Legal Technology/Computational Law
Preconditions, opportunities and risks

Wolfgang Hoffmann-Riem *

Abstract

The article refers to the use of digital techniques for identifying, applying, and enforcing the law. It describes the opportunities and difficulties associated with the modelling of law in software. Due to digitalisation, traditional law is being practised in new ways, and is even being replaced in some areas. For lawyers, a market is currently emerging for new legal services. Public administrations and the courts are also embracing the possibilities afforded by digitalisation. The article refers to the need to assure — *inter alia* — the quality of the data and algorithmic systems (integrity, safety and security, absence of bias and discriminatory parameters, etc.). It analyses the differences between human decisions as social constructs and algorithmic decisions as technical constructs. The transfer of legal rules into digital rules requires standardization. This produces a conflict: legal rules are in many cases characterised by the fact that the terms are vague and open to differing interpretation. Furthermore, they often require that predictions be made and that competing considerations are balanced. Many norms even permit the exercise of discretion. It is therefore not sufficient to rely only on the language of the norm: non-textual factors will also have an impact on the interpretation and application of the law. The discussion includes an analysis of the German legal provisions regulating the use of automated administrative decisions, and sounds a warning regarding the automated sanction of legal violations: ultimately, despite the putative benefits of digitalisation, we must be sensitive to the risks that it may alter traditional mechanisms of legal enforcement and even reshape the very substance of the law.

*Affiliate Professor of Innovation and Law at Bucerius Law School, Hamburg and Professor Emeritus of Public Law and Public Administration at the University of Hamburg. From 1999-2008 Justice of the German Federal Constitutional Court, wolfgang.hoffmann-riem@law-school.de. This is a revised version of the keynote delivered at the Bucerius Summer Program in Legal Technology and Operations on 1 July 2019, published at (2019) 2 Bucerius Law Journal 57.

Although computers and digital technologies have existed for many decades, their capabilities today have changed dramatically. Current buzzwords like Big Data, artificial intelligence, robotics and blockchain are shorthand for further leaps in development.

The digitalisation of communication, which is a disruptive innovation, and the associated digital transformation of the economy, culture, politics, and public and private communication[1] — indeed, probably of virtually every area of life — will cause dramatic social change. It is essential to prepare for the fact that digitalisation will also have a growing impact on the legal system.

Opportunities and risks associated with the development of legal technology and computational law

One of the new buzzwords is legal technology ('legal tech').[2] The term describes the use of digital technologies to assist in identifying, interpreting, and applying the law and, in some instances, also in creating it. As a result, traditional law is being practised in new ways, and even being replaced in some areas. The role of lawyers is changing.[3] We are witnessing the emergence – often in collaboration between lawyers and IT experts — of new forms of legal advice and other legal services, the use of new kinds of expert legal knowledge and legal argument retrieval, and the digital analysis of documents and attempts to predict future judgments by courts.[4]

Decisions that used to be made by humans are increasingly being made in an automated manner. Examples include automated administrative decision-making and forms of digitally mediated problem-solving. Legal tech is increasingly playing an important role in e-government[5] and e-justice.[6] Algorithmic regulation and governance by algorithms are other new magic words.

Of increasing importance is the transaction technology blockchain, which is conquering new fields, such as the confidential storage of legally relevant data. The technology makes it possible to automate the legal effects of non-compliance with legal obligations, to ensure the reliable compensation of creative accomplishments protected by copyright, to create digital registers, such as land registers, to allow safe cross-border online transactions, and much more.[7]

The use of algorithmic systems in the field of law is expected to generate considerable savings in terms of transaction costs, as well as to make the analysis of source materials and the preparation and making of decisions and their implementation faster, more efficient, and more effective.

---

[1] On digital transformation, see e.g. Ahmed Bounfour, *Digital Futures, Digital Transformation* (Springer 2016); Tim Cole, *Digitale Transformation* (2nd, Vahlen 2017); Christoph Keese, *Silicon Germany: Wie wir die digitale Transformation schaffen* (Albrecht Knaus 2017); Thomas Ramge and Viktor Mayer-Schönberger, *Das Digital: Markt, Wertschöpfung und Gerechtigkeit im Datenkapitalismus* (Econ 2017).

[2] Examples from the growing academic debate about legal tech in Germany: Jens Wagner, *Legal Tech und Legal Robots* (1st, Springer Gabler 2018); Annika Klafki, Felix Würkert, and Tina Winter (eds), *Digitalisierung und Recht* (Bucerius Law School Press 2017); Stephan Breidenbach and Florian Glatz (eds), *Rechtshandbuch Legal Tech* (CH Beck 2018); Markus Hartung, Micha-Manuel Bues, and Gernot Halbleib (eds), *Legal Tech: Die Digitalisierung des Rechtsmarkts* (CHBeck/Vahlen 2018); Martin R Schulz and Anette Schunder-Hartung (eds), *Recht 2030. Legal Management in der digitalen Transformation* (Fachmedien Recht und Wirtschaft, dfv Mediengruppe 2019); Jens Wagner, *Legal Tech und Legal Robots* (2nd, Springer Gabler 2020).

[3] See Richard Susskind, *The End of Lawyers? Rethinking the Nature of Legal Services* (Oxford University Press 2010); Richard Susskind, *Tomorrow's Lawyers: An Introduction to Your Future* (2nd, Oxford University Press 2017); Kevin D Ashley, *Artificial Intelligence and Legal Analytics: New Tools for Law Practice in the Digital Age* (Cambridge University Press 2017).

[4] See Susskind, *The End of Lawyers? Rethinking the Nature of Legal Services* (n 3); Susskind, *Tomorrow's Lawyers: An Introduction to Your Future* (n 3). Concerning the emergence of the legal tech market in Germany, see, e.g., Dominik Tobschall and Johann Kempe, 'Der deutsche Legal-Tech-Markt' in Stephan Breidenbach and Florian Glatz (eds), *Rechtshandbuch Legal Tech* (CH Beck 2018) p. 25 et seq.

[5] On e-government, see Bundesregierung, Digitale Verwaltung (18/3074, BTDrucks 2014); Margrit Seckelmann (ed), *Digitalisierte Verwaltung. Vernetztes E-Government* (2nd, Erich Schmidt Verlag 2019).

[6] On e-justice, see David Jost and Johannes Krempe, 'E-Justice in Deutschland' (2017) 70(38) Neue Juristische Wochenschrift 2705; Wilfried Bernhardt, 'Quo vadis Digitalisierung der Justiz?' [2018] (8/9) Juris 310.

[7] See, e.g., Michèle Finck, 'Blockchains: Regulating the Unknown' (2018) 19(4) German Law Journal 665.

Legal technology also makes it possible to eliminate certain barriers to access to the law.

At the same time, this transformation raises various questions: Will the use of digital technologies correctly capture or instead miss the complexity and multidimensional nature of conflicts that law is called upon to resolve? Will it adequately take into account the vagueness and ambiguity of legal terms and the problems related to the use of discretion? Will it reduce the diversity of factors relevant for reaching decisions, or instead allow them to increase? Will the rule of law be adhered to? Will there be sufficient guarantees of transparency? Are there risks that accountability for decisions and responsibility will become obfuscated and that abilities to control them will be degraded?

The Irish philosopher John Danaher asks whether algorithmic governance might even pose a risk to the moral and political legitimacy of public decision-making processes. He speaks of a 'threat of algocracy', meaning a situation in which algorithm-based systems massively limit the opportunities for humans to participate in and understand decisions, and thus the options for action by those affected by them.[8]

More generally, will computational tools disrupt legal practice as well as legal scholarship, with detrimental effects on the quality of legal protection, especially the rule of law? This is the focus of the research project 'Counting as a human being in the era of computational law' (CoHuBiCoL). The initiators are studying fundamental issues regarding the further development of the law. 'The overarching goal is to develop a new hermeneutics for computational law, based on (1) research into the assumptions and (2) the implications of computational law, and on (3) the development of conceptual tools to rethink and reconstruct the Rule of Law in the era of computational law'.[9]

The following remarks cannot and should not anticipate the possible results of such a project. Rather, they should serve as the basis for further reflections by describing the risks and opportunities associated with the digitalisation of the law, and in particular by elaborating how this differs in comparison to the traditional use of the law.

Algorithms, including learning algorithms

The digital transformation of society follows from the use of digital algorithms.[10] There are simple systems and now — using artificial intelligence techniques – intelligent IT systems.[11] The latter include machine learning.[12] The term refers to computer programs that are able to learn from records of past conduct and outcomes. In particular, the software has the ability to recognise patterns, evaluate images, translate language in texts, generate rules, and make predictions. The trend has not stopped there. The use of artificial intelligence as well as artificial neural networks makes it possible to largely simulate human ways of thinking and rules for acting. Here, the software is capable of enhancing digital programming created by humans, and thus of evolving independently of such programming (i.e. deep learning).[13] Particularly sophisticated systems can adapt on their own when confronted with new problem situations. These systems can also identify contexts, structures and architectures on their own and improve their capability completely independently on the basis of the new information they gain.

---

[8] John Danaher, 'The Threat of Algocracy: Reality, Resistance and Accommodation' (2016) 29(3) Philosophy and Technology 245.

[9] See 'Fact Sheet: Counting as a Human Being in the Era of Computational Law' (European Commission 2017) ⟨https://cordis.europa.eu/project/id/788734⟩ and www.cohubicol.com.

[10] A critical analysis of the manifold functions of algorithms is provided by Rob Kitchin, 'Thinking Critically About and Researching Algorithms' (2016) 20(1) 14.

[11] See generally Stuart Russell and Peter Norvig, *Artificial Intelligence: A modern Approach* (Pearson Higher Education 2016); Wolfgang Ertel, *Grundkurs Künstliche Intelligenz* (4th, Springer Vieweg 2016).

[12] On machine learning and its application in the legal sphere, see Harry Surden, 'Machine Learning and Law' (2014) 89(1) Washington Law Review 87; Ethem Alpaydin, *Machine Learning* (The MIT Press 2016).

[13] See Ian Goodfellow, Yoshua Bengio, and Aaron Courville, *Deep Learning (Adaptive Computation and Machine Learning)* (The MIT Press 2016); Felix Stalder, *Kultur der Digitalität* (Suhrkamp 2016); Stefan Kirn and Claus D Müller-Hengstenberg, 'Intelligente "Software-Agenten": Eine neue Herausforderung für unser Rechtssystem?' [2014] Multimedia & Recht 307.

One consequence of this is that humans are no longer able to fully understand how exactly these systems work. The U.S. researcher Andrew Tutt says about learning systems:

> Even if we can fully describe what makes them work, the actual mechanisms by which they implement their solutions are likely to remain opaque: difficult to predict and sometimes difficult to explain. And as they become more complex and more autonomous, that difficulty will increase.[14]

This finding obviously raises questions of responsibility, accountability, explicability, and comprehensibility, as well as the scope for human supervision and judicial control, not to mention the ability to take corrective measures in the event of undesirable developments.[15]

Quality assurance

The use of digital processes depends highly on the quality of the data being processed, the information transmitted by them, and the software used for processing. Data quality includes, *inter alia*, the integrity and availability of the information conveyed with the aid of data, in some cases also the safeguarding of confidentiality. Furthermore, data has to be kept current, e.g. through readjustment when there is a change in the de facto basic conditions or in the applicable legal requirements. Quality also includes the safety and security of the data and the software.

Quality problems may also result from the fact that digital programs are created through division of labour, often without the ability to specifically account for the respective contributions by the various actors and the control effects that they trigger. Moreover, for those participating in the process, it is not always evident which programming consequences are caused by the actions of which actors and how are they compatible with one another.

From a legal standpoint, software quality means in particular that programming takes into account all legally relevant factors and excludes those that are normatively undesirable, such as valuations in contravention of norms or influenced by impermissible motives. Specifically, it must be assured here that bias or discriminatory parameters are not built into the design of the algorithmic system.[16]

Differences between social and technical constructs

Formerly, legal decisions were 'human-made', though often supported by technology. Human decisions are social constructs. They are developed in specific contexts of an organisational, procedural, or cultural nature and are based on the relevant skills of the human decision-maker.[17] The same applied and still applies to the input of data that is entered by humans in order to be processed by computer, including legal norms, facts, and circumstances that are important for resolving conflicts.

By contrast, the approaches used in algorithmic systems are technical constructs, even though the programs were created by humans and the input is entered by humans. The technical process differs from human decisions in a variety of ways.

First, based on their current technical performance capabilities, algorithms do not possess some abilities that are distinctively human. For instance, algorithms lack the ability to use 'implicit knowledge', i.e. knowledge that humans possess based on their earlier experiences, even where they cannot expressly name its source. When a

---

[14]   Andrew Tutt, 'An FDA for Algorithms' (2017) 69(1) Administrative Law Review 83.

[15]   For analyses and possible answers to these questions, see the contributions in Thomas Wischmeyer and Timo Rademacher (eds), *Regulating Artificial Intelligence* (Springer 2020).

[16]   Engin Botzdag, 'Bias in Algorithm Filtering and Personalization' (2013) 15 Ethics and Information Technology 209; Omer Tene and Jules Polonetsky, 'Big Data for All: Privacy and User Control in the Age of Analytics' (2013) 11(5) Northwestern Journal of Technology and Intellectual Property 239; Alexander Tischbirek, *Artificial Intelligence and Discrimination: Discriminating Against Discriminatory Systems* (Springer 2020).

[17]   For further details, see Wolfgang Hoffmann-Riem, 'Verhaltenssteuerung durch Algorithmen – eine Herausforderung für das Recht' (2017) 142(1) Archiv des öffentlichen Rechts 1.

computer is being programmed, it is reliant on the fact that the applied knowledge is explicit, in other words that the knowledge can be translated into a computer-capable language.

In addition, computers lack some other abilities — or at least sufficient abilities — that are important for some legal decisions. These include abilities concerning empathy, the development of creativity and the use of intuition, which is also important for lawyers (in German, this is called 'Judiz'). Moreover, algorithms reach some limits (at least so far) with regard to the argumentatively derived interpretation of the meaning of norms.[18] Algorithms can establish only correlations, and not causalities. Algorithms are furthermore limited in their ability to undertake a complex balancing of all considerations and to calibrate the criteria for balancing in a way that satisfies the relevant conditions for their legal application.

Although some of these deficits cannot be eliminated, in many cases it is possible to gloss over them through simulation or through the use of correlations obtained with statistical procedures, often also in such a way that something no longer appears to be a deficit at all.

At this point, some may doubt whether some of the human abilities I have just described are particularly important when dealing with law. Others may fear that such abilities may be employed by some persons in an undesirable manner, e.g. to reinforce prejudices or as a tool for manipulation and discrimination. It is no secret that humans are capable of socially undesirable behaviour and on occasion also employ it. However, it also should not be overlooked that corresponding deficits — such as latent discrimination — can also be built into software programs and then, undetected, find expression in countless decisions influenced by them.

Modelling computational law: opportunities and difficulties

When digital technologies are employed to interpret and apply the law, it must be assured that the legal requirements are complied with. In general, it is possible to translate legal rules into technical rules. For this purpose, standardisation is necessary, since an action by a computer requires clear language commands. In some fields, the norms are unambiguous and thus can be converted into algorithmic rules. Under these circumstances, software programming can easily satisfy the requirements concerning in particular the rule of law. This is also the case where the applicable facts and circumstances can be compiled unambiguously in a digital manner, for instance, in many fields of taxation.

However, norms conceived in human language are in many cases characterised by the fact that the terms are vague and open to different interpretations.[19] Moreover, norms often contain multiple terms, and when they interact with one another, this may create room for interpretation and different applications. Transferring such norms into software programming leads to a risk of reducing or even changing the substance of law.

Legal practice and legal studies have come up with a number of suggestions for how terms and norms that are vague and open to interpretation can be given greater specificity. Judicial precedents can be drawn upon for the purpose of specification if the approaches taken in such decisions have broad acceptance. In common law systems, this is facilitated by the fact that judicial precedent is recognised as having considerable weight. In Germany, while precedents are also significant,[20] legal dogma ('Rechtsdogmatik') is of particular importance.[21] In both legal cultures, it is nevertheless possible to deviate from such previous consensus and to understand the terms in a different way, such as in

---

[18] See Mireille Hildebrandt, 'Law as Computation in the Era of Artificial Legal Intelligence: Speaking Law to the Power of Statistics' (2018) 68(1) University of Toronto Law Journal 12. For proposals on how to deal with this problem, see Ashley (n 3).

[19] See Wolfgang Hoffmann-Riem, *Innovation und Recht – Recht und Innovation* (Mohr Siebeck 2016); Thilo Kuntz, 'Recht als Gegenstand der Rechtswissenschaft und performative Rechtserzeugung' (2016) 216(6) Archiv für die civilistische Praxis 866, with further references.

[20] See Mehrdad Payandeh, *Judikative Rechtserzeugung* (Mohr Siebeck 2017).

[21] See generally Christian Bumke, *Rechtsdogmatik: Eine Disziplin und ihre Arbeitsweise. Zugleich eine Studie über das rechtsdogmatische Arbeiten Friedrich Carl von Savignys* (Mohr Siebeck 2017).

the face of changed circumstances. If we are deprived of this ability through digital programming, this would create a risk that law will no longer be able to respond appropriately to social or economic change.

In particular, unambiguous programming is absent in norms that specify aims and purposes, but not, or to only a limited extent, the permissible means for their realisation. A decision-making leeway also exists where it is necessary to balance competing considerations. This is a familiar problem, for example, with risk law, where the possible or required measures have to be determined in accordance with the value of the legally protected interest that is in jeopardy. One formula here reads: as the importance increases of the legally protected but jeopardised interest, the threshold for the likelihood of impending damage must be lowered accordingly.[22]

Legal requirements are ambiguous, in particular where norms permit the exercise of discretion, require that predictions be made or are designed to contribute to the planning and shaping of future structures. I have already mentioned the difficulties associated with the balancing of considerations. One example of the need to undertake such balancing, especially in the field of public law, is the application of the principle of proportionality.

Fraught with uncertainty is also the outcome of decisions in 'dilemma situations', meaning situations in which all of the alternative decisions available will result in damage. How such situations are to be handled is currently the subject of intense discussions with respect to autonomous driving.[23] How will the program decide by algorithm when in a certain traffic situation the automobile has only two choices: drive into a group of children at play or into a group of seniors waiting at a bus stop?

There are many other situations in which legal programmes call for decisions that in legal terms are not clearly or definitively pre-programmed. This is the case where the legal system requires that the decision-maker must also apply subjective criteria. Examples include verifying whether duties of care were breached and applying standards of fault, such as negligence.

To the extent that the issue has to do with evaluating whether a fact is true — for instance, in connection with the assessment of evidence — the legal system, at least in Germany, expressly requires that the outcome depends on whether the decision-maker is convinced. Conviction is without doubt a subjective category in need of detailed specification. The same goes for the prediction of the recidivism risk of criminal offenders, which is intended to aid in making a decision about whether a sentence may be suspended. In the U.S. such decisions are often made on a purely automated basis,[24]. an unusual concept in German legal culture.

Supplemental controlling factors in the application of law

All of this is exacerbated by a further problem. Because of such open decision-making situations, the legal system builds on the fact that in addition to norms conceived in language, there are non-textual factors that have an impact on the interpretation and application of the law.[25] These may be called supplemental controlling factors, such as the significance of the type of organisation making the decision. Thus, it often makes a difference if the decision is made by a court — whether an individual judge or a collective body — or by an administrative authority. The procedure used to make the decision may also be relevant, such as whether and how a legal hearing is granted and whether there is access to all relevant files. But above all, it is the specific experiences and value orientations of

---

[22] Regarding this issue, see Matthias Klatt and Johannes Schmidt, *Spielräume im öffentlichen Recht* (Mohr Siebeck 2010); Ralf Poscher, 'Eingriffsschwellen im Recht der inneren Sicherheit' (2008) 41(3) Die Verwaltung 345.

[23] See, e.g., Philipp Weber, 'Dilemmasituationen beim autonomen Fahren' (2016) 29(6) Neue Zeitschrift für Verkehrsrecht 249; Ethik-Kommission automatisiertes und vernetztes Fahren Bundesministerium für Verkehr und digitale Infrastruktur, Report (June 2017) p. 16.

[24] Nancy Ritter, 'Predicting Recidivism Risk: New Tool in Philadelphia Shows Great Promise' [2013] (271) National Institute of Justice Journal 4; Grant Duwe and Michael Rocque, 'Effects of Automating Recidivism Risk Assessment on Reliability, Predictive Validity, and Return on Investment (ROI)' (2017) 16(1) Criminology & Public Policy 235.

[25] See Hoffmann-Riem, *Innovation und Recht – Recht und Innovation* (n 19) p. 180 et seq.

the individuals charged with making the decision that are important.

In some cases, a norm may have to be specified as one designed to deal with the conflict at hand – in the literature on methodology, some Germans call this creation of an 'Entscheidungsnorm'.[26] If this task is no longer entrusted to individuals charged with applying the law but instead to a computer program, this results in a change in the decision-making factors that are imparted by the controlling factors' organisation, procedure, and personnel.[27] A software program that is designed to make automated decisions is developed under completely different contextual conditions from those surrounding the creation of a norm by legislators and its subsequent application to a given case.

Using techniques like categorical regulations to pre-empt the importance of such factors would not be a proper solution. This would require a return to the legal formalism school of jurisprudence, which for good reason has become outdated.[28] Freezing one specific interpretation — a kind of 'digital neo-positivism' — is not an adequate response to the challenges currently being faced in the interpretation and application of modern law.

Designing software with the involvement of lawyers and non-lawyers

It should be kept in mind that the actors involved in developing the requirements for the specific design of the software architecture are different from those who are normally involved in making and applying the law. The design of the software comprises coding for electronic data processing, software testing and, potentially, its revision following the experience gained in testing or real-time op-

eration. By no means are lawyers always employed here, let alone are they the only ones employed. In particular, IT experts are involved. Moreover, the internal programming process is not governed by legal rules: to date, there are no procedural requirements concerning the creation of software, nor is it assured that only legal decision-making factors, or at least only those that are legally legitimated, will be built into the programming. Furthermore, the programming process as such is normally not subject to any legal control, even though this could be by all means provided for, e.g. through procedures for a proactive certification of certain digital programs.

In view of the structure of the traditional approach taken by algorithms and the constraints of these occasions, programmers may be tempted to treat the relevant norm requirements as unambiguous, even where they are not. They may also succumb to the temptation to simply feign this if need be.

Automated administrative decisions — the example of German law

It is not possible to address the broad range of potential applications and challenges here. Therefore, I will first deal with the extent to which the public administration and the courts are entitled to make digitally automated decisions. Then I will turn to the automated sanctioning of violations of legal obligations below. I will restrict my remarks here to the current situation in Germany.

By way of note, I should first mention that algorithms have long been employed by the public administration and the courts in their daily work, including the preparation of decisions, for instance, when it comes to research or systemisation. Certain administrative decisions also have

---

[26] Concerning this concept, see Friedrich Müller and Ralph Christensen, *Juristische Methodik, Vol.1: Grundlagen für die Arbeitsmethoden der Rechtspraxis* (11th, Duncker & Humblot 2013), in particular, paras. 233 and 274; Hoffmann-Riem, *Innovation und Recht – Recht und Innovation* (n 19) pp. 60-61, 80 et seq.; Kuntz (n 19) pp. 867, 873 et seq.

[27] See Hoffmann-Riem, *Innovation und Recht – Recht und Innovation* (n 19) pp. 97-98.

[28] See Hoffmann-Riem, 'Verhaltenssteuerung durch Algorithmen – eine Herausforderung für das Recht' (n 17) p. 17. According to Klaus Wiegerling, 'Daten, Informationen, Wissen' in Stephan Breidenbach and Florian Glatz (eds), *Rechtshandbuch Legal Tech* (CHBeck 2018) p. 32, behind the 'datafication' lie 'positivistic metaphysics'.

long been issued electronically and sent out without individual control by the case officer, such as pension notices or salary and benefits statements.[29]

Furthermore, express rules have recently been enacted about when the public administration may make decisions on a fully automated basis. In Germany,[30] they can be found in the Administrative Procedures Act,[31] in the Fiscal Code,[32] and in Book Ten of the Social Code.[33] They show that German legislators are taking a very cautious approach[34] in this field of data-driven law. The legislators continue to rely primarily on decisions made by humans. Fully automated decisions are permissible only where the norms in question do not allow the exercise of discretion and there is no assessment leeway with regard to the application of undefined legal terms.[35] Put another way, where leeway exists in making a decision because the law is, for instance, vague or ambiguous, particularly where legally relevant interests have to be assessed and balanced against one another, the legislators consider the human factor to be an indispensable part of a just decision.[36]

The facts and circumstances that are important for an administrative decision, in other words, the underlying legal conflict in particular may generally be ascertained by the administration with the assistance of an automated system. However, Section 24 of the Administrative Procedures Act specifies that if the parties to the conflict make factual assertions that are significant in the given case, a natural person must examine whether this is relevant for the decision, that is, whether they need to supplement or modify the facts and circumstances ascertained in an automated manner to a material extent.

Automated administrative acts are subject to the same constitutional guarantee of judicial review as are other administrative acts. However, as of now, courts in Germany are not permitted to make automated decisions.[37] It does also not suffice that in their judicial review the courts check the algorithms used by the public administration, as the court must make its own assessment based on criteria not necessarily identical with those employed by public administration.[38] The reaching of a court decision, and thus also of the criteria to be applied to it, are not fully identical to those that are controlling for the administration. In particular, a judicial review procedure is not structured in the same way as the procedure for issuing a new administrative act.

Specific problems arise when an automated administrative decision is able to be comprehensively reviewed for its correctness only if the court deals with the underlying software, i.e. the automated decision-making program and its handling of the specific conflict. That would be

---

[29]   See, e.g., Hans Peter Bull, 'Der "vollständig automatisiert erlassene" Verwaltungsakt – zur Begriffsbildung und rechtlichen Einhegung von E-Government' (2017) 132(7) Deutsches Verwaltungsblatt 409, p. 409 et seq.; he also shares ideas on the question concerning the point at which an administrative decision should be considered fully automated (pp. 410-11).

[30]   I will not deal with the provisions on automated decision-making in Article 22 of the EU General Data Protection Regulation (Regulation (EU) 2016/679), which is binding on all EU Member States.

[31]   Verwaltungsverfahrensgesetz. See, *inter alia*, sections 3a, 35a, 37(2) and (3), and 41(2).

[32]   Abgabenordnung. See, in particular, sections 155(4) and 149(4).

[33]   Sozialgesetzbuch. See, e.g., section 31a of Book Ten.

[34]   See Nadja Braun Binder, 'Vollständig automatisierter Erlass eines Verwaltungsaktes und Bekanntgabe über Behördenportale' [2016] (21) Die Öffentliche Verwaltung 891; Thorsten Siegel, 'Automatisierung des Verwaltungsverfahrens' (2017) 132(1) Deutsches Verwaltungsblatt 24; Ariane Berger, 'Der automatisierte Verwaltungsakt' [2018] (17) Neue Zeitschrift für Verwaltungsrecht 1260.

[35]   See section 35a of the Administrative Procedures Act. This provision has also been transposed into the Administrative Procedures Acts of the Federal "Länder", albeit partly in a modified form. However, the prohibition is not designed to be controlling simply when the norm, as worded, permits discretion or uses a vague legal term, insofar as decision-making latitude is constrained by an administrative directive to reach certain decisions in cases of this type or by the administration's obligation to comply with decisions it had previously made ("Selbstbindung durch ständige Verwaltungspraxis"). On that problem, see Christian Djeffal, 'Das Internet der Dinge und die öffentliche Verwaltung – Auf dem Weg zum automatisierten Smart Government?' (2017) 132(13) Deutsches Verwaltungsblatt 808, at pp. 808, 814.

[36]   As argued by Lorenz Prell, 'On section 35a' in *Beck'scher Online-Kommentar Verwaltungsverfahrensgesetz* (39th, 2018), section 35a, para 14. For a discussion of the possibilities and restrictions of machine learning for decisions that include the exercise of discretion, see Viktoria Herold, 'Algorithmisierung von Ermessensentscheidungen durch Machine Learning' in Jürgen Taeger (ed), *Rechtsfragen digitaler Transformation – Gestaltung digitaler Veränderungsprozesse durch Recht* (OlWIR Verlag für Wirtschaft, Informatik und Recht 2018).

[37]   See Peter Enders, 'Einsatz künstlicher Intelligenz bei juristischer Entscheidungsfindung' [2018] 721, pp. 721, 723.

[38]   See, e.g. Thomas Wischmeyer, 'Regulierung intelligenter Systeme' (2018) 143(1) Archiv des öffentlichen Rechts 1, p. 57.

made easier if the employed software could itself provide information about the reasons supporting the decision in a language understandable to humans. This type of 'explainable artificial intelligence' has not yet been developed to the point of unproblematic application, but it is being worked on.[39]

Effective judicial control also requires that the algorithms employed by the administration be disclosed to the courts. It has yet to be clarified legally the extent to which algorithms, or at least their underlying criteria and precepts, must be disclosed to the courts. In the case of learning algorithms, the training programs and even the testing programs and their results would also have to be accessible.[40]

Even where such criteria are disclosed, it remains doubtful whether judges, who in most cases are not algorithm experts, will be able to undertake an effective review. In addition, in the case of learning software, it must be taken into consideration that not even the specialists, let alone the specific IT programmers, know and are able to understand how the currently employed software — which was potentially modified since the initial programming — functioned in detail. Therefore, it is especially important that efforts be made to understand the way intelligent algorithmic systems behave and to make that knowledge also accessible to those who apply the law.[41]

To the extent that, as is frequently the case, algorithms are treated as business secrets or as official secrets with respect to the parties to administrative or judicial proceedings, the parties for their part have no opportunity to uncover errors in the algorithms or their application and to ask the court for a specific review.[42]

Thus, in Germany — but also elsewhere — there are still substantial obstacles associated with the use of certain automated decision-making systems by state authorities. But I do not believe that the situation will remain like this. The tentative steps that have been taken so far in Germany also constitute an effort to gather experiences that can later form the basis for opening up additional fields of application.

Automated sanctioning of violations of legal obligations

Finally, I would like to address the opportunities for the automated enforcement of compliance with legal obligations. This is the field of code-driven law.

I will illustrate the problem with the example of an apartment that has been rented out under special conditions: if the tenant does not pay the rent on time and the apartment door is equipped with the requisite technical features, they are automatically locked out, without prior notice, and can no longer enter and use the apartment, even if a small child is still inside.

Such possibilities for automated sanctioning exist in the important area of 'smart contracts', where the terms of the agreement between the parties are written directly into digital code, which very often exists across a decentralised blockchain network.[43] This technology is used to make transactions traceable, transparent and irreversible, and breaches of contract can be sanctioned automatically.

---

[39] See Wischmeyer (n 38) p. 61, with further references in note 247.

[40] See Thomas Hoeren and Maurice Niehoff, 'KI und Datenschutz – Begründungserfordernisse automatisierter Entscheidungen' (2018) 9(1) Zeitschrift für rechtswissenschaftliche Forschung 47.

[41] In this regard, a group of U.S. scientists are calling for the creation of a new interdisciplinary field of behavioural research focusing on machine behaviour. See Iyad Rahwan and others, 'Machine behaviour' (2019) 568(7753) Nature 477.

[42] One example: With regard to risk management systems under tax law, section 88 (5) of the Fiscal Code expressly prohibits the reporting of details, to the extent that doing so would prejudice the equality and legality of taxation. See, e.g., Mario Martini and David Nink, 'Wenn Maschinen entscheiden … – vollautomatisierte Verfahren und der Persönlichkeitsschutz' (2017) 36(10) Neue Zeitschrift für Verwaltungsrecht - extra 1, p. 10.

[43] For more on this topic, see Martin Heckelmann, 'Zulässigkeit und Handhabung von Smart Contracts' [2018] Neue Juristische Wochenschrift 504; Klaus Eschenbruch, 'Smart Contracts' [2018] Neue Zeitschrift für Baurecht und Vergaberecht 3; Müller and Christensen (n 26), p. 600; Markus Kaulartz, 'Rechtliche Grenzen bei der Gestaltung von Smart Contracts' in Jürgen Taeger (ed), *Smart World – Smart Law? Weltweite Netze mit regionaler Regulierung* (OlWIR Verlag für Wirtschaft, Informatik und Recht 2016).

Automated sanctioning is also relevant with regard to filter technologies that prevent violations of the law, such as the dissemination of hateful or racist content on the internet, known as 'content curation'. In addition, it can be used as a tool to prohibit the unauthorised use of works protected by copyright,[44] a problem addressed by the EU Directive on Copyright and related rights in the Digital Single Market (EU 2019/790). While the directive has broad public support, it is not without its critics, especially in relation to the risk of infringements of the freedom of opinion and information associated with the use of upload filters.

These examples of automated sanctioning show that the law can be exploited for purposes other than merely specifying what someone may or may not do, with the affected person then deciding on his or her own whether to comply with the norm. In the case of automated sanctioning, technology excludes the interposition of a deliberate decision by the person involved. It is not even necessary for the affected person to have first been threatened with such a sanction, which would enable him or her to decide on his or her own whether to comply with a rule or to disregard it. Such technically implemented rules are self-executing.[45]

Awareness of an impending sanction is one of the means of safeguarding the autonomy of those affected by it: as beings who think and are also capable of ethical action, they can decide on their own whether to comply with the legal proscription or whether there are reasons not to do so, thus risking potential sanction. Under certain circumstances, the ability to refuse to follow a rule may even be desirable,[46] for instance, where conducting oneself not in conformity with a rule is more consistent with its meaning than 'blindly' following it. This may be the case in the dilemma situations mentioned earlier. A relatively harmless example is where a driver decides to disobey a traffic law in order to avoid an accident. The sociologist Niklas Luhmann coined the term 'useful illegality' to describe such special situations.[47]

Outlook

There are many more examples of how novel approaches are making use of digitalisation. The more digital transformation encompasses the legal system, the more important it is for the parties involved to have corresponding skills. Especially for tomorrow's lawyers, it will no longer be sufficient to learn and practice law in the way that was typical for the analogue world. One aim ought to be to gain abilities to use the new technology.[48]

It is also important to reflect on what digitalisation is bringing about. If a contract is concluded in an automated manner, and if a breach of it is likewise sanctioned in an automated manner, this has consequences for the way that law is employed, and thus for the way that interests are protected. The same applies where the issuance of administrative acts is left to non-transparent algorithms and vaguely understood software. It also makes a difference if the review of lawfulness is handled by self-learning machines instead of procedures involving persons trained in the law who act according to judicial ethics. The changes are not limited to individual decision-making processes. They may also have an impact on society's acceptance of the law, on the role of law in settling disputes, and ultimately on the legitimation of the legal system and its recognition as being just.

I certainly do not mean to suggest that the shift from text to data and code as such should be considered negative or that application of law in the 'analogue age' was preferable. However, the impact of that shift needs to be carefully analysed and assessed, as does the architecture of com-

---

[44]   See Kevin Dankert, 'Normative Technologie in sozialen Netzwerkdiensten' (2015) 98(1) Kritische Vierteljahresschrift für Gesetzgebung und Rechtswissenschaft 49, pp. 56-57; Omer Tene and Jules Polonetsky, 'Taming the Golem: Challenges of Ethical Algorithmic Decision-Making' (2017) 19(1) North Carolina Journal of Law & Technology 125, p. 125, 154 et seq.

[45]   See Wolfgang Schulz and Kevin Dankert, *Die Macht der Informationsintermediäre* (Friedrich-Ebert-Stiftung 2016) II.3.B.

[46]   Timo Rademacher, 'Wenn neue Technologien altes Recht durchsetzen: Dürfen wir es unmöglich machen, rechtswidrig zu handeln?' (2019) 74(14) Juristenzeitung 702; Maximilian Becker, 'Von der Freiheit, rechtswidrig handeln zu können' [2019] (8/9) Zeitschrift für Urheber- und Medienrecht 636.

[47]   Niklas Luhmann, *Funktion und Folgen formaler Organisation* (2nd, Duncker & Humblot 1972) p. 304 et seq.

[48]   See Susskind, *Tomorrow's Lawyers: An Introduction to Your Future* (n 3).

putational law, how it is applied to the persons affected by it, and what effect it has on the quality of the legal system, including the methodology of law. Moreover, adequate opportunities for correction must be created so that any undesirable developments can be remedied.

The more that digitalisation changes our social life, the more important it becomes to ensure transparency, responsibility and accountability, as well as public and judicial control. It is essential to prevent citizens from being treated as uninformed, unthinking or even submissive objects. It is also important for those who interpret and apply law to maintain a critical distance to the things that they are engaged with.

References

Alpaydin E, *Machine Learning* (The MIT Press 2016).

Ashley KD, *Artificial Intelligence and Legal Analytics: New Tools for Law Practice in the Digital Age* (Cambridge University Press 2017).

Becker M, 'Von der Freiheit, rechtswidrig handeln zu können' [2019] (8/9) Zeitschrift für Urheber- und Medienrecht 636.

Berger A, 'Der automatisierte Verwaltungsakt' [2018] (17) Neue Zeitschrift für Verwaltungsrecht 1260.

Bernhardt W, 'Quo vadis Digitalisierung der Justiz?' [2018] (8/9) Juris 310.

Botzdag E, 'Bias in Algorithm Filtering and Personalization' (2013) 15 Ethics and Information Technology 209.

Bounfour A, *Digital Futures, Digital Transformation* (Springer 2016).

Braun Binder N, 'Vollständig automatisierter Erlass eines Verwaltungsaktes und Bekanntgabe über Behördenportale' [2016] (21) Die Öffentliche Verwaltung 891.

Breidenbach S and Glatz F (eds), *Rechtshandbuch Legal Tech* (CH Beck 2018).

Bull HP, 'Der "vollständig automatisiert erlassene" Verwaltungsakt – zur Begriffsbildung und rechtlichen Einhegung von E-Government' (2017) 132(7) Deutsches Verwaltungsblatt 409.

Bumke C, *Rechtsdogmatik: Eine Disziplin und ihre Arbeitsweise. Zugleich eine Studie über das rechtsdogmatische Arbeiten Friedrich Carl von Savignys* (Mohr Siebeck 2017).

Bundesministerium für Verkehr und digitale Infrastruktur E.-KauvF, Report (June 2017).

Bundesregierung, Digitale Verwaltung (18/3074, BTDrucks 2014).

Cole T, *Digitale Transformation* (2nd, Vahlen 2017).

Danaher J, 'The Threat of Algocracy: Reality, Resistance and Accommodation' (2016) 29(3) Philosophy and Technology 245.

Dankert K, 'Normative Technologie in sozialen Netzwerkdiensten' (2015) 98(1) Kritische Vierteljahresschrift für Gesetzgebung und Rechtswissenschaft 49.

Djeffal C, 'Das Internet der Dinge und die öffentliche Verwaltung – Auf dem Weg zum automatisierten Smart Government?' (2017) 132(13) Deutsches Verwaltungsblatt 808.

Duwe G and Rocque M, 'Effects of Automating Recidivism Risk Assessment on Reliability, Predictive Validity, and Return on Investment (ROI)' (2017) 16(1) Criminology & Public Policy 235.

Enders P, 'Einsatz künstlicher Intelligenz bei juristischer Entscheidungsfindung' [2018] 721.

Ertel W, *Grundkurs Künstliche Intelligenz* (4th, Springer Vieweg 2016).

Eschenbruch K, 'Smart Contracts' [2018] Neue Zeitschrift für Baurecht und Vergaberecht 3.

'Fact Sheet: Counting as a Human Being in the Era of Computational Law' (European Commission 2017) ⟨https://cordis.europa.eu/project/id/788734⟩.

Finck M, 'Blockchains: Regulating the Unknown' (2018) 19(4) German Law Journal 665.

Goodfellow I, Bengio Y, and Courville A, *Deep Learning (Adaptive Computation and Machine Learning)* (The MIT Press 2016).

Hartung M, Bues M.-M, and Halbleib G (eds), *Legal Tech: Die Digitalisierung des Rechtsmarkts* (CHBeck/Vahlen 2018).

Heckelmann M, 'Zulässigkeit und Handhabung von Smart Contracts' [2018] Neue Juristische Wochenschrift 504.

Herold V, 'Algorithmisierung von Ermessensentscheidungen durch Machine Learning' in Taeger J (ed), *Rechtsfragen digitaler Transformation – Gestaltung digitaler Veränderungsprozesse durch Recht* (OlWIR Verlag für Wirtschaft, Informatik und Recht 2018).

Hildebrandt M, 'Law as Computation in the Era of Artificial Legal Intelligence: Speaking Law to the Power of Statistics' (2018) 68(1) University of Toronto Law Journal 12.

Hoeren T and Niehoff M, 'KI und Datenschutz – Begründungserfordernisse automatisierter Entscheidungen' (2018) 9(1) Zeitschrift für rechtswissenschaftliche Forschung 47.

Hoffmann-Riem W, *Innovation und Recht – Recht und Innovation* (Mohr Siebeck 2016).

— 'Verhaltenssteuerung durch Algorithmen – eine Herausforderung für das Recht' (2017) 142(1) Archiv des öffentlichen Rechts 1.

Jost D and Krempe J, 'E-Justice in Deutschland' (2017) 70(38) Neue Juristische Wochenschrift 2705.

Kaulartz M, 'Rechtliche Grenzen bei der Gestaltung von Smart Contracts' in Taeger J (ed), *Smart World – Smart Law? Weltweite Netze mit regionaler Regulierung* (Ol-WIR Verlag für Wirtschaft, Informatik und Recht 2016).

Keese C, *Silicon Germany: Wie wir die digitale Transformation schaffen* (Albrecht Knaus 2017).

Kirn S and Müller-Hengstenberg CD, 'Intelligente "Software-Agenten": Eine neue Herausforderung für unser Rechtssystem?' [2014] Multimedia & Recht 307.

Kitchin R, 'Thinking Critically About and Researching Algorithms' (2016) 20(1) 14.

Klafki A, Würkert F, and Winter T (eds), *Digitalisierung und Recht* (Bucerius Law School Press 2017).

Klatt M and Schmidt J, *Spielräume im öffentlichen Recht* (Mohr Siebeck 2010).

Kuntz T, 'Recht als Gegenstand der Rechtswissenschaft und performative Rechtserzeugung' (2016) 216(6) Archiv für die civilistische Praxis 866.

Luhmann N, *Funktion und Folgen formaler Organisation* (2nd, Duncker & Humblot 1972).

Martini M and Nink D, 'Wenn Maschinen entscheiden … – vollautomatisierte Verfahren und der Persönlichkeitsschutz' (2017) 36(10) Neue Zeitschrift für Verwaltungsrecht - extra 1.

Müller F and Christensen R, *Juristische Methodik, Vol.1: Grundlagen für die Arbeitsmethoden der Rechtspraxis* (11th, Duncker & Humblot 2013).

Payandeh M, *Judikative Rechtserzeugung* (Mohr Siebeck 2017).

Poscher R, 'Eingriffsschwellen im Recht der inneren Sicherheit' (2008) 41(3) Die Verwaltung 345.

Prell L, 'On section 35a' in *Beck'scher Online-Kommentar Verwaltungsverfahrensgesetz* (39th, 2018).

Rademacher T, 'Wenn neue Technologien altes Recht durchsetzen: Dürfen wir es unmöglich machen, rechtswidrig zu handeln?' (2019) 74(14) Juristenzeitung 702.

Rahwan I and others, 'Machine behaviour' (2019) 568(7753) Nature 477.

Ramge T and Mayer-Schönberger V, *Das Digital: Markt, Wertschöpfung und Gerechtigkeit im Datenkapitalismus* (Econ 2017).

Ritter N, 'Predicting Recidivism Risk: New Tool in Philadelphia Shows Great Promise' [2013] (271) National Institute of Justice Journal 4.

Russell S and Norvig P, *Artificial Intelligence: A modern Approach* (Pearson Higher Education 2016).

Schulz MR and Schunder-Hartung A (eds), *Recht 2030. Legal Management in der digitalen Transformation* (Fachmedien Recht und Wirtschaft, dfv Mediengruppe 2019).

Schulz W and Dankert K, *Die Macht der Informationsintermediäre* (Friedrich-Ebert-Stiftung 2016).

Seckelmann M (ed), *Digitalisierte Verwaltung. Vernetztes E-Government* (2nd, Erich Schmidt Verlag 2019).

Siegel T, 'Automatisierung des Verwaltungsverfahrens' (2017) 132(1) Deutsches Verwaltungsblatt 24.

Stalder F, *Kultur der Digitalität* (Suhrkamp 2016).

Surden H, 'Machine Learning and Law' (2014) 89(1) Washington Law Review 87.

Susskind R, *The End of Lawyers? Rethinking the Nature of Legal Services* (Oxford University Press 2010).

— *Tomorrow's Lawyers: An Introduction to Your Future* (2nd, Oxford University Press 2017).

Tene O and Polonetsky J, 'Big Data for All: Privacy and User Control in the Age of Analytics' (2013) 11(5) Northwestern Journal of Technology and Intellectual Property 239.

— 'Taming the Golem: Challenges of Ethical Algorithmic Decision-Making' (2017) 19(1) North Carolina Journal of Law & Technology 125.

Tischbirek A, *Artificial Intelligence and Discrimination: Discriminating Against Discriminatory Systems* (Springer 2020).

Tobschall D and Kempe J, 'Der deutsche Legal-Tech-Markt' in Breidenbach S and Glatz F (eds), *Rechtshandbuch Legal Tech* (CH Beck 2018).

Tutt A, 'An FDA for Algorithms' (2017) 69(1) Administrative Law Review 83.

Wagner J, *Legal Tech und Legal Robots* (1st, Springer Gabler 2018).

— *Legal Tech und Legal Robots* (2nd, Springer Gabler 2020).

Weber P, 'Dilemmasituationen beim autonomen Fahren' (2016) 29(6) Neue Zeitschrift für Verkehrsrecht 249.

Wiegerling K, 'Daten, Informationen, Wissen' in Breidenbach S and Glatz F (eds), *Rechtshandbuch Legal Tech* (CHBeck 2018).

Wischmeyer T, 'Regulierung intelligenter Systeme' (2018) 143(1) Archiv des öffentlichen Rechts 1.

Wischmeyer T and Rademacher T (eds), *Regulating Artificial Intelligence* (Springer 2020).

A reply: AI as a social construct

Virginia Dignum • Umeå University virginia@cs.umu.se

This short article comments on the paper 'Legal Technology / Computational Law' by Wolfgang Hoffmann-Riem, from the perspective of my background in Computing Science and Artificial Intelligence.

I fully subscribe to the main message of the article, that of the importance of ensuring transparency, responsibility and accountability[1] with respect to computational implementations of law and regulatory measures. These processes can have profound consequences to the manner in which law in employed and interests are protected. As Hoffmann-Riem correctly states, quoting Danaher, 'algorithmic governance might even pose a risk to the moral and political legitimacy of public decision-making processes.' Digital transformation, particularly the use of artificial intelligence, is challenging the social contract and providing both risks and opportunities for democracy. Legal rules are characterised by the fact that they are vague and open to interpretation. In the same way that the current ideal of democracy is grounded on the individual's right to self-determination, the current legal system is based on the capability of legal professionals to interpret legal rules and use empathy, creativity and intuition in order to reach the best decision. Mireille Hildebrandt states that 'a law that cannot be disobeyed does not qualify as law, but rather as brute force or discipline'.[2] This is particularly challenging for computational systems that, by definition and by design, are more suited to represent unambiguous facts, than to support a myriad of interpretations, such as are at the basis of legal reasoning. An increased dependency on AI legal-tech has therefore an impact on the interpretation and application of the law.

Nevertheless, computational methods have long been applied to law and regulation. AI and Law research can roughly be classified into a theoretical perspective, which aims at the understanding of legal reasoning by computational means; and a practically one aiming to apply intelligent technology can aid legal practice. Hoffmann-Riem's paper mostly focuses on the latter, and in particular on what is commonly referred to as data-driven approaches. But AI is not just about learning nor is it just driven by data. Data-driven artificial intelligence, such as neural networks, is particularly aligned with the common law tradition, where courts decide the law applicable to a case by interpreting statutes and applying precedents which record how and why prior cases have been decided. On the other hand, model-driven approaches are aligned with civil law approaches, where core principles are codified into a referable system, which are often more amenable to be represented in well-structured models, such as decision trees.

For a long time, applications of AI to law centered in the model-driven approaches, focusing on the development of computational models of legal argument, including rule-based systems, and more recently and more successfully, on argumentation models [2]. However, as in many other domains, model-driven approaches to legal reasoning are seriously constrained by the difficulty of acquiring and representing knowledge. Hence, the current overall success of data-driven approaches that basically leave the representation problem to be solved by the computer, in the form of stochastic pattern identification. Nevertheless, neither are model-driven approaches completely hopeless, nor are data-driven approaches the solution to all our problems. The recently proposed view of AI as Law

---

[4] where AI systems are critical discussion systems rather than 'calculators' of legal results requires an hybrid approach that model- and data-driven methods as means to address the problems with current approaches as highlighted by Hoffmann-Riem.

Where Hoffmann-Riem focuses on the differences between social and technical constructs, I would like to point out their similarities. AI, technology in general, but also law are artefacts, or constructs, produced by human agency, and which meaning, notion, or connotation are defined by society. All constructs, be it social or technological, are engineered, and are agents in their environment. As engineering, it means that they can be modified, as agents, their presence in a social environment influences others. A main difference is that whereas we tend to see social constructs such as law as being interfaced by institutions, which ensure accountability and responsibility, we often tend to assign direct agency to AI constructs. What is directly missing here is a clear institutional scaffolding for AI, and therefore, for AI supported decision making.

It is fundamental to recognise that the computational artefact cannot be separated from the socio-technical system of which it is a component.[3] This system includes people, institutions and organisations (developers, manufacturers, users, bystanders, policy-makers, etc), their interactions, and the procedures and processes that guide these interactions. Responsible AI is not, as some may claim, a way to give machines some kind of 'responsibility' for their actions and decisions, and in the process, discharge people and organisations of their responsibility. On the contrary, responsible AI requires that the people and organisations involved in the decision-making processes take more responsibility and more accountability: for the decisions and actions of the AI applications, and for their own decision of using AI on a given application context. As such, the socio-technical AI system needs to include the institutions that can and should take responsibility and act in consideration of an ethical framework such that the overall system can be trusted by the society.

References

[1]   Virginia Dignum. *Responsible Artificial Intelligence: How to Develop and Use AI in a Responsible Way*. Switzerland: Springer, 2019.

[2]   Henry Prakken. 'AI & law on legal argument: research trends and application prospects'. *SCRIPTed* 5.3 (2008), pp. 449–454.

[3]   Andreas Theodorou and Virginia Dignum. 'Towards ethical and socio-legal governance in AI'. *Nature Machine Intelligence* 2.10–12 (2020).

[4]   Bart Verheij. 'Artificial intelligence as law'. *Artificial Intelligence and Law* 28.2 (2020), pp. 181–206.

---

[3]   For a more detailed argument, see my article with Andreas Theodorou in the *Nature Machine Intelligence* journal [3].

Author's response: **Contexts count**

Wolfgang Hoffmann-Riem

The stimulating commentary bears out my position that multidimensionality in dealing with the law must also be preserved when digital technologies are used. Although law is formulated in written form and its application requires that its meaning be understood, the interpretation of meaning is influenced by the contexts in which a norm is created and specifically applied. This includes the relevant institutions, procedures, cultures, and resources (particularly, knowledge, time, and money). The same pertains to the act of applying the norm to a given set of facts and circumstances and thus to the resolution of a specific problem within the framework of law.

The commentary does criticise to some extent my juxtaposition of social and technological constructs. The way it is formulated is in fact too strict. I should have expressly added that the two interact with and influence each other. My aim was to elaborate the differences that exist between a decision made solely by humans and one made solely by or with the assistance of technology. In this regard, I mentioned that the technological constructs I described are also influenced by humans: certainly in connection with software programming but also (usually) in terms of the processing of inputs, particularly the facts and circumstances. As I emphasised at the outset, even in the area of Legal Tech, application of law is not determined solely by technology.

I am therefore in full agreement with the statement that the 'computational artefact cannot be separated from the socio-technical system of which it is a component.' The same applies to the statement that responsibility and accountability for the decisions that are necessary for dealing with law should not be vested in machines:

> Responsible AI requires that the people and the organisations involved in the decision making process take more responsibility and more accountability: for the decisions and actions of the AI applications, and for their own decision of using AI on a given application context.

However, learning systems pose a significant problem in terms of technical complexity and limited accessibility to decision-making processes. Responsibility and accountability presuppose knowledge and options for intervention. It is to be hoped that progress will be made in further developing useful explainable artificial intelligence.