-speech application, on the grounds that the imitation (cloning) and use of a voice using AI without consent constitutes a violation of her personal rights ("... of their personal rights").[19]

It is therefore clear that the right to one's own voice or, correspondingly, the right of publicity, from the user's perspective, will be the most important right to be considered in the creation of speech-synthesized voice recordings from the user's perspective, not only in Germany or in Europe, but also internationally.

5. Remuneration of the Speakers for their Voice Clones – Collective Rights Management

As described in I.2.b) above, there is currently no consistent or common remuneration structure for the creation and use of voice profiles or voice clones. Although the agreement between SAG-AFTRA and the major studios on the creation of "digital replicas" and their remuneration is an indication, it is questionable whether the per diems or daily fees[20] despite the physical absence of the actors and actresses contained therein will generally prevail, particularly for the voice-over and dubbing sector. There are already some remuneration schemes in place where certain voice actors are paid by from the provider of the speech synthesis software based on the number of times the voice profile is used. However, this seems to be isolated cases for now.

It is also being discussed whether, in the future, remuneration for the use of voice clones might possibly become the subject to collective societies exercising remuneration claims in the future. This is, of course, would still presuppose that the person concerned has given his or her prior consent to the creation of the voice clone. This remains to be seen. From a German perspective, the negotiation activities of associations BFFS and Verband Deutscher Sprecher:innen e.V. should be followed and the results might be able to provide information about the future of an adequate remuneration for the use of AI voices. On an international level, developments and the outcome of the strike called by SAG-AFTRA against major video game publishers which went into effect on July 26, 2024, should be closely monitored.

17 Analogous to Section 22 KUG, Schricker/Löwenheim, Urheberrecht/Götting, 6th ed. 2020, para. 44 with further references.
18 Götting/Schert/Seitz, HdB des Persönlichkeitsrechts/Schierholz, 2nd ed. 2019, Section 16 para. 5 with further references.
19 PM of the Beijing Internet Court on the decision of 23.4.2024, available at: https://english.bjinternetcourt.gov.cn/2024-04/24/c_706.htm.
20 Hansen ZUM 2024, 111 ff. and handout SAG-AFTRA "Regulating Artificial Intelligence – TV / Theatrical 2023, available at: https://www.sagaftra.org/files/sa_documents/AI%20TVTH.pdf.

Quick read ...

- The use of speech synthesis in the localization of games is possible in principle. In general, there are many available applications.
- Both nationally and internationally, the possibility of lawful use of a pre-existing voice or a voice created at the user's request essentially depends on the proper rights clearance of the right to the contributor's own voice. This requires the consent of the person concerned to the commercial exploitation of this special right of personality.
- When choosing a provider for speech synthesis, attention should be paid to the transparency regarding the consent of voice contributors and any references to the remuneration or participation of the voice contributors whose voices are used. Non-transparent providers should be avoided.
- Game developers and publishers should agree at an early stage whether certain voices of voice actors, celebrities or other contributors could also be considered as signature voices, fixed voices or voice clones for localizations in other languages and subsequent productions. If this is the case, this should be considered and specified in detail and transparently in the contributor's agreement when the person in question is commissioned to to create the original version of a performance (right to use the voice, i.e. create a voice clone, authorized scope of use of the voice clone, remuneration, obligation to delete).
- With regard to the development of market standard remuneration for the creation and granting of rights to a voice clone, the current negotiations between the national and international industry associations involved must be awaited and monitored.

Kai Florian Furch
is a partner in the media law firm Brehm & v. Moers Rechtsanwälte (BvM) in Berlin.

JULIAN KLAGGE / DUYGU ÜGE

AI and trade secret law in the games industry

Need for protection for trained AI models in games development

Protection of innovation

The use of artificial intelligence (AI) has become an integral part of the development of games and innovations in gameplay. The development and training of AI models are time-consuming and costly and as such create a need for protection for the developers or owners of economically valuable AI models. This article aims to shed some light on the uncertainties (under the lex lata) surrounding the protection of trained AI models under patent and copyright law and demonstrate that such AI models and their constituent elements can be protected as trade secrets while setting out the measures that must be taken to protect such AI models. reading time: 17 minutes

I. Introduction

The use of artificial intelligence (AI) has become an integral part of the games industry with the possible applications of AI models[1] being widely varied and constantly expanding.[2] The targeted use of AI models is becoming an increasingly important factor when it comes to a game's ability to be competitive and successful on the market. The potential for leveraging AI models in the games sector appears to be far from exhausted, as illustrated by the constant emergence of new AI-based functionalities in games development. Games developers often use existing, trained AI models from third-party providers and integrate them either into the development process or into the gameplay directly, depending on the relevant functionality. A current example would be the Avatar Cloud Engine (ACE) developed by the US giant, Nvidia, which sets out to revolutionise interactions with non-playable characters (NPCs).[3] ACE is a cloud-based AI model based on large language models (LLMs) trained for the specific purpose. Developers can then integrate the AI model into their games via interfaces, to enable players to communicate interactively with NPCs. This means that conversations with NPCs do not follow pre-determined scripts with dialogue recorded by voice actors but are instead, within set parameters, spontaneous and situation-specific.

Games studios are also developing and training proprietary AI models themselves to use in their own games. The French publisher and developer Ubisoft is a good example of this. Ubisoft has its „Neo NPC" project, a collaboration with Nvidia and Inworld, in which it is developing its own AI model for interactive communication with NPCs. The intention is to enable spontaneous, situational and therefore authentic conversations with NPCs based on a set of relevant parameters.[4] Another example from Ubisoft is the AI tool „Ghostwriter". The tool is based on an AI model that supports writers in the time-consuming creation of NPC dialogue and background chattering in open-world games while also generating, based on specified parameters and dialogue templates, additional suggestions for sentences spoken by NPCs, which the writer can accept, reject or modify.[5]

1 In the following, this is understood to mean generative machine learning models in the form of artificial neural networks; on how such models work and their training, see, e.g., Ebers/Heinze/Krügel/Steinrötter, Künstliche Intelligenz und Robotik/Niederée/Nejdl, 2020, § 2 marg. nos. 20 et seqq.; Söbbing MMR 2021, 111; Apel/Kaulartz RDi 2020, 24 (25 et seq.).

2 See the overview in the article by Hentsch/Rodenhausen MMR 2024, 714 (715 et seq.) – in this issue.

3 See https://www.nvidia.com/en-us/geforce/news/nvidia-ace-for-games-generative-ai-npcs/.

4 See https://news.ubisoft.com/en-us/article/5qXdxhshJBXoanFZApdG3L/how-ubisofts-new-generative-ai-prototype-changes-the-narrative-for-npcs; see also Grindel MMR 2024, 711 (711 et seq.) – in this issue.

5 See https://news.ubisoft.com/en-us/article/7Cm07zbBGy4Xml6WgYi25d/the-convergence-of-ai-and-creativity-introducing-ghostwriter; see also Furch MMR 2024, 728 (730) – in this issue.

Developing and training an own AI model requires considerable time and financial resources which normally results in the trained model having a high economic value. This inevitably raises the question as to how these models and their constituent elements can be protected with sufficient legal certainty against unauthorised use by third parties. This article seeks to address this question and show that, de lege lata, neither patent law nor copyright law offer sufficiently secure protection options for trained AI models and their elements but that practicable protection can be achieved via trade secret law.

II. Insufficient protection of trained AI models under patent or copyright law de lege lata

The particularly high relevance in practice of the protection of trained AI models under trade secret law becomes clear given the uncertainties of protection under patent or copyright law that exist de lege lata. The eligibility for protection of trained AI models under patent law and especially under copyright law is the subject of much debate. It requires a complex case-by-case assessment, the outcome of which is often unsatisfying for developers and owners of trained AI models due to the resulting unknowns in practice. In the following, we outline just the main barriers to patent or copyright protection for trained AI models.[6]

1. Patent protection of trained AI models?

According to Section 1 (1) of the German Patent Act (PatG) and Article 52 (1) of the European Patent Convention (EPC), patent protection is afforded to inventions in all fields of technology provided that they are new, involve an inventive step and are capable of industrial application. Patent protection is not available to mathematical methods and computer programs as such, as set out in Section 1 (3) Nos. 1 and 3 PatG, Article 52 (2) (a) and (c) EPC.

As a result, the algorithm underlying the trained AI model is not patentable as a mathematical, logical concept.[7] The same will generally apply, depending on the necessary case-by-case analysis, regarding the eligibility for patent protection of trained (and untrained) AI models as such. To overcome the grounds for exclusion under Section 1 (3) PatG and Article 52 (2) EPC, the claimed teaching must contain instructions which serve to solve a specific technical problem, using technical means, beyond the use of the data processing system or at least to influence such a problem.[8] As a pure software system, the neural network on which the AI model is based will generally be limited solely to the collection, processing, storage, evaluation and/or transmission of data and/or the provision of information, meaning that a technical problem is not solved.[9] The situation might be different for AI models if they are used in the context of so-called computer-implemented inventions to solve a specific technical problem and, for example, directly control the hardware used.[10] This also opens up possibilities, in the games sector and elsewhere, for incorporating such embedded AI software solutions, such as AI-powered controllers, into other patents. Whether the incorporation of AI models into patents makes sense in a particular case, bearing in mind the need to disclose the invention in a sufficiently clear manner, is another matter.[11]

2. Copyright protection of trained AI models as computer programs?

The protection of trained AI models as computer programs under Section 69a, Section 2 (1) No. 1 German Copyright Act (UrhG) is no less problematic and the subject of much debate. While software protection under copyright law for untrained AI models that can be perceived in code form and their „internal structure" may in principle be considered if the conditions for protection are met,[12] the copyright protection of trained AI models comes up against the limits of the understanding of what a computer program is de lege lata.[13] The BGH defines a computer program as a set of instructions capable, when incorporated in a machine-readable medium, of causing a machine having information-processing capabilities to display, perform or achieve a particular function, task or result.[14] The decisive criterion for a computer programme is therefore that it contains control commands[15] and represents its author's own intellectual creation.

Since ideas and principles underlying an element of a computer program are excluded from protection under Section 69a (2), sentence 2 UrhG, the algorithms underlying the trained AI model cannot be the subject of computer program protection under copyright law.[16] Even more significant with regard to trained AI models is the fact that all elements of a computer program that are not individually created by its author but are automatically generated by the computer system in the course of data processing, have no access to copyright protection due to the lack of an own intellectual creation. Thus, de lege lata, copyright protection for the weights of the neural connections of an AI model, generated as a result of the training, will likely be excluded from protection,[17] especially since these have no control function in themselves.[18] However, since these connection weights have a significant impact on the functionality and economic value of the trained AI model, the gaps in protection resulting from the copyright protection for computer programs are an issue for developers and owners of trained AI models.

3. Copyright protection of trained AI models as computer databases?

Finally, protection of trained AI models under the neighbouring rights for makers of databases pursuant to Section 87a UrhG is generally excluded. Section 87a (1), sentence 1 UrhG defines a database as a „collection of works, data or other independent elements arranged in a systematic or methodical manner and individually accessible by electronic or other means, the obtaining, verification or presentation of which requires a substantial qualitative or quantitative investment." Even just the criterion of the

6 For more detail, see, e.g., Ebers/Heinze/Krügel/Steinrötter, Künstliche Intelligenz und Robotik/Heinze/Engel, 2020, § 10 marg. nos. 24 et seqq.; Hartmann/Prinz DSRITB 2018, 769.

7 Söbbing MMR 2021, 111 (113); in general, see, Benkard, PatG/Bacher, 12th Ed. 2023, § 1 marg. no. 98c et seq. which states that the use of algorithms in a process for generating a technical outcome does not generally exclude the possibility of patent protection.

8 See BPatG (German Federal Patent Court) BeckRS 2015, 13810.

9 Ebers/Heinze/Krügel/Steinrötter, Künstliche Intelligenz und Robotik/Heinze/Engel, 2020, § 10 marg. no. 25, with reference to BPatG BeckRS 2015, 13810 and BGH (German Federal Court of Justice) GRUR 2009, 479 para. 12 – Steuerungseinrichtung für Untersuchungsmodalitäten; of a sceptical view, also Söbbing MMR 2021, 111 (113); Hetmank/Lauber-Rönsberg GRUR 2018, 574 (575).

10 Söbbing MMR 2021, 111 (113) cites, as an example of this, the AI-based control software for a robot vacuum.

11 Hoeren/Sieber/Holznagel, HdB Multimedia-Recht/Lampe, 59th Supplement 2023, part 29.2 marg. no. 29.

12 Apel/Kaulartz RDi 2020, 24 (27 et seq.); for detail, see: Hartmann/Prinz DSRITB 2018, 769 (776 et seqq.).

13 Wandtke/Bullinger, PK Urheberrecht/Grützmacher, 6th Ed. 2022, § 69a marg. no. 21; open to the possibility of copyright protection for trained AI models, Hartmann/Prinz DSRITB 2018, 769 (782 et seqq.)

14 BGH GRUR 1985, 1041 (1047) – Inkasso-Programm.

15 Fromm/Nordemann, Urheberrecht/Czychowski, 12th Ed. 2018, § 69a marg. no. 5.

16 Apel/Kaulartz RDi 2020, 24 (27); Ehinger/Stiemerling CR 2018, 761 (766).

17 Wandtke/Bullinger, PK Urheberrecht/Grützmacher, 6th Ed. 2022, § 69a marg. no. 21; Apel/Kaulartz RDi 2020, 24 (27); of a different opinion, Hartmann/Prinz DSRITB 2018, 769 (783 et seqq.).

18 Ebers/Heinze/Krügel/Steinrötter, Künstliche Intelligenz und Robotik/Heinze/Wendorf, 2020, § 9 marg. no. 50; Ehinger/Stiemerling CR 2018, 761 (766 et seq.).

database elements being independent cannot be said to apply to trained AI models. Database elements are deemed to be independent if they can be separated from one another without impairing the value of their informative, literary, artistic, musical or other content.[19] The connection weights between the individual neurons in a trained AI model do not meet this criterion, however. Although the weighting information does have a specific meaning, from the perspective of a third party it has no use beyond the context of the specific neural network; it is therefore not independent of the other information about the weights of the neural connections.[20] The value of the weighting information of individual neuronal connections of the trained AI model is based precisely on the fact that they are related to each other.[21]

Further difficulties in terms of separation arise when considering which substantial investments within the meaning of Section 87a (1), sentence 1 UrhG can be taken into account when trying to justify the existence of neighbouring rights, especially with regard to a trained AI model and the weights of the connections between individual neurons it contains, which significantly determine the value of the AI model. These are only generated automatically in the course of the training of the AI model. Under the law, the cost and effort for generating the data contained in a database must explicitly be excluded.[22] It is doubtful that the weighting information produced during the training of the AI model can still be subsumed under the cost and effort required to obtain, verify or present the data contained in the database.[23]

III. Protection of trained AI models via the law governing trade secrets

The obstacles to the protection of trained AI models under patent or copyright law outlined above lead one to consider their protection at least as trade secrets. The protection of trade secrets was reorganised in the Directive on the Protection of Trade Secrets[24] and the German Trade Secrets Act (GeschGehG), the legislation with which the Directive was implemented here.[25] Owners of trade secrets are entitled to a number of claims against infringers who unlawfully obtain, use or disclose the trade secret. The protection of AI models as trade secrets could be decisive for companies in the games industry needing to assert claims for unauthorised use by third parties.

Section 2 No. 1 GeschGehG provides the definition of the key term, trade secret. According to that provision, a trade secret must be information which is not generally known or readily accessible, either as a whole or in the precise arrangement and composition of its component parts, to persons in the circles which normally handle this type of information and which is therefore of economic value. In addition to the secrecy criterion, the information to be protected must be the subject of measures to maintain secrecy by its rightful owner which are appropriate in the circumstances. Finally, the owner of the information must have a legitimate interest in maintaining secrecy.

1. Trained AI models and their constituent elements as „information"

The definition of information under Section 2 No. 1 GeschGehG covers information of any kind, such as facts, data, circumstances and processes, irrespective of how these are embodied,[26] such that information which only exists virtually (e.g. in cloud storage) is also covered.[27] Individual pieces of information (data points) as well as data sets and data pools are eligible for protection.[28]

This broad definition of information means that information and data related to trained AI models, which is excluded from patent or copyright protection or for which such protection is very uncertain, are in principle eligible for protection as trade secrets. It is necessary that this information and data has been expressed or perpetuated in a way that allows it to be protected by appropriate secrecy-preserving measures.[29]

The algorithms on which the trained AI model is based[30] and the weights of the connections contained in the neural network, which significantly determine the economic value of the trained AI model,[31] are therefore also eligible for protection under trade secret law. The weights are normally technically isolated as data and can be stored separately, reproduced and transferred to a structurally similar neural network (in terms of volume and arrangement of neurons and their connections).[32] Finally, the protection of trade secrets can also extend to the data and content generated by trained AI models as well as the training data used.[33] In principle, therefore, comprehensive protection as trade secrets is possible for trained AI models and their constituent elements.

2. Secret and economic value of the trained AI model and its constituent elements

That the information is secret is an essential criterion for the establishment of trade secret protection. Section 2 No. 1 (a) GeschGehG requires that the information is not generally known or readily accessible, either as a whole or in its exact arrangement and composition. The information may only be known to or accessible by a limited group of people.[34] It must therefore neither be part of the common knowledge of the general public or of an average person belonging to the relevant specialist group,[35] nor be readily accessible or usable by an interested person without a major expenditure of time and money.[36] Information containing generally known elements may still constitute secret information and fall within the scope of the law.[37] The decisive factor is that the combination of known and unknown parts of the information is secret. If the information is se-

19 CJEU GRUR 2005, 254 marg. no. 29 – Fixtures-Fußballballspielpläne II; BGH MMR 2016, 689 para. 19 – TK 50 II.
20 Ebers/Heinze/Krügel/Steinrötter, Künstliche Intelligenz und Robotik/Heinze/Wendorf, 2020, § 9 marg. no. 54.
21 Apel/Kaulartz RDi 2020, 24 (29).
22 CJEU MMR 2005, 29 marg. nos. 31 et seqq. with remarks by Hoeren – British Horseracing; BGH MMR 2011, 676 para. 19 – Zweite Zahnarztmeinung II.
23 Correctly referring to this point, Apel/Kaulartz RDi 2020, 24 (28); Sassenberg/Faber, Rechtshandbuch Industrie 4.0 und Internet of Things /Kuss/Sassenberg, 2nd Ed. 2020, § 13 marg. no. 49; in favour, e.g., Hacker GRUR 2020, 1025 (1030).
24 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.
25 Ohly/Sosnitza, UWG/Ohly, 8th Ed. 2023, preliminary remarks on GeschGehG marg. no. 13 et seq.; Köhler/Bornkamm/Feddersen, UWG/Alexander, 42nd Ed. 2024, UWG prior to § 1 marg. no. 45.
26 Keller/Schönknecht/Glienke, GeschGehG/Keller, 2021, § 2 No. 1 marg. no. 15.
27 Köhler/Bornkamm/Feddersen, UWG/Alexander, 42nd Ed. 2024, GeschGehG § 2 marg. no. 25a.
28 See Krüger/Wiencke/Koch GRUR 2020, 578 (580).
29 Köhler/Bornkamm/Feddersen, UWG/Alexander, 42nd Ed. 2024, GeschGehG § 2 marg. no. 26.
30 BGH MMR 2014, 489 para. 27 with remarks by Taeger – Scorewerte.
31 Sassenberg/Faber, Rechtshandbuch Industrie 4.0 und Internet of Things/Kuss/Sassenberg, 2nd Ed. 2020, § 13, marg. no. 50.
32 Ehinger/Stiemerling CR 2018, 761 (766 ff.); Ebers/Heinze/Krügel/Steinrötter, Künstliche Intelligenz und Robotik/Heinze/Wendorf, 2020, § 9 marg. no. 50.
33 Bußmann/Glasowski/Niehaus/Stecher RDi 2022, 391 (393 et seq.); Hacker GRUR 2020, 1025 (1032).
34 OLG Stuttgart [Appeal Court of Stuttgart] GRUR-RS 2020, 35613 para. 109 – Schaumstoffsysteme.
35 Köhler/Bornkamm/Feddersen, UWG/Alexander, 42nd Ed. 2024, GeschGehG § 2 marg. no. 35.
36 OLG Düsseldorf (Appeal Court of Düsseldorf) MMR 2022, 68 para. 32 – Konstruktionszeichnung für Zentrifugentrommel.
37 Krüger/Wiencke/Koch GRUR 2020, 578 (580); Ohly GRUR 2019, 441 (443); BeckOK GeschGehG/Hiéramente, 19th Ed. 15 March 2024, GeschGehG § 2 marg. no. 8.

cret, it must also have a clear economic value which must be based at least partly on the fact that it is secret.[38] The economic value is not determined by the market value of the secret.[39] A potential economic value for the owner of the trade secret can suffice.[40]

These further requirements of trade secret protection will generally be deemed to be met if the developers or owners of trained AI models have taken appropriate precautions. Both the algorithms created for a particular functionality of the AI model and the weights of the neural connections generated in the course of the training will sometimes require, in the context of the development and training of an AI model (depending on complexity) enormous costs in terms of time and financial resources. It is specifically the weights of the individual neuronal connections, that determine the value of a trained AI model, that are the result of a time-consuming and cost-intensive training process and are therefore neither easily accessible to third parties nor common knowledge. The associated economic value of the trained AI model and its constituent elements will generally be beyond question. This applies incidentally also to the training data used to train the AI model. Even if these can be described as generally known and accessible when looked at individually, their specific compilation and qualitative preparation for training the AI model is typically not known across the industry.[41]

3. Appropriate measures to maintain secrecy

A decisive factor for the establishment of trade secret protection is that measures to maintain secrecy have been instituted that are appropriate in the circumstances, Section 2 No. 1 (b) GeschGehG. Possible measures in this regard include all technical, organisational and legal means that are capable of preventing or impeding the unauthorised acquisition, use and disclosure of secret information.[42] What specific secrecy-preserving measures are necessary depends on the type of trade secret and the exact circumstances surrounding its use.[43] The crucial factor is that the relevant information is demonstrably being actively protected.[44]

To protect their AI models, games companies are therefore strongly advised to actively set up and, for the avoidance of doubt, to document strict measures for maintaining secrecy.[45]

Effective technical protection measures such as encryption and password protection, with regularly updates, should always be employed. In addition, organisational measures to protect the trained AI model will play a key role. These include an inventorisation, documentation and classification of the information requiring protection in as much detail as possible.[46] Strict physical and digital access restrictions should also be established. Access to the AI model should only be granted to those employees (specifically developers) who need the associated information to perform their tasks (need-to-know principle) and are contractually bound to observe confidentiality.[47] It is also advisable, in the scope of the necessary trade secret compliance, to familiarise employees with the importance of trade secret protection and the applicable rules and processes within the company by means of internal guidelines and instructions and to regularly remind employees to comply with them.[48] Particular attention must be paid in this regard when an AI model is jointly developed by several development studios of a games company across multiple locations.

If external persons are involved in the development and training of the AI model, companies are strongly advised to put in place express non-disclosure agreements (NDAs) as a legal protection measure. Particular care must be taken to define or categorise the information to be kept secret in such a way that the content and scope of the duty to observe secrecy are sufficiently clear to all relevant parties.[49] Sweeping confidentiality obligations in the form of catch-all clauses that cover practically all company information are normally considered invalid.[50]

When it comes to marketing the product concerned, games companies have the simple possibility of retaining the trained AI model containing the associated base of data, when incorporating the model into the game, on its own systems or cloud-based (software as a service) and not to have it installed on the customer's infrastructure.[51] Such a solution can substantially reduce the risk of reverse engineering (Section 3 (1) No. 2 GeschGehG) as well as permitted decomplilation (Section 69e UrhG) but also newer forms of attack such as membership inference attacks and model inversion attacks which aim to reconstruct the training data used.[52]

4. Legitimate interest in maintaining secrecy

Finally, Section 2 No. 1 (c) GeschGehG requires a legitimate interest in maintaining secrecy on the part of the owner of the information.[53] The owner must have both a legitimate interest in secrecy and a legitimate expectation that secrecy will be maintained.[54] The background to this requirement is to exclude those confidentiality interests of which the law disapproves.[55]

Games companies will generally have a legitimate interest in keeping the AI models used in the development phase and in the games themselves secret. It is precisely this know-how in developing the right AI model that can provide a crucial competitive advantage over rival companies and be decisive for the success of a game.

IV. Legal consequences and impact in practice

If the trained AI model is protected as a trade secret, the owner will be entitled, in cases where a third party obtains, uses or discloses it, to claims for information, injunctive relief, surrender and recall of infringing products under Sections 6 et seqq. GeschGehG as well as claims for damages under Section 10 GeschGehG. The claims available do not differ in this regard from those relating to classic, exclusive intellectual property rights. Unlike classic intellectual property rights, however, trade secret rights do not give rise to an exclusive right to the know-how protected as a trade secret.[56] Instead, the protection of trade secrets creates a relationship between a person and the in-

38 Harte-Bavendamm/Ohly/Kalbfus, GeschGehG/Harte-Bavendamm, 2nd Ed. 2024, § 2 marg. no. 37.
39 Ohly GRUR 2019, 441 (443).
40 Ohly GRUR 2019, 441 (443).
41 Hacker GRUR 2020, 1025 (1032);
42 Harte-Bavendamm/Ohly/Kalbfus, GeschGehG/Harte-Bavendamm, 2nd Ed. 2024, § 2 marg. no. 42.
43 BT Printed Paper 19/4724, 24.
44 Harte-Bavendamm/Ohly/Kalbfus, GeschGehG/Harte-Bavendamm, 2nd Ed. 2024, § 2 marg. no. 41; LAG Düsseldorf (Higher Labour Court of Düsseldorf) MMR 2021, 181 para. 80 – PU-Schaum; OLG Schleswig MMR 2022, 565 marg. no. 45.
45 Illustrative with suggested clauses, Apel/Kaulartz RDi 2020, 24 (31 et seqq.).
46 Köhler/Bornkamm/Feddersen, UWG/Alexander, 42nd Ed. 2024, GeschGehG § 2 marg. nos. 55 et seqq.
47 OLG Stuttgart GRUR-RS 2020, 35613 para. 170.
48 Apel/Kaulartz RDi 2020, 24 (31).
49 LAG Düsseldorf MMR 2021, 181 para. 80.
50 With additional references, Köhler/Bornkamm/Feddersen, UWG/Alexander, 42nd Ed. 2024, GeschGehG § 2 marg. no. 61c.
51 Specifically referring to this, Apel/Kaulartz RDi 2020, 24 (31); see also the AI model Nvidia ACE, described in part I.
52 Apel/Kaulartz RDi 2020, 24 (31).
53 Criteria for the requirement of legitimate interest, Ohly GRUR 2019, 441 (444).
54 See Recital 14 of Directive (EU) 2016/943.
55 Köhler/Bornkamm/Feddersen, UWG/Alexander, 42nd Ed. 2024, GeschGehG § 2 marg. no. 78 et seq.
56 Recital 16 of Directive (EU) 2016/943; Hauck NJW 2016, 2218 (2221); critical on this point, Hohendorf, Know-how-Schutz und Geistiges Eigentum, 2020, pp. 249 et seqq.

formation and thus only protects a factual state that depends on the conditions for protection being met, specifically on the fact that the information is secret.[57] If the AI model is not protected by appropriate measures or if the information ceases to be secret at a later time, the protection afforded by the right to trade secrets also ceases to apply. It is therefore primarily the state of being secret and thus the factual state which is legally protected.[58]

For trained AI models to be protected under trade secret law, it is therefore crucial to establish appropriate measures to preserve secrecy and, in the event of dispute, to prove such measures exist. Hence, the specific protective measures should be precisely documented and regularly checked to ensure that they are technically up to date.[59] While a lack of proof does not prevent the possible licensing of trade secrets, a lack of protective measures does lead to the loss of the claims that trade secret law grants the owner in the event of unauthorised access.[60]

V. Conclusion

Due to the uncertainties that often exist around the patent or copyright protection of trained AI models, protection as a trade secret offers a valuable and practicable alternative for developers or owners of such models, particularly in the games industry. Even if trade secret law does not grant exclusive protection in the sense of traditional intellectual property law, it leads to far-reaching prohibition claims against third parties provided appropriate measures maintaining secrecy are employed. A further advantage of protection as a trade secret is that protection can be obtained for the trained AI model as a whole as well as for individual elements of the AI model that cannot be protected under patent or copyright law, such as the algorithms underlying the AI model or the weights of the neural connections of the trained model. The owners of such economically valuable AI models are therefore strongly advised to institute measures to maintain secrecy in relation to their AI models, to document them and to ensure they are constantly up to date with the latest technical developments.

Quick read ...

- In addition to AI models from third-party providers, games developers are increasingly using their own AI models, developed and trained in-house, for innovative new features in their games. There is a significant need for protection of such AI models, due to the investment of time and financial resources in their development and training.
- Protection under patent or copyright law for trained AI models in the games sector regularly fails, under the lex lata, due to the specific protection requirements or grounds for exclusion that exist. In contrast, such AI models can be protected as trade secrets and this protection can also extend to elements that cannot be protected under patent or copyright law (e.g. algorithms, weights of the neuronal connections of a trained AI model).
- Developers or owners of trained AI models in the games sector are strongly advised to establish strict measures to maintain secrecy from a technical, organisational and contractual perspective, to protect their economically valuable AI models at least via trade secret law.

Dr. Julian Klagge
is an attorney at law and partner at NORDEMANN in Berlin.

Duygu Üge
is an attorney at law at NORDEMANN in Berlin.

57 Ohly GRUR 2014, 1 (3); BT Printed Paper 18/4724, 19.
58 Ohly GRUR 2014, 1 (3).
59 Apel/Kaulartz RDi 2020, 24 (31).
60 Bußmann/Glasowski/Niehaus/Stecher RDi 2022, 391 (395 et seq.).

MMR MultiMedia und Recht

Zeitschrift für IT-Recht und Recht der Digitalisierung

ISSN 2698-7988

Redaktion: Anke Zimmer-Helfrich, Chefredakteurin (V.i.S.d.P); Ruth Schrödl, Redakteurin; Christine Völker-Albert, Redakteurin; Eva Wanderer, Redaktionsassistentin; Wilhelmstr. 9, 80801 München, Postanschrift: Postfach 40 03 40, 80703 München, Telefon: 089/381 89-427, Telefax: 089/38189-625, E-Mail: mmr@beck.de.

twitter.com/MMRZeitschrift
de.linkedin.com/showcase/zeitschriftmmr

Manuskripte und andere Einsendungen:
Alle Einsendungen sind an die o. g. Adresse zu richten. Es besteht keine Haftung für Manuskripte, die unverlangt eingereicht werden. Sie können nur zurückgegeben werden, wenn Rückporto beigefügt ist. Die Annahme zur Veröffentlichung muss in Textform erfolgen. Mit der Annahme zur Veröffentlichung überträgt die Autorin/der Autor dem Verlag C.H.BECK an ihrem/seinem Beitrag für die Dauer des gesetzlichen Urheberrechts das exklusive, räumlich und zeitlich unbeschränkte Recht zur Vervielfältigung und Verbreitung in körperlicher Form, das Recht zur öffentlichen Wiedergabe und Zugänglichmachung, das Recht zur Aufnahme in Datenbanken, das Recht zur Speicherung auf elektronischen Datenträgern und das Recht zu deren Verbreitung und Vervielfältigung sowie das Recht zur sonstigen Verwertung in elektronischer Form. Hierzu zählen auch heute noch nicht bekannte Nutzungsformen. Das in § 38 Abs. 4 UrhG niedergelegte zwingende Zweitverwertungsrecht der Autorin/des Autors nach Ablauf von 12 Monaten nach der Veröffentlichung bleibt hiervon unberührt.

Peer-Review-Verfahren: Jeder Beitrag wird vor Abdruck von der Schriftleitung und ferner von zwei Gutachtern in anonymisierter Form gelesen und bewertet

Redaktionsrichtlinie C.H.BECK:
Redaktionsrichtlinien und Werkabkürzungen sind im Zitierportal des Verlags C.H.BECK abrufbar: www.zitierportal.de

Anzeigenabteilung: Verlag C.H.BECK,
Anzeigenabteilung, Wilhelmstraße 9, 80801 München, Postanschrift: Postfach 40 03 40, 80703 München.
Media-Beratung: Telefon (0 89) 3 81 89-687, Telefax (0 89) 3 81 89-589.
Disposition, Herstellung Anzeigen, technische Daten: Telefon (089) 381 89-609, Telefax (089) 38189-589, E-Mail: anzeigen@beck.de
Verantwortlich für den Anzeigenteil: Dr. Jiri Pavelka.

Verlag: Verlag C.H.BECK oHG, Wilhelmstr. 9, 80801 München, Postanschrift: Postfach 40 03 40, 80703 München, Telefon: (0 89) 3 81 89-0, Telefax: (089) 38189-398, Postbank München IBAN: DE82 7001 0080 0006 2298 02, BIC: PBNKDEFFXXX. Amtsgericht München, HRA 48 045. Gesellschafter sind Dr. Hans Dieter Beck und Dr. h. c. Wolfgang Beck, beide Verleger in München.

Erscheinungsweise: Monatlich.

Bezugspreise 2024: Jahresabo € 539,– (inkl. MwSt.). Vorzugspreis für Mitglieder der davit und Kooperationspartner jährlich € 409,– (inkl. MwSt.). Einzelheft € 55,– (inkl. MwSt.). Versandkosten jeweils zuzüglich. Die Rechnungsstellung erfolgt zu Beginn eines Bezugszeitraumes. Nicht eingegangene Exemplare können nur innerhalb von 6 Wochen nach dem Erscheinungstermin reklamiert werden. Jahrestitelei und -register sind nur mit dem jeweiligen Heft lieferbar.
Hinweise zu Preiserhöhungen finden Sie in den beck-shop AGB unter Ziff. 10.4.

Bestellungen über jede Buchhandlung und beim Verlag.

KundenServiceCenter:
Telefon: (0 89) 3 81 89-750,
Telefax: (0 89) 3 81 89-358.
E-Mail: kundenservice@beck.de

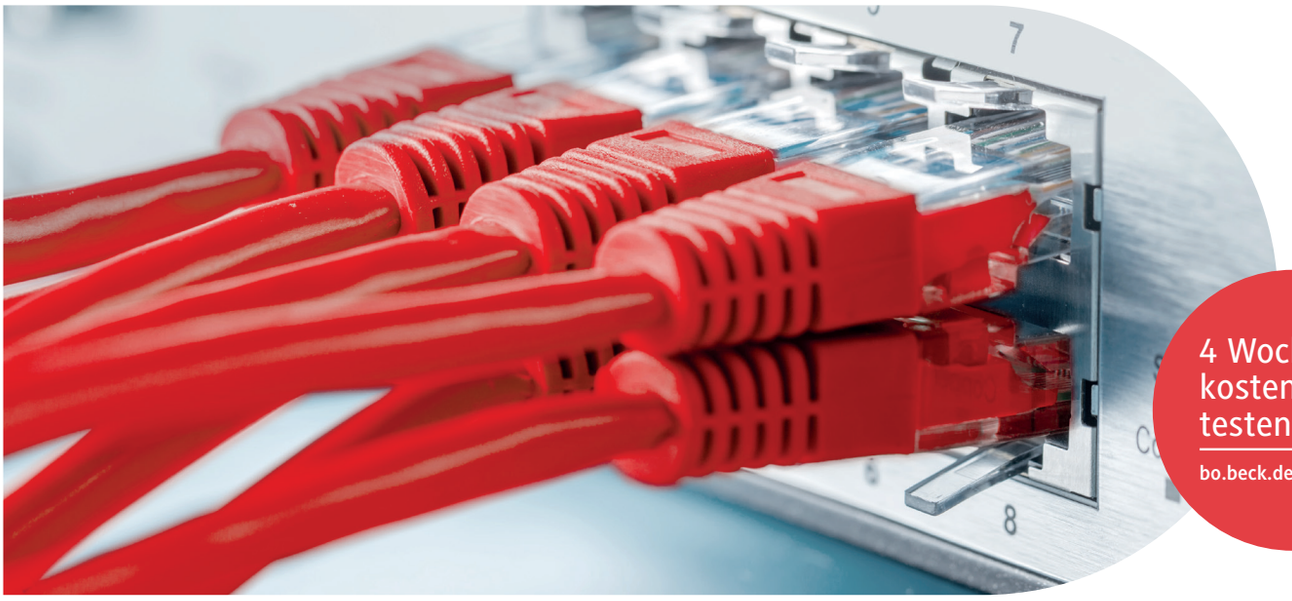
Abbestellung:
Abbestellfristen finden Sie unter: www.beck-shop.de/mmr-zeitschrift-it-recht-digitalisierung/product/1584

Hinweis gemäß Art. 21 Abs. 1 DS-GVO: Bei Anschriftenänderung kann die Deutsche Post AG dem Verlag die neue Anschrift auch dann mitteilen, wenn kein Nachsendeauftrag gestellt ist. Hiergegen kann jederzeit mit Wirkung für die Zukunft Widerspruch bei der Post AG eingelegt werden.

Satz: FotoSatz Pfeifer GmbH, 82152 Krailling.

Druck: Druckerei C.H.BECK, Bergerstraße 3–5, 86720 Nördlingen.

beck-online
DIE DATENBANK



4 Wochen kostenlos testen!
bo.beck.de/0376310

Datenwirtschaftsrecht und IT-Recht

Effizient arbeiten – wann und wo Sie wollen

Schnell, sicher & smart – mit den Fachmodulen von beck-online gestalten Sie Ihre Fallbearbeitung noch rascher, effektiver und zuverlässiger.

Neu: Datenwirtschaftsrecht PLUS

PLUS

Den Überblick über das immer wichtiger werdende Datenwirtschaftsrecht behalten Sie mit den zahlreichen Kommentaren und Handbüchern dieses neuen Moduls, darunter **Borges/Keil (Hrsg.), Big Data, Handbuch (Nomos), Podszun, Digital Markets Act: DMA, Paschke/Rücker, Data Governance Act sowie dem BeckOK Datenschutzrecht, Hrsg. Wolff/Brink/v. Ungern-Sternberg.**

€ 59,–/Monat* | Modulinfo & Preise online: bo.beck.de/135431

IT-Recht PLUS

PREMIUM

Die ideale Grundausstattung für Ihre tägliche Arbeit: Mit Highlights wie der Zeitschrift **MMR, Spindler/Schuster, Recht der Elektronischen Medien** und **BeckOK Informations- und Medienrecht, Hrsg. Gersdorf/Paal.**

€ 115,–/Monat* | Modulvergleich & Preise online: bo.beck.de/037631

IT-Recht PREMIUM

PLUS

Mit zusätzlichen renommierten Werken wie: **Auer-Reinsdorff/Conrad, Handbuch IT- und Datenschutzrecht, Paschke/Berlit/Meyer/Kröner, Hamburger Kommentar Gesamtes Medienrecht** und **Bräutigam/Rücker, E-Commerce.**

€ 179,–/Monat* | Modulvergleich & Preise online: bo.beck.de/094931

*Normalpreis für bis zu 3 Nutzer, Vorzugspreis teilweise verfügbar, zzgl. MwSt., 6-Monats-Abo

Verlag C.H.BECK oHG, Wilhelmstraße 9, 80801 München | 174722 | Folgen Sie uns auf Mehr Infos: ch.beck.de/socialmedia

beck-online.DIE DATENBANK genügt.

C.H.BECK