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Citation

Custers, B. H. M. (2024). A fair trial in complex technology cases: why courts and judges need a basic understanding of complex technologies. *Computer Law And Security Review*, 52. doi:10.1016/j.clsr.2024.105935

Version: Publisher's Version

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Downloaded from: <https://hdl.handle.net/1887/3718970>

Note: To cite this publication please use the final published version (if applicable).

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Computer Law & Security Review: The International Journal of Technology Law and Practice

journal homepage: www.elsevier.com/locate/clsr

A fair trial in complex technology cases: Why courts and judges need a basic understanding of complex technologies

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ARTICLE INFO

Keywords:

Fair trial
Transparency
Right of access
Complex technology
Equality of arms
Data protection law

ABSTRACT

Technology is getting increasingly complicated. If complex technologies have the potential to cause harm, people may need protection. Such legal protection is increasingly available, but it is only effective if it can also be enforced in courts. If people do not understand what is happening, for instance, with their personal data, they may not go to court at all. When people go to court, they may encounter another problem: if also courts and judges have a limited understanding of how the complex technologies work, this can affect the right to a fair trial. In this paper, it is argued that a fair trial requires that courts and judges need to have sufficient understanding of the technology in cases on which they are ruling. Since not all judges can be trained to have deep understanding of technology, other ways to address this are proposed.

1. Introduction¹

An ever increasing part of our lives is taking place online. New technology developments, like big data, the Internet of Things, quantum computing, blockchain technology, and advanced algorithms raise questions regarding the regulation of such technologies, for instance, with regard to the rights and protection citizens have or should have.² Legal scholars and practitioners can play an important role in suggesting and shaping such rights, particularly in the area of data protection, but also beyond this, addressing issues regarding adequate protection against privacy interferences, discrimination, and even human dignity (in case people are merely being judged upon their data). There is a lot of discussion (within IT law and beyond) how such rights should be shaped in the digital age.

This paper is focused on a fundamental right that has received somewhat less attention in the context of technological developments, i. e., the right to a fair trial.³ Technology is rapidly becoming more complex, and the collecting and processing of data increasingly takes place out of sight of users, with decreasing transparency as a result. This lack

of transparency is even further entrenched because complex technology and data flows are hard to explain and difficult to understand. This amplifies already existing power asymmetries in the relationships between companies and governments on the one hand and citizens and consumers on the other hand. This constitutes a risk for the right to a fair trial because parties opposing each other in court do not have the same knowledge and information.

There is also a second reason why the right to a fair trial is increasingly under pressure. The power asymmetry regarding knowledge and information can spill over in courts if it is also unclear for courts and judges how the technology works. Courts and judges are then dependent on information provided by the party that has developed or is deploying the technology. Although courts and judges can critically examine and question the technology used, even bringing in experts, the technology can be so complex that courts and judges may encounter the limits of their expertise.

In this paper, we argue that the right to a fair trial entails that a court or judge should have sufficient understanding of a technology if that technology plays a key role in a case on which the court or judge is

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¹ An earlier version of this paper was published in Dutch: Custers, B.H.M. (2023) Techniekennis voor een eerlijk proces: fair trial vereist ook van rechters enige kennis van complexe technologie, *Nederlands Juristenblad*, afl. 21, p. 1733-1741

² Custers, B.H.M. (2022) New Digital Rights: Imagining additional fundamental rights for the digital era, *Computer Law & Security Review*, Vol. 44, p. 1-13. <https://doi.org/10.1016/j.clsr.2021.105636>.

³ Flack-Makitan, K. (2022). Right to a Fair Trial and Digital Technologies in Civil Procedure. *Actualities, Civ. Proc. Law*, 439; Dymitruk, M. (2019) The right to a fair trial in automated civil proceedings. *Masaryk University Journal of Law and Technology*, 13(1), p. 27-44; Marrani, D. (2019) *Right to fair trial: impacts of new technology and contemporary space of justice on the process and administration of justice*, Doctoral Thesis, Universidad de Barcelona.

<https://doi.org/10.1016/j.clsr.2024.105935>

Available online 13 January 2024

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ruling. Limited understanding of the technology would lead to flawed judgements. We will discuss in more detail what ‘sufficient understanding’ means in this context. Since not all judges can be equipped with detailed technological knowledge, we propose several other solutions to this problem.

The right to a fair trial in Article 6 of the European Convention on Human Rights (ECHR) assumes an inquisitorial system as found in civil law jurisdictions. In common law systems judges will usually not search for additional information, but mostly decide on information provided by the litigating parties.⁴ In this paper, we focus on civil law systems and parts of the analysis may not apply to common law systems. However, even in common law systems judges will have to understand and assess the information provided by both parties.

This paper is structured as follows. Section 2 discusses the increasing complexity of technology and the consequences of this for transparency and access. Section 3 examines the right to a fair trial in the context of technology, particularly the collecting and processing of personal data. Section 4 proposes several solutions to better safeguard the right to a fair trial in the context of these developments. Section 5 provides conclusions.

2. Increasing complexity

Technology is rapidly getting more complex and less transparent. At the same time, these technologies have the potential to cause harm.⁵ Legislators try to protect people from these harms by introducing new legislative instruments. In recent years, the EU legislator has introduced the EU General Data Protection Directive (GDPR)⁶ to protect personal data, the Cybersecurity Act,⁷ the Digital Services Act (DSA),⁸ the Digital Markets Act (DMA),⁹ the e-Privacy Directive,¹⁰ the Networks and Information Security (NIS II) Directive,¹¹ and many other legislative instruments to address the potential harms of new, complex technologies. The current focus is on a new Artificial Intelligence Act (AI Act)¹² that would take a risk-based approach to regulating AI systems, which is unique in the world.

However, all this legal protection is only effective if, in the end, it can also be enforced in courts. The complexity (and limited transparency and access that come along with this complexity) can stand in the way of this. If people do not know how complex technologies affect them, they may not see a need to address their concerns to those developing, using, or deploying these technologies, let alone go to court to challenge this. In this section, we further explain how complexity may prevent people from going to court. In the next section, we explain that if people go to court, they may be confronted with courts that lack understanding of the complex technologies.

⁴ Note this also applies to private law cases in many civil law jurisdictions.

⁵ See, for instance, Dhirani, L. L., Mukhtiar, N., Chowdhry, B. S., & Newe, T. (2023) Ethical dilemmas and privacy issues in emerging technologies: a review. *Sensors*, 23(3), 1151; Wright, D., Finn, R., Gellert, R., Gutwirth, S., Schütz, P., Friedewald, M., Mordini, E. (2014) Ethical dilemma scenarios and emerging technologies. *Technological Forecasting and Social Change*, 87, 325-336.; Wood, M. A. (2021) Rethinking how technologies harm. *The British Journal of Criminology*, 61(3), 627-647.

⁶ <https://eur-lex.europa.eu/eli/reg/2016/679/oj>

⁷ <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A2019R0881>

⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A2022R2065>

⁹ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A2022R1925>

¹⁰ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A2009L0136>

¹¹ <https://eur-lex.europa.eu/eli/dir/2022/2555>

¹² <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52021PC0206>

Despite its increasing ubiquity, all the technology we use is getting less and less visible. Computers and other hardware are getting smaller and more practical. Computing power and storage capacity can be created in smaller devices or transferred to the cloud. What is left are mostly the screens through which we interact with the technology. Behind these screens, the technology is becoming more and more complex. By collecting and processing large amounts of data, technologies like data mining, machine learning, and artificial intelligence (AI) can build (prediction) models to offer users personalised experiences, products, and services. These technologies deal with very large amounts of data. Processing these data requires sophisticated data analytics and sometimes tools that are self-learning, such as AI. The data is often too complex for humans to obtain meaningful insight and overview and to be able to distill hidden patterns and other knowledge from the data. These tools for automated data analyses can offer solutions to this. However, they can also be the cause of automation bias, in which people easily confide in automated decisions.¹³

The complexity of automated data analyses can be an obstacle when it comes to explaining its functionality to average users of the technology.¹⁴ If systems are self-learning, even those who built the technology may at some point be unable to explain how the technology works. For traditional technology, the same input always yields the same output, but for self-learning technology (e.g., AI) the same input can yield different output after some time, because the technology has obtained new insights. This is a black box problem.¹⁵ But even when it is possible to reverse engineer a black box decision, the understanding of the system that is obtained is just a snapshot. After some time, the system will have evolved and the understanding will get outdated. As such, it can be hard to explain how these technologies work and how they affect individual users.

An additional problem is that transparency and explanation of technologies can conflict with other interests. Firstly, there are the interests of the companies using these technologies. Such technologies can be proprietary. For instance, the technology used can be subject to intellectual property rights, particularly software that processes data, extracts knowledge from data or builds models on data. The data, data analytics tools, and the knowledge extracted can all be trade secrets that constitute the competitive edge of a company. Sharing information (for instance, on how insurance companies determine their fees), could harm their position.¹⁶

Secondly, there are the interests of other users. Models are often built on data of large amounts of users. Transparency about how the models work and how they can lead to particular decisions for individual users requires transparency regarding *all* the data that was used as input to build and train the models. These are data of other users, access to which an individual user is not entitled. On the basis of the GPDR data subjects only have rights regarding their own personal data, not regarding the

¹³ Skitka, L. J., Mosier, K., & Burdick, M. D. (2000). Accountability and automation bias. *International Journal of Human-Computer Studies*, 52(4), 701-717; Skitka, L. J., Mosier, K. L., & Burdick, M. (1999). Does automation bias decision-making?. *International Journal of Human-Computer Studies*, 51(5), 991-1006.

¹⁴ Custers, B., Dorbeck-Jung, B., Faber, E., Iacob, S., Koops, B.J., Leenes, R., Poot, H. de, Rip, A., Teeuw, W.B. (ed.), Vedder, A. (ed.), Vudisa, J. (2008) *Security Applications for Converging Technologies; impact on the constitutional state and the legal order*, WODC rapport, Telematica Instituut, Enschede en Universiteit van Tilburg.

¹⁵ Pasquale, F. (2015) *The black box society: the secret algorithms that control money and information*. Cambridge, MA: Harvard University Press.

¹⁶ Note that the 2022 EU Data Act to some extent addresses this issue by making more data available. See <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A68%3AFIN>.

personal data of others.¹⁷

Altogether, these developments mean that technology and the effects of technology are increasingly hard to explain. Transparency, access, and explanation are inherently complicated because the technology is becoming more complex and less predictable, because companies and government agencies are not always cooperative, and because this may interfere with the rights and freedoms of others.¹⁸

3. The right to a fair trial

Article 6 of the European Convention on Human Rights (ECHR) guarantees everyone the right to a fair trial. This includes the right to a fair and public hearing within a reasonable time by an independent and impartial tribunal established by law (Article 6.1 ECHR). This is further detailed in case law of the European Court of Human Rights (ECtHR).¹⁹ Parties must have a reasonable opportunity to present their case under conditions that do not place them at a substantial disadvantage vis-à-vis the adversary.²⁰ From this body of case law, the principle of equality of arms can be inferred. According to the ECtHR, this principle of equality of arms is violated when a party has no opportunity to react to documents that are part of the litigation.²¹ If a technology leads to a decision that affects the legal position of a person, information about the functionality of that technology would be appropriate. Limited or incorrect information, or no information at all, would be a violation of the principle of equality of arms and, therefore, a violation of the right to a fair trial.

Closely related to the right of access to an independent and impartial judge or court is the issue of the scope of the assessment of a case by a judge or court. Article 6 ECHR requires that the judge or court has sufficient jurisdiction to decide the case before it. This requirement of 'full jurisdiction' is essential for the right of access to a judge or court. If a judge or court is not authorized (or does not feel competent) to investigate the facts, this may constitute a violation of Article 6 ECHR.²² This can be understood as an obligation for a judge or court to indeed investigate all the relevant facts. According to the ECtHR it is a violation of Article 6 ECHR if the judge or court does not examine the facts that are crucial for the determination of the dispute.²³ In specific circumstances, a marginal assessment of the facts can be allowed.²⁴ In administrative law, a court may never completely rely on the assessment of the administration. That would be a violation of the right of access to a judge or court. In such cases, a citizen has to be properly informed (about any evidence brought forward by the administration and how to bring forward their own evidence) by the administration in earlier stages of the

¹⁷ See, for instance, Article 15 GDPR on the right of access, Article 16 on the right to rectification, or Article 17 GDPR on the right to erasure: a data subject has these rights only regarding 'data concerning him or her'.

¹⁸ Custers, B.H.M., and Heijne, A.S. (2022) The Right of Access in Automated Decision-Making: The Scope of Article 15(1)(h) GDPR in theory and practice, *Computer Law and Security Review*, <https://doi.org/10.1016/j.clsr.2022.105727>.

¹⁹ See, for instance, ECtHR, 27 June 1968, nr. 1936/63, §22 (Neumeister v. Austria); ECtHR 17 January 1970, nr. 2689/65, §28 (Delcourt v. Belgium); ECtHR 27 June 1987, nr. 8562/79, §44 (Feldbrugge v. The Netherlands); ECtHR 22 February 1996, nr.17358/90, §47 (Bulut v. Austria); ECtHR 7 June 2001, nr. 39594/98, §72 (Kress v. France), ECtHR 27 April 2004, nr. 62543/00, §56 (Gorraiz Lizarrago v. Spain).

²⁰ ECtHR 15 May 2005, nr. 68416/01, § 62 (Steel and Morris v. The United Kingdom).

²¹ ECtHR 27 June 1987, nr. 8562/79, §44 (Feldbrugge v. The Netherlands); ECtHR 18 February 1997, nr. 18990/91, §23 (Niederöst Huber v. Switzerland).

²² ECtHR, 19 November 2020, ECLI:CE:ECHR:2020:1119JUD000192014, ECtHR Updates 2020/294 (Project-Trade d.o.o./Kroatië).

²³ ECtHR 17 December 1996, nr. 20641/92, § 54 (Terra Woningen BV v. The Netherlands).

²⁴ ECtHR 22 November 1995, Series A. Vol. 335-A (Bryan v. The United Kingdom).

decision-making. These earlier stages must contain sufficient safeguards for establishing the facts of a case.

In summary, a fair treatment of a court case requires that judges and courts critically examine the facts and form their own judgment. This can only be done if the judges and courts have sufficient knowledge about the topics in a particular case. In technological cases, this means they must have sufficient technological knowledge. Obviously, the same applies to other cases in which special expertise may play a role, such as medical cases, mergers & acquisitions, and cases with psychiatric offenders. If judges and courts do not have sufficient knowledge about the topics of the cases they have to rule on, there is a considerable risk of violating the requirement of fair treatment of the case, simply because the assessment of the facts may be insufficiently based on the material aspects of the case. It may even be argued that exposure to this risk already creates a violation of fair treatment of the case (i.e., regardless of fair outcomes), because under these conditions fair treatment cannot be guaranteed.

The Court of Justice of the EU (CJEU) is even more explicit on this than the ECtHR. Although evidence is usually a matter of national laws, the CJEU applies the principles of equivalence (i.e., EU laws must not be any less favourable than national laws) and effectiveness (i.e., EU laws must not render the exercise of rights impossible or excessively difficult).²⁵ The effectiveness principle is relevant for the subject matter expertise of judges and courts: if the court observes that a party has not been afforded a real opportunity to comment effectively on evidence and that evidence pertains to a technical field of which the judges have no knowledge and is likely to have a preponderant influence on the assessment of the facts by the court, the court should conclude that the right to a fair trial is violated and the evidence needs to be excluded to prevent such a violation.²⁶ In other words, judges always need to be well-educated and have sufficient subject matter expertise and experience in cases in which they rule. If not, they must exclude evidence, because they cannot guarantee a fair trial. Obviously judges and courts can appoint experts, but even then, they need to be able to assess the contents of the reporting of those experts. If experts are always followed blindly, they would be the ones deciding all the cases, which clearly would not always guarantee a fair trial.

Note that looking at Article 6 ECHR and case law of the ECtHR and CJEU as starting points for our analysis, we mostly focus on civil law jurisdictions. These are inquisitorial systems, as opposed to common law systems in which judges often will not search for additional information. In common law systems, judges usually decide on the information provided by the litigating parties. The rules of discovery or pre-trial disclosure for criminal cases aim to make the necessary information available to each side and then it is for the lawyers for both sides to understand and assess that information to the judge. This significantly reduces the need for judges to understand all information, but nevertheless understandability can be an issue. In case there is a jury, the jury members need to understand and assess the information presented to them.

In summary, the right to a fair trial is under pressure in technologically complex cases for two reasons. The first reason is the unequal relationship between companies and government agencies on the one hand and consumers and citizens on the other hand. The second reason is the unequal relationship between companies and government agencies on the one hand and judges and courts on the other hand. The first relationship often shows power asymmetries, in which it depends on the willingness of a company or government agency to provide

²⁵ CJEU, 6 October 2015, C-69/14. ECLI:EU:C:2015:662 (Tarsia), CJEU, 24 October 2018, C-234/17, ECLI:EU:C:2018:853 (XC et al.), CJEU, 19 December 2019, C-752/18 ECLI:EU:C:2019:1114 (Deutsche Umwelthilfe).

²⁶ CJEU, 10 April 2033 C-276/01 ECLI:EU:C:2003:228. §77-78. See also CJEU 18 March 1997, Reports of Judgments and Decisions 1997-II, §36 (Mantovanelli v. France).

transparency and access. The second relationship shows how inequalities in knowledge and access to information can propagate into courts if it is also unclear for judges how the technology works. Judges and courts are dependent on information provided by the party that controls the technology. Although judges and courts can critically examine this by raising questions and by bringing in experts, these technologies can be too complex for them. Here we discuss three cases in Dutch law that illustrate how judges can react in different ways when confronted with the limits of their technological expertise.

3.1. The Uber case: no critical examination

In 2021, the Court of Amsterdam ruled in the Uber case.²⁷ In this case, the scope of the right of access (Article 15 GDPR) was subject of debate. Some former taxi drivers of ride hailing app Uber requested access to their personal data. Uber provided only partial information. The information that was provided, was in a format that was not further explained and therefore not understandable for the drivers, despite the GDPR requirement that the information provided should be easily accessible and easy to understand and that clear and plain language is used and, additionally, where appropriate, visualisation is used (Recital 58 and Article 12.1 GDPR). Uber processes 26 categories of data in the system Guidance Notes but did not provide most of these categories.²⁸ Typically, data on driving behaviour, including GPS data and data on acceleration and breaking behaviour were not provided completely.²⁹

The drivers went to court to get access to their personal data in Uber systems like Guidance Notes, Driver's Profiles, Tags, and Reports. They also wanted to know, on the basis of Article 15.1.h GDPR, whether Uber was using automated decision-making or profiling. In court, Uber provides several arguments to try to give as little information as possible. For instance, Uber denies that the system Driver's Profiles contains driver's profiles, they argue that the requested information are protected trade secrets, and they state that the drivers abuse their right of access for another court case in the UK (where it is contested whether the drivers are employees or freelancers). These arguments mostly are not in line with the provisions in and intentions of the GDPR, but more important is the observation that Uber is the stronger party that has access to all the information and that the drivers cannot challenge the processing of their data as long as they do not know how their data is being processed. Uber is unwilling to offer transparency and keeps blocking this from its position of power. The scope of the right of access in Article 15 GDPR therefore seems to depend heavily on the willingness of data controllers to cooperate with this.³⁰

In the Uber case, the drivers try to enforce transparency and access through the court. The case shows, however, that the court repeatedly relies on the information provided by Uber, without critically examining this. For instance, the court accepts without further questions Uber's argument that the system Driver's profiles does not contain driver's profiles and is not a profiling system at all.³¹ No questions are asked on what kind of personal data this system processes.

When Uber states that the processing of personal data has no legal

²⁷ Court of Amsterdam, 11 March 2021, C/13/687315/HA RK 20-207, ECLI:NL:RBAMS:2021:1020 (Uber).

²⁸ For an overview of the 26 items, see <https://ekker.legal/wp-content/uploads/2020/07/Court-application-Uber.pdf>, p. 6-7.

²⁹ Court of Amsterdam, 11 March 2021, ECLI:NL:RBAMS:2021:1020 (Uber), § 4.53.

³⁰ Cf. Custers, B.H.M., and Heijne, A.S. (2022) The Right of Access in Automated Decision-Making: The Scope of Article 15(1)(h) GDPR in theory and practice, *Computer Law and Security Review*, <https://doi.org/10.1016/j.clsr.2022.105727>.

³¹ Court of Amsterdam, 11 March 2021, ECLI:NL:RBAMS:2021:1020 (Uber), § 4.66.

effect or similarly significant effect, the court asks no further questions.³² However, to establish any legal effects or similarly significant effects, it is necessary to look into which personal data are processed and in which ways. Since the profiles are used to match drivers with clients and to assess the quality of the service of the drivers, it seems reasonable to assume this actually does significantly affect the drivers: on the basis of their profiles, the drivers get assigned more or less rides, which effects their income.

In summary, the right to a fair trial is under pressure in this case. On the one hand, Uber heavily uses the power asymmetries and refuses to provide transparency and access. On the other hand, the court does not critically examine the arguments, which raises the question whether the court actually has sufficient knowledge and understanding of (i) the technologies used in this case, and (ii) the GDPR. Although the court has full jurisdiction in this case, there is a lack of critical examination. Because the judges do not critically examine the facts, there is arguably a violation of the right to a fair trial in Article 6 ECHR.³³

In April 2023, the Amsterdam Court of Appeal ruled on this case and overruled most parts of the district court's ruling.³⁴ During the appeal, the court does critically examine the case and forms its own judgment on the facts. The Court of Appeal states that Uber has a duty to motivate in more detail any refusals to provide transparency and access, because most of the information required to assess the facts in this case are within the domain of Uber.³⁵ In this way, the Court of Appeal address the power and information asymmetries between parties and better guarantees a fair trial.

The Uber case raises the question to what extent it can be expected from courts and judges that they always have full knowledge and understanding of complex technologies and of complicated legislation (like the GDPR in this case). This may not be realistic or practically possible. Section 4 will further discuss this.

3.2. The wonderment addresses case: acknowledge complexity and apply restraint

In another case, it can be observed that the judges are quite aware of the required technological knowledge to guarantee a fair trial. In 2020, the Administrative High Court in the Netherlands had to rule in a case on so-called 'wonderment addresses'.³⁶ The city of Eindhoven had started building risk profiles for addressing benefit fraud and tax fraud on the basis of addresses. These risk assessments yielded 'wonderment addresses' that were subject to closer scrutiny and extra checks, such as home visits and passport checks. One of the people affected went to court because he felt that his personal data were processed illegitimately and that he was selected on discriminatory grounds.

The Administrative High Court stated to be unable to assess whether the city of Eindhoven had acted illegally when using this type of risk profiling, because it was not clear how the risk analyses identified these addresses. The court concluded that discrimination could not be ruled out and that the investigations were started illegitimately and, therefore, any evidence for fraud was obtained illegitimately.

In this case, the court acknowledges the technological complexity of the ways in which personal data are collected and processed. When the court tried to critically examine the methods used for data analysis, the city of Eindhoven could not sufficiently clarify its methods. Since the

³² Court of Amsterdam, 11 March 2021, ECLI:NL:RBAMS:2021:1020 (Uber), § 4.67.

³³ ECtHR, 17 December 1996, NJCM 1997/617, (Terra Woningen BV v. The Netherlands).

³⁴ Court of Amsterdam, 4 April 2023, ECLI:NL:GHSMS:2023:793; Court of Amsterdam, 4 April 2023, ECLI:NL:GHSMS:2023:796.

³⁵ Court of Amsterdam, 4 April 2023, ECLI:NL:GHSMS:2023:793, § 3.20.

³⁶ High Administrative Court (CRvB), 8 December 2020, 19/3942 PW, ECLI:NL:CRVB:2020:3294.

court cannot rule out arbitrariness and discrimination, it chooses a restrained course of action to protect the citizen. With this, the court acknowledges the limits of its own expertise. This seems appropriate considering the requirements of a fair trial, but in the end is insufficient to guarantee a fair trial. If the methods of the city of Eindhoven were legitimate, but the court would not understand the explanations offered, the right to a fair trial would also be violated. Therefore, also in this case it can be argued that the court insufficiently attempts to form its own independent judgment of the facts, interfering with the right to a fair trial in Article 6 ECHR.³⁷

3.3. The PAS case: looking under the hood

In its program addressing nitrogen exhaust (PAS, Programma Aanpak Stikstof), the Dutch government tried to reduce nitrogen depositions in nature reserves. The approach was mostly based on a computer model called AERIUS that calculated nitrogen depositions resulting from traffic, livestock farms, and industry in nature reserves. In 2019, the Council of State, the highest general administrative court in the Netherlands,³⁸ ruled that this approach was illegitimate as a basis for issuing permits for economic activities.³⁹ This led to a 'nitrogen crisis', in which many projects, mostly in building new homes, came to a halt.

A series of case law concerning this nitrogen approach followed, in which the focus was on the computer model AERIUS. The Council of State was willing to critically examine how exactly this (very) complex model functions. Instead of avoiding all the complexities and intricacies, the judges delved into this. This is shown by the very detailed descriptions of the inner workings of AERIUS in the final ruling.⁴⁰

The court pays particular attention to the risks of unequal positions of the parties in the litigation. Beyond the scope of individual cases, the court states that in case of automated decision-making government agencies have a duty to clarify and publish design choices, underlying assumptions, and the data used.⁴¹ This should be done fully, timely, and on their own initiative. Similar to the appeal in the Uber case (see Section 3.1), the court tries to address the power and information asymmetry to better guarantee a fair trial.

In the AERIUS case law, the court stated clearly that a restrained assessment of automated decision-making models is no longer appropriate and that courts must look into the technology in more detail.⁴² The court puts this into practice by looking 'under the hood' of these systems and carefully assessing in detail the choices, data, and assumptions applied.⁴³ In other words, courts need to be prepared to open, where necessary, the black boxes in these types of automated decision-making.

Although the court's approach in this case may look like the most

desirable approach from a fair trial perspective, it should be noted that it does not come without costs. Typically, such an approach may involve a lot of effort, resulting in longer processing times for cases and backlogs in courts. Also, it requires higher standards for judges, for instance, in terms of their knowledge and training, creating scarcity of highly skilled judges. In the next section, we will discuss several options to move forward.

4. Ways to address complexity in courts

The necessity of bringing highly specialized expertise into courtrooms is not something new. This can be done in several ways. Here we discuss different solutions that can be used for addressing complex technologies in courts. These solutions are grouped in three categories, focusing on the judges, the experts, and the courts respectively.

4.1. The T-shaped lawyer

The cases presented in this paper raise the question to what extent lawyers need to be educated differently in the future. Basic knowledge and understanding of technology is increasingly important for lawyers, including judges. According to some people, this is falling behind.⁴⁴ This does not mean that lawyers need programming skills, but they may need some understanding of technological developments and what technology can and cannot do.

In this context, there is a lot of talking about T-shaped lawyers,⁴⁵ legal all-rounders that are equipped to deal with the complex societal issues of the 21st century.⁴⁶ The stem or vertical bar of the capital T symbolises the profound (i.e., specialized) knowledge in a particular area of expertise and the top or horizontal bar of the letter T symbolises the broad (i.e., general) knowledge of other areas of expertise. However, there are different opinions on what the contents of the top of the T should be.⁴⁷ It is not clear which areas of expertise this would cover and how profound the knowledge in these areas should be. Since each of these areas of expertise has its own specialisation, lawyers, particularly judges, should have considerable knowledge and expertise to understand these topics. This raises the question what level of knowledge and understanding is realistic to achieve, as it would significantly extend the duration of legal education programs.

Many have suggested extension of the legal and non-legal knowledge and expertise of lawyers. This includes leadership⁴⁸ and soft skills.⁴⁹ Other knowledge and expertise mentioned in this context are project management, planning, finances, and HR skills, topics that are useful for

³⁷ In another case, the court also evades looking into the technology: Court of The Hague, 24 June 2015, ECLI:NL:RBDHA:2015:7145 (Urgenda), § 4.3. Here the court states that it will base itself on the information the parties provided during the litigation. As a result of this limitation, the court does not critically examine the reliability of this information.

³⁸ The High Supreme Court mentioned in Section 3.2 is the highest administrative court in selected areas only, such as social benefits and civil servants.

³⁹ Council of State (ABRvS), 29 May 2019, ECLI:NL:RVS:2019:1764.

⁴⁰ Council of State (ABRvS), 29 May 2019, ECLI:NL:RVS:2019:1764, § 3.10 t/m 3.16. See also Council of State (ABRvS) 18 July 2018, ECLI:NL:RVS:2018:2454, § 23.4-23.7, with references to 1.500 pages of maps and tables.

⁴¹ Council of State (ABRvS) 17 May 2017, ECLI:NL:RVS:2017:1259 (PAS), § 14.4.

⁴² Williams, R.A. (2018) Rethinking deference for algorithmic decision-making, Oxford Legal Studies Research Paper No. 7/2019, 31 August 2018, <https://ssrn.com/abstract=3242482>, p. 32 and p. 40; Cobbe, J. (2019) Administrative Law and the Machines of Government: Judicial Review of Automated Public-Sector Decision-Making, *Legal Studies*, 2019 (39), p. 641.

⁴³ See in particular Council of State (ABRvS), 17 May 2017, ECLI:NL:RVS:2017:1259 (PAS), § 10.15-10.27.

⁴⁴ Susskind, R. (2023) *Tomorrow's lawyers: An introduction to your future*. Oxford: Oxford University Press; Tamanaha, B. (2012) *Failing Law Schools*, Chicago: University of Chicago Press.

⁴⁵ Literature does not mention T-shaped judges.

⁴⁶ Amani Smathers, R. (2014) The 21st-Century T-Shaped Lawyer, *Law Practice Magazine*, 40(4), www.americanbar.org; Amani Smathers, R. (2016) T-Shaped Lawyer, *Techno[law]gic*, 29 January 2016, <http://www.amanismathers.com/technolawgic/2014/2/21/t-shaped-lawyer>; Mak, E. (2017) The T-shaped lawyer and beyond: rethinking legal professionalism and legal education for contemporary societies, Inaugural lecture, Universiteit Utrecht. Den Haag: Eleven International Publishing

⁴⁷ Mak, E. (2017) The T-shaped Lawyer and Beyond: Rethinking legal professionalism for contemporary society. Inaugural lecture, Universiteit Utrecht. Den Haag: Eleven International Publishing.

⁴⁸ Polden, D. J. (2012) Leadership matters: lawyers' leadership skills and competencies. *Santa Clara Law Review*, 52, 899.

⁴⁹ Giusti, G. (2008) *Soft skills for lawyers*, London: Chelsea publishing, p. 12-19.

running a law firm or working at a larger law firm. Some have suggested to add emotional intelligence to the T-shaped lawyer.⁵⁰ In the area of technological knowledge and expertise, it has been suggested that lawyers need to be equipped with sufficient knowledge on programming,⁵¹ artificial intelligence,⁵² design thinking,⁵³ and statistics.⁵⁴ Obviously, adding all these topics to the curricula in law schools raises the question whether this broader orientation affects the in-depth knowledge of lawyers of their legal work. The only way to really avoid this seems to be extending the duration of the educational programs, but even then, it remains to be seen whether extra training and education will sufficiently address the issues. For instance, lawyers who got extra training on it, still were susceptible to statistical misinterpretations such as the prosecutor's fallacy.⁵⁵

4.2. Experts, court experts, and expert judges

Instead of deepening their knowledge and expertise themselves in many different areas, lawyers can also obtain knowledge from others. In courtrooms, this can be done basically in three different ways: bringing (court) experts into court proceedings or courtrooms, having specialised judges in specific areas, or (discussed in Section 4.3) establishing specialised courts.

Experts can be consulted in court proceedings to provide explanations on technological issues. Their knowledge can find its way into statements and evidence that can be used in court proceedings.⁵⁶ Experts are usually referred to as expert witnesses (in criminal law) or court experts in general. As explained below, in many countries court experts are registered in national registries, making 'court expert' an official, protected title, distinguishing court experts from 'regular' experts.

Expertise needed in court obviously depends on the nature and circumstances of a court case. In criminal law, this may concern DNA analysis, handwriting analysis, forensic psychiatry, psychology, remedial education, toxicology, addictive substances, weapons and ammunition research, forensic pathology, digital forensics, legal psychology, and much more.⁵⁷ In private law and administrative law, areas of

expertise may vary even more widely, including topics like accountancy, construction engineering, civil engineering, veterinary, digital forensics, electronic engineering, explosion safety, finance, fraud, data protection and privacy, medicine, tenancy law, computer science, installation technology, injury biomechanics, aviation law, maritime legal expertise, mediation and alternative dispute resolution, environmental expertise, expropriation law, administrative liability, personal injury, stewardship, urban planning, damage assessment, maritime technology, taxation, toxicology, real estate, and infrastructure and transport.⁵⁸

To guarantee the quality of the expertise of court experts, many countries have set up national registers for court experts. These registers serve as a tool to find an expert in a specific area, but also as a tool of quality assurance. Experts will only be registered after they have been assessed and, after registration, usually they will be assessed periodically, i.e., every 4–6 years. In the EU, 22 countries have official registers of court experts, of which ten are drawn up by the courts, five are prepared by institutions, and four by professional bodies.⁵⁹ Although a detailed account of how these registers are used in each country is beyond the scope of this paper, here we provide brief descriptions of registers in several jurisdictions.⁶⁰

In Germany, courts have to choose an expert from the register (*Sachverständigenregister*)⁶¹ containing experts accredited by a public-law body at the state level, the *Kammern*. The *Kammern* maintain these registers of experts whom they have appointed, so that finding a suitable (accredited) expert in a specific area need not be problematic for the court. If needed, courts may consult non-registered experts, which often happens.⁶²

In France, the *Conseil National des Compagnies d'Experts de Justice* (CNCEJ, national council of legal expert companies) maintains a register of approximately 10,000 experts.⁶³ This register is managed by the *Cour de Cassation*, the highest court in the French judiciary. It lists experts from various fields, including forensics, engineering, medicine, finance, and more. Experts can get on the national list after they have been listed as an expert for at least five years at a regional appeal court. The CNCEJ has several branches in which experts keep each other up to date via training programs and events. A typical example is the *CNCEJ en Informatique et Techniques Associées* (CNEJITA, the CNCEJ on computer science and related technologies) which was established in 1992.

In Belgium the courts can decide who has sufficient expertise to act as a court expert. There were no official registries for this, only unofficial lists,⁶⁴ until a national register was established in 2016.⁶⁵ The minister of justice appoints court experts, who have to take an oath before they are registered. A registration is for the duration of six years and can be extended, each time for six years. The register also contains lists of certified translators and interpreters.

In the Netherlands, there are two national registers. The *Landelijk*

⁵⁰ This suggestion included adding emotional intelligence to the top of the T, creating the "plus-shaped" lawyer. Fernando Garcia, The 'Plus-Shaped' Lawyer for the 21st Century, CANADIAN LAW. (April 17th, 2017), <https://www.canadianlawyermag.com/author/fernando-garcia/the-plus-shaped-lawyer-for-the-21stcentury-3594/> [https://perma.cc/5997-WLYS]. But two years later, this same author is citing to the Delta Model. Fernando Garcia, New Skill-Enhancing Models to Become Tomorrow's Lawyer in 2019, CANADIAN LAW. (Jan. 7, 2019), <https://www.canadianlawyermag.com/author/fernando-garcia/news/kill-enhancing-models-to-become-tomorrows-lawyer-in-2019-16685/> [https://perma.cc/2757-5FB6].

⁵¹ Ohm, P. (2020) Computer Programming For Lawyers, see <https://www.cp4l.org/>

⁵² Reid, M. (2018) A Call to Arms: Why and How Lawyers and Law Schools Should Embrace Artificial Intelligence. *University of Toledo Law Review*, 50, 477.

⁵³ Amani Smathers, R. (2014) The 21st-Century T-Shaped Lawyer, *Law Practice Magazine*, 40(4), www.americanbar.org.

⁵⁴ Finkelstein, M. O. (1998) Teaching statistics to law students. In *Proceedings of the Fifth International Conference on Teaching Statistics*, Vol. 1, Voorburg, The Netherlands: International Statistical Institute. p. 505-511.

⁵⁵ Prakken, H. (2021) Recognising and Avoiding Fallacies in Interpreting Statistical Evidence. *Logic and Law*. Edward Elgar Publishing. <https://webpace.science.uu.nl/~prakk101/pubs/BayesLawLogic.pdf>; Prakken, H. (2020) A new use case for argumentation support tools: supporting discussions of Bayesian analyses of complex criminal cases. *Artificial Intelligence and Law*, 28, p. 27-49.

⁵⁶ Custers, B.H.M., and Stevens, L. (2021) The Use of Data as Evidence in Dutch Criminal Courts, *European Journal of Crime, Criminal Law and Criminal Justice*, Vol. 29, Nr. 1, p. 25-46.

⁵⁷ Prinsen, M.M. and Custers, B.H.M. (2010) Introduction to Forensics. In: *Transnational Criminology Manual*, Volume 3, M. Herzog-Evans (ed.), Tilburg: Wolf Legal Publishers, p. 15-34.

⁵⁸ Topics collected from the websites of some of the national registries for court expert, see below.

⁵⁹ Nuée, Al. (2015) Civil-law expert reports in the EU: national rules and practices, DG Internal Policies, Department C (citizens rights and constitutional affairs). [https://www.europarl.europa.eu/RegData/etudes/IDAN/2015/5192_11/IPOL_IDA\(2015\)519211_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/IDAN/2015/5192_11/IPOL_IDA(2015)519211_EN.pdf)

⁶⁰ It would be interesting for future research to compare and contrast these practices across jurisdictions.

⁶¹ https://www.ble.de/DE/Projektfoerderung/Foerderungen-Auftraege/Bundesprogramm-Energieeffizienz/Sachverstaendige/Register_node.html

⁶² 6 Section 73 StPO (Strafprozeßordnung; Code of Criminal Procedure); see Löwe-Rosenberg, Die Strafprozeßordnung und das Gerichtsverfassungsgesetz. Großkommentar, Berlin: De Gruyter Recht, 25. Auflage, 2004, p. 38.

⁶³ <https://www.cncej.org/annuaire>

⁶⁴ Kwakman, N.J.M., Nijboer, J.A., Keulen, B.F., Elzinga, H.K., (2011) Expert Registers in Criminal Cases. Governance in Criminal Proceedings [Online]. <http://www.rug.nl/rechten/congressen/archief/2011/governancemeetslaw/workingpapers/papernijboerkeulen.pdf>.

⁶⁵ <https://justsearch.just.fgov.be/national-registry-search/expert>

Register *Gerechtigd Deskundigen* (LRGD, National Register of Court Experts) is funded by private partners, mostly law firms, and focuses on private law experts.⁶⁶ This register was established in 2005. Each registration is for five years and can be renewed, each time for five years. The *Nederlands Register Gerechtigd Deskundigen* (NRGD, Netherlands Register of Court Experts) is funded by the government and focuses on forensic experts, i.e., experts in criminal law cases.⁶⁷ This register was established in 2010. The NRGD registers court experts for five years and can renew the registration, each time for five years.

In Italy, the *Albo dei Periti e degli Esperti* (register of experts and consultants) is managed by the local chambers of commerce, which means each there is no national register.⁶⁸ In Spain, the *Registro de Expertos Judiciales* is managed by the Spanish Ministry of Justice.⁶⁹

In some countries, there are no national registers or no registers at all for court experts. In England and Wales, it is for the courts to decide whether experts have sufficient knowledge and expertise.⁷⁰ There used to be a register of court experts, maintained by the Council for the Registration of Forensic Practitioners, but both the council and its register ceased to exist when government funding ended.⁷¹

In the United States, there does not exist a centralised register of judicial experts. Typically, the process of appointing experts in the US involves the selection and agreement between the parties involved in the litigation. Each side may present their own court experts. The evidence must then be assessed according to the Frye test and the Daubert standard. The Frye test dates from a 1923 court case and requires that any scientific evidence must be a result of a theory that has ‘general acceptance’ in the scientific community.⁷² The Daubert Standard dates from a 1993 court case and provides courts four factors to consider when determining expert testimony admissibility: (1) whether the expert’s theory or technique can be tested, (2) whether the theory or technique has an acceptable known or potential rate of error, (3) the existence and maintenance of standards controlling the technique’s operation, and (4) whether the theory or technique has attained ‘general acceptance’.⁷³

Every time a court wants to consult a court expert, a minimum requirement is that judges can signal the need for such expertise. Courts and judges need to have a basic understanding of what a particular expertise can offer to be able to signal that bringing in such expertise is needed in a case. This is to some extent comparable to the work of a General Practitioner that needs to be able to assess whether a particular situation is serious enough to forward a patient to a medical specialist in the hospital.

A solution that goes beyond making use of a court expert is adding a (non-legal) expert to a court or tribunal. Although the majority of the judges in a case should probably always be lawyers, it is possible to add people with other knowledge and background to the decision-making process. These expert judges contribute to the final ruling (contrary to court experts that mere provide input for the final ruling). This model is often used in disciplinary law, in which tribunals exist of lawyers and experts of the discipline concerned. For courts, such a model can offer a solution if the required expertise is not available among lawyers. Expert judges can be subjected to quality assessments similar to those existing for court experts. Also, expert judges can be required to follow

additional training programs, for both their area of expertise and training in their legal and judiciary work.

4.3. Specialised courts, centres of expertise and supervisory authorities

Instead of bringing expertise into courts, it is also a possibility to take technologically complex cases to specialised courts. The judiciary can develop such specialised courts in particular areas of expertise. Courts can be specialized in criminal, tax, military, and business trial units, as well as units addressing bankruptcy, children and minors, family, mental health, gambling, prostitution, inventories, patents, etc.⁷⁴

For instance, in the UK, the judiciary has established a specialised Technology and Construction Court, that focuses on buildings, engineering and surveys.⁷⁵ In the Netherlands, the district court of Rotterdam has a Maritime Chamber, specialised in maritime cases.⁷⁶ Such specialised courts can further develop the quality of adjudication and enhance the efficiency of court cases. These models could serve as an example for courts dealing with other technologically complex cases.

Specialization has several benefits, such as developing and optimizing human capital to resolve specific issues, generating predictable and uniform case law, and improved efficiency in procedural flows. However, some critics claim that judges in these specialized units are more susceptible to political and economic influences, and that these units make it easier for interest groups to function and may even impact the shaping of the legal system itself.⁷⁷ Another potential concern is that this approach may prove to be difficult to implement, as it may require significant legal reforms and considerable budgets, time and training for judges.

Centres of expertise can also be established outside the judiciary. In such cases, the experts are not part of the judiciary, but can assist the judiciary in further developing their expertise. Courts and judges can then ask questions or join training programs at these centres of expertise. The difference between court experts and centres of expertise lies in their focus: court experts provide input in specific cases, whereas centres of expertise provide opportunities for courts and tribunals to further develop their expertise.

Beyond the judiciary, also supervisory authorities have significant knowledge and expertise. In case of privacy and data protection, national data protection authorities (DPAs) are a typical example. In many cases, these DPAs can offer solutions that avoid litigation in court. Since supervisory authorities are usually not part of the judiciary, parties can always decide to take their case to court. However, given the workload of the judiciary and the costs involved for litigation, it is possible that supervisory authorities will increasingly play a role in this. Future legislation, such as the EU’s proposed AI Act, already provides for independent, specialised supervisory authorities at a national level to deal with these cases.⁷⁸

5. Conclusion

The right to a fair trial in technologically complex cases has not

⁶⁶ <https://www.lrgd.nl/>

⁶⁷ <https://www.nrgd.nl/>

⁶⁸ For instance, in Milan, this is <https://www.milomb.camcom.it/ruolo-periti-ed-esperti>.

⁶⁹ <https://www.mjusticia.gob.es/en/AreaTematica/DocumentacionPublicaciones/Documents/Nombramiento%20de%20auditores%20y%20expertos%20independientes.pdf>

⁷⁰ Hodgkinson, T., and James, M. (2007) *Expert Evidence: Law & Practice*, London: Sweet & Maxwell, p. 34-39.

⁷¹ <https://edm.parliament.uk/early-day-motion/39067/closure-of-the-council-for-the-registration-of-forensic-practitioners>.

⁷² Frye v. United States, 293 F. 1013, D.C. Cir. 1923.

⁷³ Daubert v. Merrell Dow Pharmaceuticals, 509 U.S. 579 (1993).

⁷⁴ Kesan, J. P., & Ball, G. G. (2010). Judicial experience and the efficiency and accuracy of patent adjudication: An empirical analysis of the case for a specialized patent trial court. *Harvard Journal of Law & Technology*, 24, 393.

⁷⁵ <https://www.gov.uk/courts-tribunals/technology-and-construction-court>

⁷⁶ <https://minerva-advocaten.nl/en/news/maritime-chamber>.

⁷⁷ Procopiuck, M. (2018) Information technology and time of judgment in specialized courts: What is the impact of changing from physical to electronic processing? *Government Information Quarterly*, Volume 35, Issue 3, 2018, p. 491-501, <https://doi.org/10.1016/j.giq.2018.03.005>.

⁷⁸ For the most recent version of the proposal (14 June 2023), see https://www.europarl.europa.eu/doceo/document/TA-9-2023-0236_EN.pdf. For the initial proposal, see COM(2021)206, proposed regulation on harmonized rules on artificial intelligence (artificial intelligence act) and amending certain union legislative acts.

received a lot of attention in IT law so far. Transparency and access are under pressure because technology is becoming increasingly complex and increasingly hard to explain and understand, particularly when the technology is not very visible, such as most technologies collecting and processing personal data. Flawed transparency can amplify already existing asymmetries in power between companies and government agencies on the one hand and citizens and consumers on the other hand. This poses a risk for the right to a fair trial because parties opposing each other in court do not have access to the same knowledge and information.

This paper also examined a second reason why the right to a fair trial is under pressure. The asymmetries in knowledge and information also play a role in courts if courts and judges have insufficient understanding of how the technology functions. In such cases, courts and judges are highly dependent on the party that has developed or is deploying the technology. This requires courts and judges to critically examine the information offered, but also that they have a basic understanding of the technology to be able to ask the right questions. The technology can be very complex, which means that judges may encounter the limits of their expertise. In such cases, judges should not shy away and avoid looking into the technologically complex matters or marginally assess the information offered, but they should critically examine the information and the way the technology works. This allows them to form their own opinion of the facts in a case.

Courts and judges can be enabled to do this by providing them with a basic understanding of technology (the T-shaped lawyer), but there are

limits to what can be expected from this. Alternatively, courts can bring in court experts or expert judges. But in all cases a minimum requirement is that judges can signal the need for bringing in this expertise. Another possibility is to forward technologically complex cases to specialised courts within the judiciary or to supervisory authorities, enabling these organisations to further develop expertise in these areas. However, the common denominator in all the proposed solutions remains that courts and judges need to have a basic understanding of complex technologies.

Declaration of competing interest

For this paper, there are no conflicts of interests to report.

Data availability

No data was used for the research described in the article.

Acknowledgements

The author would like to thank Mr. Aleid Wolfsen, chairman of the Dutch Data Protection Authority (Autoriteit Persoonsgegevens), for the discussions they had on this topic and his feedback on an earlier version of this paper.