Algorithmic Competition from the Perspective of EU Law: Framing the Concept and Identifying Issues of Concern

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ABSTRACT

This paper examines the impact of artificial intelligence on the functioning and the regulation of competition within the European common market. It argues that algorithmic economy demonstrates peculiarities that the EU legislator could not have taken into account when enacting EU competition law. The judicial adaptation of the pertinent provisions in force to contemporary business practices deploying smart technology reflects inevitably economic and political aspirations which have not been yet crystalized at EU level. This causes contradictory court decisions and legal uncertainty. Moreover, the autonomy of smart software raises liability and enforcement concerns. To resolve these issues, European Jurisprudence needs to consult technological feedback, which is though constantly revised and updated. In view of these challenges, this paper advocates the need of a reformed regulatory regime for competition in the EU, which is responsive to the competitive risks posed by the increasing AI involvement in business practice.

CCS Concepts

• Applied computing → Enterprise computing, Electronic commerce • Computing methodologies → Artificial intelligence, Machine learning.

Keywords

Algorithms; Artificial Intelligence; Big Data; Disruptive Innovation; ADS; Economies of Scale; Zero-profit markets; Network Effects; Competition Law; Common Digital Market; Anticompetitive Leveraging; Exploitative Abuse; Collusion.

1. INTRODUCTION

The following analysis comments upon the readiness and adequacy of EU competition law in force to deal with the challenges posed by the intense use of artificial intelligence (AI) in business practice. The competitive implications of AI can arguably compose the concept of "algorithmic competition". To justify this connotation the paper will firstly define the association between algorithms and AI and will then clarify the impact of the latter on contemporary economy. In this context, the significance of smart software for accumulating market power will be substantiated. The paper will subsequently examine anticompetitive business practices which can be facilitated by AI. Based on relevant case-law and legal research's insights, the paper will finally indicate inconsistencies in the European legal order that impede competition within the algorithmic economy and will advocate any necessary reforms.

2. DEFINING THE CONCEPT OF ALGORITHMIC COMPETITION

2.1 Algorithms, Computer Systems and AI

According to a well-established definition, an "algorithm" is a method to perform a task, outlined in a finite sequence of predefined steps. In the context of computer programming, human instructions of how to perform individual tasks are being translated in a language understandable by the computer's central processing unit. Consequently, the source code of any computer program is in principle an algorithm coded in programming language.

In its basic form, AI refers to the ability of machines to respond to external stimuli and solve problems conferred to them through programming. This intelligence can be lower or higher depending on the complexity of the underlying program's algorithmic code. For instance, software programmed to automatically adjust the settings of a camera to environmental conditions is smarter than the one used to calculate taxes. The reason is that the source code of the former program, unlike the one of the latter, is capable to quantify vague variables which are not susceptible to absolute answers of the type "yes or no". Both applications, however, fall under the so-called "symbolic artificial intelligence", which relies on the encoding of human expertise and can perform tasks automatically to the extent that it is accordingly instructed. In its most advanced form, AI is getting detached from programming and relies on machine learning techniques. These train the underlying program's algorithmic code on data, thus making it capable to adapt to unspecified situations without explicit human modelling[1].

2.2 Market Competition in the Algorithmic Economy

According to the above, algorithms form the core of AI, which in principle governs all computer systems. While machine learning algorithms bring AI closer to human intellect, smart software

[1] See in detail European Parliament Briefing, *How artificial intelligence works*, PE 634.420, March 2019.

WAIEL2020, September 3, 2020, Athens, Greece

penetrates all transaction fields and transforms global economy. Nowadays, manufacturing and service provision are getting increasingly automated[2]. Innovative products and functionalities are launched onto digital[3] and conventional markets[4]. Besides, business practice relies to an increasing degree on automated decision-making. This means that companies entrust procedures like product optimization and pricing, service personalization, marketing targeting, financial risk management, etc. on data analysis and algorithmic assessments. Under these circumstances, algorithms and machine learning models have turned into tradeable goods of significant value and high marketability. As a result, new business activities emerge in this field. Such is for instance the intermediation in the sale of prefabricated algorithms and machine learning models pursued by the online marketplace "Algorithmia.com".

Within this financial landscape, the concept of algorithmic competition receives a dual meaning. On the one hand, it refers to the competition taking place in those markets where algorithms, smart software and artificial intelligence applications are themselves the object of trading. On the other hand, algorithmic competition is the one exercised in any single market by means of algorithms. In this case, artificial intelligence is treated as an input, e.g. an ingredient, to boost competitiveness and financial strength.

2.3 Establishing Market Dominance by Means of Algorithms

The concept of market dominance refers to the financial strength enjoyed by an undertaking which enables it to have significant impact on the conditions under which competition is developed in a market. It is determined primarily by an undertaking's high market shares, i.e. volume of sales within a predefined timeframe. AI assists undertakings in establishing and reinforcing dominance in the above sense in multiple ways.

In economic terms, the obvious significance of smart algorithms lies in fostering innovation in both the analog and the digital environment. By releasing innovative products and services into the market companies open new fields for competition which they initially monopolize. Innovation adoption can also enhance a company's brand effect, i.e. reputation and popularity, thus influencing consumer purchasing behaviour in its favor and increasing its market shares.

By means of AI businesses can moreover achieve economies of scale, i.e. save costs and prevent the loss of profits, in different ways. Such results can be achieved for instance through the automation of corporate operations, which leads to staff and production costs reduction. Besides, algorithmic prognostication implemented in the context of profiling and scoring leads to more accurate marketing targeting and safeguards bad debt avoidance. These saving-up benefits give companies the opportunity to reduce their prices and invest capital in further improving their infrastructure, thus gaining significant competitive advantage over their rivals in the relevant market.

In the digital environment in particular, machine-learning algorithms also amplify the network effects of multisided platforms. This term refers to sites which facilitate direct interaction between several distinct groups of users. For example, app stores like "Google Play" connect mobile app developers with smart device users. Social networks like "Facebook" connect end- and business users. By the same token, online marketplaces like "Amazon" connect retailers with potential customers, while search engines like "Google Search" bring together website owners, end-users, and advertisers. Because such platforms commonly offer their services free of charge to end-users, they have been characterized as "zero price" markets[5]. In fact, they make profit by monetizing their "network effects"[6].

According to the relevant economic model, platform providers seek to attract end-users to their open-access network in order to increase the visitation of their platform. This popularity is then redeemed by encouraging business users, who seek exposure to potential customers, to join the platform for selling or advertising their products. Hence, multisided platforms gain revenues by charging third-party advertising assignments and/or by collecting selling fees. To maximize their network effects, digital platforms utilize smart software.

Google algorithms, for instance, optimize the relevance of Google Search results with user queries and accelerate the display of the corresponding rankings. In this way, the platform enhances its credibility towards end-users and increases its traffic, thus inciting proportionally more businesses to use its services. Besides, by means of algorithms Google can achieve more personalized and effective third-party sales promotion, thus safeguarding the loyalty of business users to its search engine in lieu of its competitors. Consequently, through the algorithmic optimization of their services multisided platforms can keep all sides of their network growing, thus increasing their profits and market shares[7].

2.4 Algorithmic vs Data Competition

Algorithmic competition in the aforementioned sense is data driven. As implied above, modern machine-learning algorithms can configure their parameters independently to tackle random problems, based on the experience they gain through training data. Therefore, the operation of AI is inextricably linked to data analysis.

In view of the above, it can be argued that algorithms can yield the competitive benefits described, inasmuch as they get trained on big data. In this context, the term "data" refers to both personal data, i.e. those identifying natural persons, and any piece of business-related information which is competitively sensitive. This assumption, however, raises the question as to whether the raw material of economic power consists today in the accumulation of large datasets or in the advanced technology processing such data to serve commercial purposes.

Regarding this speculation, it must be firstly acknowledged that data have turned nowadays into tradeable goods of significant value. This is evidenced, for instance, by the fact that they are commonly treated as an in-kind compensation for gaining access

[2] E.g. industrial and surgical robots, legaltech programs, etc.

[3] E.g. auto-complete, web search, voice match and GPS functionalities, facial recognition apps, bar code readers, chatbots, etc.

[4] E.g. self-driving vehicles, etc.

[5] Douglas A. Melamed and Nicolas Petit, *The misguided assault on the consumer welfare standard in the age of platform markets*. (2019) 54 Rev Ind Organ 741, 754 et seq.

[6] See Paul Belleflamme and Martin Peitz 2016, *Platforms and network effects*. Working Paper Series 16-14, University of Mannheim, Department of Economics, September 2016. http://hdl.handle.net/10419/149591.

[7] See Eleni Tzoulia 2020, *Competition law issues*. In: Iglezakis I (Ed) *Legal Issues of Mobile Apps - A Practical Guide*. Wolters Kluwer, pp. 177-210, 193 et seq.

to digital services and content. Moreover, business activities like data brokering are booming. These developments have prompted the EU legislator to regulate relevant transactions at both a Business-to-Business (B2B) and a Business-to-Consumer (B2C) level[8].

In the light of competition law, the economic significance of data is twofold. On the one hand, it lies in their function as a stand-alone commodity, which is sold and bought in the market like any conventional product. On the other hand, it refers to their function as an input which serves the production, distribution, and promotion of a company's final product onto the market.

With respect to the latter function, it has been declared by European Jurisprudence that gaining a competitive lead in the relevant market is not associated with the mere amount of data possessed by a company. What matters most is the type of data collected, their quality and variety, and their relevance to the purpose served by their processing[9]. It can be therefore argued that the competitive benefits of big data in their capacity as a corporate input relate to their fitness for algorithmic decision-making and derive from their analysis, which nowadays is highly automated, i.e. algorithmic. In this sense, data competition represents a facet of algorithmic competition and it is examined accordingly herein.

3. ALGORITHMIC COMPETITION UNDER THE SCRUTINY OF EU COMPETITION LAW

This section examines anti-competitive business practices facilitated by AI software which have already preoccupied European courts and the legal theory. The objective of this analysis is to identify adversities faced by the competent authorities when called to subsume instances of algorithmic competition under the applicable provisions and doctrines of EU competition law. Certain implications of AI protection with intellectual property rights (IPR) for competition law enforcement will be also commented upon.

3.1 Anticompetitive Leveraging Facilitated by Algorithms

Article 102 TFEU prohibits undertakings from abusing their market dominance in any way likely to extinguish their competitors and diminish consumer choice. Power abuses in a dominated market may distort competition in a separate market, where the violator is also active. Dominant platform providers, for instance, are often engaged in retail markets and compete against firms which are using their platform as an upstream input to reach the consumer. In such cases, anticompetitive leveraging of market power from the dominated upstream onto the non-dominated downstream market may be demonstrated e.g. as refusal to supply downstream competitors with the upstream input, excessive billing of the upstream services, as well as in any form of preferential treatment of the proprietary retail services on the digital platform to the detriment of downstream competitors.

The exercise of such self-favoritism by means of its ranking algorithms has been ascribed to Google in two different cases, which led to contrasting rulings. Google Search utilizes machine-learning algorithms which get trained by "click-through rates", i.e. a feedback derived from the analysis of users' choices among the results generated in response to their queries. In the discourse of the "Google Shopping" case, Google had allegedly manipulated these algorithms to display prominently its own content and to demote content from vertical competitors in Google Search results with a view to dominate the downstream market of product comparison services. The European Commission held that this practice constituted anti-competitive leveraging of dominant position, thus infringing Art. 102 TFEU[10].

However, a similar behavior in the "Google Maps" case has been found compliant with EU competition law by the England and Wales High Court[11]. This case concerned Google's practice of displaying clickable thumbnail maps on top of the Google Search results in response to geographical queries, thus diverting users to Google Maps website, while placing competing mapping services, like "Streetmap.eu", lower down the page. According to the Court, this practice did not constitute an infringement of Art. 102 TFEU, because it did not affect Streetmap's visitation significantly, whereas it enhanced user experience on Google Search. Besides, a more equal treatment of competing services would cause Google disproportionate costs.

Obviously, the court aligned itself in this case with the de minimis principle and the consumer welfare formula. These doctrines are embraced in the US legal system when assessing allegations of anticompetitive leveraging[12]. They remain alien, however, to Article 102 TFEU.

3.2 Exploitative Abuses of Dominance in the Context of Algorithmic Competition

As analyzed above, data processing represents a necessary element for firms to remain competitive in the algorithmic economy. To accumulate big data, businesses commonly resort to unlawful stratagems which pose competitive risks in the relevant market. Facebook, for instance, makes users' signing up in its networking platform conditional upon their consent to the processing of their personal data. It then collects users' data from Off-Facebook sources without further consent. The collection of multi-data without informed and specific prior consent on the part of the data subjects concerned violates the GDPR. European jurisprudence has been fluctuating regarding the compliance of this data policy with EU competition law.

In detail, the German Competition Authority (Bundeskartellamt) has regarded the above practice as an exploitative abuse, in the sense that Facebook exploits its dominant position in the market of networking services to gain users' consent to unlawful data processing[13]. OLG Düsseldorf has ruled, however, that this assumption, whether grounded or not, is not sufficient to establish

[8] See Article 4 par. 2(b) Directive 2019/2161/EU of 27.11.2019 amending Council Directive 93/13/EEC and Directives 98/6/EC, 2005/29/EC and 2011/83/EU of the European Parliament and of the Council as regards the better enforcement and modernisation of Union consumer protection rules, OJ L 328/7; Articles 7 and 9 in conjunction with the recitals 30-32 Regulation (EU) 2019/1150 of the European Parliament and of the Council of 20 June 2019 on promoting fairness and transparency for business users of online intermediation services, OJ L 186.

[9] See OLG Düsseldorf, VI-Kart 1/19 (V), Facebook v. Bundeskartellamt, August 26, 2019; Commission decision M.8788-Apple/Shazam, September 6, 2018.

[10] AT.39740 - Google Search (Shopping), June 27, 2017, paras. 157 et seq.

[11] England and Wales High Court (Chancery Division), Streetmap.EU Ltd v. Google Inc. & Ors [2016] EWHC 253 (Ch) (February 12, 2016).

[12] See the Statement of the Federal Trade Commission regarding Google's search practices in relation to its price comparison service "Google Shopping", FTC File Number 111-0163, 3 January 2013.

[13] Bundeskartellamt Decision No. B6-22/16, February 6, 2019.

any violation of EU competition law. For this, it would be further necessary to substantiate a relation between unlawful data processing and the impediment of free competition in the relevant market[14]. In this respect, the court required in essence a concrete explanation as to how unlawful processing of multi-data, algorithmic decision-making, and relevant market foreclosure correlate with each other in the given case.

Very recently, the German Federal Court of Justice (BGH) took a stance in this conflict by affirming the decision of the Bundeskartellamt. However, the court justified the establishment of anticompetitive abuse based on different argumentation. It stipulated that Facebook's data policy infringes 102 TFEU irrespective of its conformity with the GDPR.

According to the court's reasoning, the aforementioned company takes advantage of its dominant position in the market of social networks to impose rigid terms and conditions on its users as regards their personal data. Facebook users do not have namely the alternative, instead of granting consent to the controversial data policy, to provide limited access to their data in return for using a downgraded version of the service. Neither to pay monetary consideration for the full use of the service without any data disclosure. Under these circumstances, Facebook acquires the necessary data to optimize its services by unduly restricting consumer choice, which is regarded as an element of functional competition. Therefore, it achieves network and lock-in effects by impeding healthy competition in the relevant market[15].

Each one of the above approaches incites equally condemnations on the part of US stakeholders. It is argued that the EU data protection and competition policy conceals digital common market protectionism and is meant to undermine American technology companies[16]. This stance can be rationalized by taking account of the significant divergences observed in the US and the EU competition regimes. Indeed, the US legal system treats personal data as an asset which is freely tradeable within private transactions. Therefore, the US competition policy does not reflect data protection concerns. Moreover, in this legal order dominant firms are encouraged to take full advantage of their market power, even to the prejudice of their competitors, if this is justifiable by consumer welfare aspirations. In this context, consumer choice is considered subordinate to efficiency gains[17].

3.3 Collusions Facilitated by Algorithm

Article 101 TFEU prohibits any form of cooperation between competing undertakings which may appreciably impede competition in the internal market, unless the restriction is justified by efficiency gains and consumer benefits. Anticompetitive coordination of business practices may be achieved through formal or informal agreements and common decisions. However, the above provision covers also concerted practices which are driven by tacit consensus. Undertakings participating in the collusion may operate at the same or at different levels of the supply chain[18].

Algorithmic decision-making enables undertakings to adapt intelligently their commercial policies to the existing or anticipated behavior of their competitors. European courts and competition authorities are occasionally called to scrutinize software-driven pricing alignments[19]. However, the full range of implications reserved by AI involvement in collusions remains to date unexplored.

Commonly, algorithms are used as a tool for the implementation of forgone agreements for business practice coordination. This is the case, for instance, when competing firms participating by mutual consent in price fixing decide to use the same repricing software to avoid the manual adjustment of their prices. Similarly, algorithms can be used in vertical collusions to supervise compliance with pricing recommendations. In such cases no particular competitive concerns are raised, since AI does not represent a decisive factor for the establishment of collusion. It is argued, however, that examining the operation of the software used may contribute to the assessment of the anticompetitive effects generated by the collusion in each given case[20].

Another scenario covers situations in which competing undertakings are supplied with identical or similar smart software by a third party. In this case, commercial policies of the parties concerned may coincide through the parallel use of the same algorithmic code and/or training data pool without any direct interaction between them. Whether this situation equates to tacit collusion depends ultimately on the competitors' awareness of this technology sharing and their attitude in view of the competitive risks it entails. These circumstances shall be assessed on a case-by-case basis according to objective and consistent indicia[21].

Finally, there is an ongoing debate regarding the instance of collusive outcomes culminating from the mere interaction of algorithms in absence of any human intervention[22]. This scenario refers to machine-learning algorithms used by competing firms and contemplates the potential of AI conferring on computers the ability to communicate with each other on their own initiative to achieve predetermined business goals. Although the feasibility of such technological advancements is yet to be confirmed, the main concerns raised by algorithm-driven collusions seem already concrete: On the one hand, they relate to issues of attributing liability. On the other hand, they refer to the opacity of smart algorithms' operation and the evidence collection hurdles resulting therefrom[23].

3.4 Liability and Enforcement Concerns in the Context of Algorithmic Competition

In more detail, it is speculated that algorithmic autonomy facilitated by machine-learning techniques may interrupt the causal link between human act and market foreclosure, thus negating liability for any natural and legal person involved in

[14] OLG Düsseldorf, VI-Kart 1/19 (V), Facebook v. Bundeskartellamt, supra n. 10.

[15] BGH, KVR 69/19, 23 June 2020.

[16] See https://www.vox.com/2015/2/13/11559038/obama-says-europes-aggressiveness-towards-google-comes-from; https://www.politico.eu/article/donald-trump-attacks-eu-over-google-antitrust-fine-margrethe-vestager/.

[17] See in detail Filippo Maria Lancieri, *Digital protectionism? Antitrust, data protection, and the EU/US transatlantic rift*, J Antitrust Enforcement (2019) 7(1): 27–53.

[18] See Richard Whish and David Bailey, *Competition law* (9th edn, Oxford University Press 2018) pp. 114 et seq.

[19] See for instance ECJ decision C-74/14 of 21.01.2016, "Eturas" UAB and Others v Lietuvos Respublikos konkurencijos taryba, ECLI:EU:C:2016:42; UK's Competition & Markets Authority (CMA), Decision of 12.08.2016, Case No 50223.

[20] Autorite de la concurrence/Bundeskartellamt, *Algorithms and Competition*, November 2019.

[21] Ibid.

[22] Without e.g. any communication or contact between these firms' human representatives, explicit programming of the critical algorithms with a view to strategic alignment, etc.

[23] See supra n. 21.

algorithm-driven collusions. In this respect, it may be observed that – as evidenced by multiple briefing notes and guidelines published to date[24] – the EU assigns AI stakeholders the mission to design, develop, deploy and use software and hardware systems which adhere to certain ethical standards. The latter have been espoused by the GDPR in the form of general principles governing data processing.

According to the accountability principle[25] in particular, negligence on the part of the data controller and any processors can be assumed in any case that untrustworthy or flawed software is engaged in decision-making processes. In other words, the controller bears the responsibility not to use decision-making mechanisms which may conduct erroneous or unfair assessments[26]. If the controller fails to meet this obligation, he/she will be held responsible for giving rise to damage, on the occurrence of which he/she will have to compensate the data subject[27].

Business practice coordination by means of smart software represents an instance of autonomous decision-making which may impair the consumer's economic freedom. However, it does not fall under the scope of the GDPR as long as it does not involve processing of personal data. In any case, the GDPR does not deal with competition law concerns. Therefore, the establishment of a strict liability regime in alignment with the above rules applying to any undertaking involved in anticompetitive collusions driven by proprietary algorithms would necessitate meticulous argumentation and substantiation.

The second concern identified above refers more precisely to the intransparency caused by the engagement of machine-learning algorithms in software operation, which may complicate the identification of competitive infringements involving AI. Indeed, self-learning abilities can make the operation of smart software unpredictable, inexplicable, and unverifiable even for the engineers that initially designed it[28]. Under these circumstances, autonomous commercial decision-making giving rise to anticompetitive results, e.g. tacit collusions, can be neither inspected nor contested.

This "algorithm blackbox" is fortified by the fact that AI applications and components are protected by intellectual property rights and trade secrets[29]. Reverse engineering methods commonly deployed to analyze the source code of controversial computer programs and machine-learning models are therefore subject to concrete legitimation by the legislation regulating IPR protection[30]. Although the moderate scrutiny of smart software authorized by this legislation may well safeguard the conflicting interests at stake[31], it appears in many cases inappropriate to make the operation of sophisticated AI intelligible and transparent.

4. CONCLUDING REMARKS AND FUTURE RESEARCH RECOMMENDATIONS

Algorithmic economy is designated by markets with no physical boundaries, new economic models, and disruptive technology. These features bear competitive risks which challenge the pertinent EU regulatory framework in force. Zero-price markets associate economic power with big data, user visitation and high tech, rather than profits and sales, thus upsetting traditional EU competition law standards. Besides, digitalization facilitates cross-market integration and confers on EU competition policy an inherently transatlantic impact. Moreover, the increasing autonomy of smart software deployed in business decision-making calls for the re-contouring of fundamental competition law concepts, like the one of collusion, raises liability concerns and impedes the investigation of EU competition law infringements.

The above analysis indicated that EU law does not possess the necessary toolkit to address these issues. To date limited progress has been made to fill this gap. The associations of data-driven innovation with market foreclosure remain vague. European Jurisprudence fails to make a clear mark as to how liberal it aspires to be towards algorithmic competition. Instead, it moves back and forth, sometimes approaching and sometimes diverging from the competition law doctrines governing third-countries' economies. The AI liability and transparency adversities have been dealt so far with proclamations and recommendations rather than consistent rules.

In view of the above, a coherent EU competition policy tailored to the particularities of algorithmic economy appears indispensable. Competition law doctrines formulated over time by Jurisprudence must be adapted to the new economic models and the algorithmic autonomy. A golden ratio between data protection, intellectual property rights and competition law must be established. All this entails proactive legopolitical and economic argumentation, based on realistic technological feedback. Therefore, a promising field of interdisciplinary research seems to emerge.

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[24] See for instance European Commission – High level expert group (2019) *Ethics Guidelines for Trustworthy AI*; European Parliament Briefing (2019) *EU Guidelines on ethics in artificial intelligence: Context and implementation.* PE 640.163; European Parliament Briefing (2019) *A governance framework for algorithmic accountability and transparency.* PE 624.262.

[25] Article 5 par. 2 of the GDPR.

[26] See also Article 29 Data Protection Working Party *Guidelines on Automated individual decision-making and Profiling for the purposes of Regulation 2016/679*, WP251rev.01 (2018), p. 31 et seq.

[27] Article 82 GDPR.

[28] Flett E, Wilson J (2017) *Artificial intelligence: is Johny 5 alive? Key bits and bytes from the UK's robotics and artificial intelligence inquiry.* CTLR 23(3):72-74, 72 et seq.

[29] See Katharina Scheja (2018) *Schutz von Algorithmen in Big Data Anwendungen - Wie Unternehmen aufgrund der Umsetzung der Geschäftsgeheimnis-Richtlinie ihre Algorithmen wie auch Datenbestände besser schützen könne*. CR 34:485-492.

[30] See Cristian Triebe (2018) *Reverse Engineering im Lichte des Urheber- und Geschäftsgeheimnisschutzes. Am Beispiel der Analyze der Firmware von Computerchips mittels Black Box-Techniken*. WRP 2018: 795-805. Compare BGH, Decision of 28 January 2014, VI ZR 156/13, BGHZ 200, 38-51.

[31] See for instance Article 6 Directive 2009/24/EC of 23 April 2009 on the legal protection of computer programs, OJ L 111; Recital 16 and Article 3 par. 1b Directive 2016/943 of 8 June 2016 on the protection of undisclosed know-how and business information (trade secrets) against their unlawful acquisition, use and disclosure, L 157/1.

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