

Martin Ebers

Marta Cantero Gamito *Editors*

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# Algorithmic Governance and Governance of Algorithms

Legal and Ethical Challenges

# **Data Science, Machine Intelligence, and Law**

Volume 1

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Martin Ebers • Marta Cantero Gamito  
Editors

# Algorithmic Governance and Governance of Algorithms

Legal and Ethical Challenges

 Springer

### *Editors*

Martin Ebers  
Humboldt University  
of Berlin, Law Faculty  
Berlin, Germany

University of Tartu,  
School of Law  
Tartu, Estonia

Marta Cantero Gamito  
CUNEF, Law Department  
Madrid, Spain

University of Tartu,  
School of Law  
Tartu, Estonia

ISSN 2730-5899

ISSN 2730-5902 (electronic)

Data Science, Machine Intelligence, and Law

ISBN 978-3-030-50558-5

ISBN 978-3-030-50559-2 (eBook)

<https://doi.org/10.1007/978-3-030-50559-2>

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# Foreword

Algorithmic systems are increasingly being used as part of decision-making processes in both public and private sectors, with potentially significant consequences for individuals, organisations and societies as a whole. It is no surprise that many types of decisions can be made faster and more efficiently using computational algorithms. However, at the same time, the scale and complexity of the decisions that are being delegated to machines together with the autonomic nature of these decisions are raising concerns about the transparency, fairness, privacy and lack of explanation of these applications. Hardly a day goes by without news of yet another case of manipulation, biases, censorship, social discrimination, violations of privacy and property rights related to the application of algorithmic systems.

The lack of transparency which prevents meaningful scrutiny and accountability is a significant concern when these systems are applied as part of decision-making processes that can have a considerable impact on people's self-determination and human rights. Moreover, the adaptive nature of many artificial intelligence (AI) algorithms together with their opacity also affects privacy and non-discrimination: if we cannot understand how the machine has reached a decision and there are no guarantees that equal conditions lead to equal results, there can be no guarantee of fairness and equal treatment.

Organisations and governments across the world are defining governance strategies to provide appropriate safeguards to protect individuals and society. As an example, High Level Expert Group on AI appointed by the European Commission has defined concrete recommendations for trustworthy AI that aim exactly at this. However, scholar, multidisciplinary research that can provide a sound basis for understanding the impact of algorithms and the possibilities for regulation is often still lacking.

As such, this present volume is an extremely welcome contribution to the advance of state of the art on algorithmic governance. The papers in this volume address these challenges and therefore contribute to shape the discussion about the current and future national and international legal framework for AI and robotics. Starting with a discussion of fundamental principles, this volume further presents work on

responses to behavioural profiling, means to deal with algorithmic opacity, labour and societal impact and challenges and different national approaches to privacy and security. It also includes a discussion of the issue of electronic personhood. Altogether, this book presents a welcome contribution to the research community.

Umeå University  
Umeå, Sweden

Virginia Dignum

# Acknowledgments

This book is the result of a doctoral seminar on “Algorithmic Governance and Governance of Algorithms” which took place at the University of Tartu on 23 May 2019. The seminar was organised as part of the IT Law Programme of the University of Tartu, the University of Tartu School of Law and the University of Tartu Doctoral School of Economics and Innovation, supported by the European Union, European Regional Development Fund (University of Tartu’s ASTRA project PER ASPERA), in co-operation with the Robotics & AI Law Society (RAILS).

The editors are grateful to the people who made this doctoral seminar possible and would like to thank the Director of the University of Tartu School of Law, Professor Gaabriel Tavits, the Director of the PhD programme, Associate Professor Merike Ristikivi, the Director of the IT Law programme, Anette Aav, as well as Katri Holst and Kertu Kirjasto for their administrative support. In addition, the editors would especially like to acknowledge Irene Negri for her excellent assistance in the editing of this book.

This book has been supported by the Estonian Research Council’s grant no. PRG124 and by the Research Project “Machine Learning and AI-Powered Public Service Delivery”, RITA1/02-96-04, funded by the Estonian Government.



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# Algorithmic Governance and Governance of Algorithms: An Introduction



Marta Cantero Gamito and Martin Ebers

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**Abstract** The use of algorithms is more than ever replacing human decision-making. Naturally, this raises concerns about how to govern AI-powered technologies. This chapter introduces the potential as well as the threat(s) posed by decision-making by algorithms (algorithmic governance) and provides an up-to-date overview of the state of art and the existing legislative initiatives in this field (governance of algorithms).

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Sections 1–3 written by Martin Ebers; Sections 4 and 5 written by Marta Cantero Gamito.

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M. Cantero Gamito

CUNEF, Law Department, Madrid, Spain

University of Tartu, School of Law, Tartu, Estonia

M. Ebers (✉)

Humboldt University of Berlin, Law Faculty, Berlin, Germany

University of Tartu, School of Law, Tartu, Estonia

e-mail: [martin.ebers@ut.ee](mailto:martin.ebers@ut.ee)

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M. Ebers, M. Cantero Gamito (eds.), *Algorithmic Governance and Governance of Algorithms*, Data Science, Machine Intelligence, and Law 1, [https://doi.org/10.1007/978-3-030-50559-2\\_1](https://doi.org/10.1007/978-3-030-50559-2_1)

# 1 The Promise and Perils of Algorithm-Based Technologies

Algorithm-based technologies<sup>1</sup> such as artificial intelligence (AI)<sup>2</sup> and smart robotics<sup>3</sup> are increasingly pervading our lives. They are deployed in many sectors ranging from retail and production, finance and transport to healthcare and security.<sup>4</sup> They come in different forms and shapes, as personal assistants on our smartphones, search engines, translation apps, data-mining programs, scoring systems, medical diagnosis systems, price algorithms, expert trading systems, and in physical manifestations, such as self-driving cars, drones, unmanned underwater vehicles, surgical robots, personal robots and social robots.

Many of these systems have the potential to improve our lives as well as the overall economic and societal welfare. AI-powered systems can lead to better healthcare services,<sup>5</sup> safer and cleaner transport systems,<sup>6</sup> better working conditions,<sup>7</sup> higher productivity<sup>8</sup> and new innovative products, services and supply chains.<sup>9</sup> They can also benefit the public sector in a number of ways;<sup>10</sup> for example, by automating repetitive and time-consuming tasks, or by providing public agencies with more accurate and detailed information, forecasts and predictions, which in turn might lead to personalized public services tailored to individual circumstances. AI-powered systems may even help to respond to key global challenges, such as the climate change<sup>11</sup> and the novel coronavirus pandemic.<sup>12</sup>

However, as with every disruptive technology, AI and smart robotics come not only with benefits but also with substantial risks, raising a broad variety of ethical

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<sup>1</sup>Generally speaking, an algorithm can be understood as “sets of defined steps structured to process instructions/data to produce an output”; Kitchen (2017).

<sup>2</sup>Popular definitions of AI are equally unrefined. For different definitions cf. Samoli et al. (2020), High Level Expert Group on AI (AI HLEG) (2019a), McCarthy (2007), Russell and Norvig (2011), pp. 1 et seq.

<sup>3</sup>There is currently no generally accepted definition of the term “robot” either. The AI HLEG describes robotics as “AI in action in the physical world”, but points out that robots cannot be equated with AI systems, since robotics also uses technologies that lie outside of artificial intelligence; cf. AI HLEG (2019a), p. 4.

<sup>4</sup>For an overview on different use-cases cf. OECD (2019a), pp. 47 et seq.; International Electrotechnical Commission (IEC) (2018), pp. 45 et seq.

<sup>5</sup>Abu-Nasser (2017) and Gray (2018).

<sup>6</sup>Anderson et al. (2016), pp. 9 et seq.; OECD (2019a), pp. 48 et seq.

<sup>7</sup>Arntz et al. (2016) and OECD (2019b).

<sup>8</sup>Autor and Salomons (2018).

<sup>9</sup>Charalambous et al. (2019) and World Economic Forum (2017).

<sup>10</sup>Freeman Engstrom et al. (2020).

<sup>11</sup>Vinuesa et al. (2020).

<sup>12</sup>Kritikos, European Parliamentary Research Service (EPRS) (2020), pp. 1–2; Dumbrava, European Parliamentary Research Service (EPRS) (2020).

and legal challenges.<sup>13</sup> Algorithmic systems can unpredictably harm people's life, health, and property. They can also affect fundamental values on which western societies are founded, leading to breaches of fundamental rights, including the rights to human dignity and self-determination, privacy and personal data protection, freedom of expression and of assembly, non-discrimination, or the right to an effective judicial remedy and a fair trial, as well as consumer protection.<sup>14</sup>

Automated or algorithmic decision making (ADM) systems are particularly of concern. Many important decisions, which were historically made by people, are now either made by machines or at least prepared by them.<sup>15</sup> We live in a "scored society"<sup>16</sup> in which citizens, consumers and legal entities are increasingly subject to actions and decisions taken by or with the assistance of AI systems. AI increases the possibilities to track and score the daily habits of people. Companies from various industries collect, analyze, acquire, share, trade, and utilize data on billions of people in order to discern patterns, predict the likely behavior of people through scoring systems, and act accordingly. As a result, there is not only the danger that AI systems—in violation of data protection law—are used by state authorities or private companies for *mass surveillance*. Rather, the widespread use of algorithms for preparing or even making decisions is also criticized on the grounds of *discrimination*. A number of examples show that ADM procedures are by no means neutral but can perpetuate and even exacerbate biases in various ways. Compared to human decision-making, ADM systems pose a particular challenge: while it is true that human decision-making is not immune to mistakes and biases, algorithmic decisions can have a much larger effect, as the software not only decides dozens or hundreds of cases, but rather tens of thousands or more.

AI systems can also unintentionally or intentionally lead to *manipulation*. Social media platforms and search engines use AI systems to channel, prioritize and filter information—with potentially detrimental effect on the right to freedom of information, the right to freedom of expression, media pluralism, and the political discourse in general.<sup>17</sup> Moreover, the insights gained by AI powered systems can be used by companies or political parties to exploit or trigger irrational behavior—a practice which in the end led to the well-known *Cambridge Analytica* scandal.<sup>18</sup>

Particularly troublesome is the fact that not only private companies, but also *governmental institutions* are increasingly relying on algorithmic systems to analyze and predict behavior in order to make decisions. Tax offices have started using

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<sup>13</sup>For an in-depth analysis cf. Ebers (2020). According to the Stanford AI Index 2019, the ethical challenges most mentioned across 59 ethical AI framework documents were: fairness; interpretability and explainability; transparency, accountability; data privacy, reliability, robustness and security; Perrault et al. (2019), p. 149.

<sup>14</sup>Cf. Council of Europe, Committee of Experts on Internet Intermediaries (MSI-NET) (2017), Raso et al. (2018).

<sup>15</sup>Cf. AlgorithmWatch (2019).

<sup>16</sup>Keats and Pasquale (2014).

<sup>17</sup>Pariser (2011), Sunstein (2017) and Epstein (2014).

<sup>18</sup>Cf. Nix (2016); moreover Rubinstein (2014).

algorithms to predict abuse and fraud in tax returns and to allocate cases for human review.<sup>19</sup> In social welfare systems, algorithms are used to determine whether a citizen should be flagged because of an increased risk of irregularities, or potential fraud.<sup>20</sup> In the field of public security, many agencies use AI systems to detect terrorists,<sup>21</sup> to screen people at the border,<sup>22</sup> and to predict and respond to crime (predictive policing).<sup>23</sup> In the US, algorithmic prognosis instruments are even used by courts to calculate the likelihood of an accused person committing another crime while on parole.<sup>24</sup> In China, the government has implemented a Social Credit System which is intended to standardize the assessment of citizens' and businesses' economic and social reputations.<sup>25</sup>

The risks associated with AI systems and smart robotics are further intensified and amplified by the specific characteristics of many of these technologies, including opacity (black box-effect),<sup>26</sup> complexity, unpredictability and partially autonomous behavior—all of which may make it hard to verify compliance with the existing legal rules. Due to these characteristics, both enforcement authorities and affected persons might lack the means to verify how a given algorithmic decision was taken and whether the relevant rules were respected.

<sup>19</sup>DeBarr and Harwood (2004).

<sup>20</sup>For Austria see <https://algorithmwatch.org/en/story/austrias-employment-agency-ams-rolls-out-discriminatory-algorithm/>; for Finland, <https://www.tieto.com/en/success-stories/2018/the-city-of-espoo-a-unique-experiment/>; for the Netherlands <https://bijvoorbautverdacht.nl/>; for Spain <https://algorithmwatch.org/en/story/spain-legal-fight-over-an-algorithms-code/>; for Sweden <https://algorithmwatch.org/en/rogue-algorithm-in-sweden-stops-welfare-payments/>. Accessed 29 Apr 2020.

<sup>21</sup>In the EU, the European Commission is funding the DANTE experiment, an anti-terrorism project (Detecting and analysing terrorist-related online contents and financing activities), aimed at using automated decision-making against terrorism, <https://www.h2020-dante.eu/>. Accessed 29 Apr 2020.

<sup>22</sup>In the EU, many countries use “iBorderCtrl”, a system tested in Hungary, Greece and Latvia to screen non-EU nationals at EU borders, using automated interviews with a virtual border guard, based on “deception detection” technology; <https://www.iborderctrl.eu/The-project>. Accessed 29 Apr 2020.

<sup>23</sup>Barrett (2017), Ferguson (2012), p. 317; Rich (2016) and Saunders et al. (2016).

<sup>24</sup>Such processes are used at least once during the course of criminal proceedings in almost every US state; Barry-Jester et al. (2015). More than 60 predictive tools are available on the market, many of which are supplied by companies, including the widely-used COMPAS system from Northpointe.

<sup>25</sup>Hvistendahl (2017), Botsman (2017). Chen et al. (2018), pointing out that the Social Credit System has not—at least for now—employed AI technologies, real-time data or automated decisions, despite foreign media reports to the contrary.

<sup>26</sup>The notion of black-box AI refers to such scenarios, where we can see only input data and output data for algorithm-based systems without understanding exactly what happens in between. Burrell (2016), Leese (2014), Mittelstadt et al. (2016), p. 6; Pasquale (2015).

## 2 From Algorithmic Governance to Governance of Algorithms

### 2.1 *The Current Legal Landscape*

There is currently not a single country (or supranational organization) in the world with legislation that explicitly takes into account the problematic characteristics of algorithmic systems in general.

Apart from a few exceptions, there are also no special rules for AI systems and smart robotics in particular. Admittedly, special regulation exists for self-driving vehicles,<sup>27</sup> drones,<sup>28</sup> and high-frequency trading.<sup>29</sup> Moreover, in the European Union, the General Data Protection Regulation (GDPR) contains rudimentary provisions for fully automated decisions.<sup>30</sup> In addition, the EU Consumer Rights Directive 2011/83/EU, as amended by the “New Deal for Consumers”, includes an obligation to provide information on the use of automatically generated personalised prices.<sup>31</sup> Moreover, the so-called P2B (Platform-to-business) Regulation 2019/1150 requires providers of online search engines to “set out the main parameters, which individually or collectively are most significant in determining ranking and the relative importance of those main parameters, by providing an easily and publicly

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<sup>27</sup>In the US, most of the states have either enacted legislation or executive orders governing self-driving vehicles; cf. National Conference of State Legislatures, Autonomous Vehicles State Bill Tracking Database, <http://www.ncsl.org/research/transportation/autonomous-vehicles-legislative-database.aspx>. Accessed 29 Apr 2020. In 2017, the House of Representatives passed a bill for a “Self Drive Act” which was supposed to lay out a basic federal framework for autonomous vehicle regulation but, ultimately, failed to be considered on the Senate floor. For the EU, see Expert Group on Liability and New Technologies—New Technologies Formation (2019).

<sup>28</sup>In the EU, the Regulation on Civil Aviation 2018/1139 addresses issues of registration, certification, and general rules of conduct for operators of drones—however, without regulating civil liability directly; cf. Bertolini (2018).

<sup>29</sup>See esp. Art. 17, Art. 48(6) MiFID II (Directive 2014/65/EU on markets in financial instruments) and Commission delegated Regulation (EU) 2017/589 of 19 July 2016 supplementing Directive 2014/65/EU of the European Parliament and of the Council with regard to regulatory technical standards specifying the organizational requirements of investment firms engaged in algorithmic trading, OJ 31 March 2017 L 87/417.

<sup>30</sup>Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC, OJ L 119, 4 May 2016. Art. 22 GDPR prohibits fully automated decisions; for those decisions, Art. 13 (2) lit. f and Art. 14 (2) lit. g GDPR establish moreover a special obligation for data controllers to provide information. However, these provisions have a rather limited scope of application, because they only apply to decisions “based solely on automated processing” of data. Since most algorithmically prepared decisions still involve a human being, the majority of ADM procedures is not covered by the aforementioned provisions; cf. Martini (2019), pp. 10 et seq.

<sup>31</sup>According to Art. 6(1) (ea) Consumer Rights Directive 2011/83/EU as amended by Directive 2019/2161/EU, the trader may have to inform the consumer “that the price has been personalised on the basis of an automated decision making process”.

available description”.<sup>32</sup> Furthermore, some countries have issued rules for automated algorithm-based administrative decisions, such as Canada with its “Directive on Automated Decision-Making”.<sup>33</sup> In France, the Digital Republic Act (Loi no. 2016-1321 du 7 octobre 2016 pour une République numérique), provides that, in the case of state actors taking a decision “on the basis of algorithms”, individuals have a right to be informed about the “principal characteristics” of the decision-making system.<sup>34</sup>

However, all these rules deal only with individual aspects without providing a satisfactory answer to the problems described above. Certainly, many countries and sometimes also international and supranational organizations have laws, norms and rules that are relevant for AI and robotics—ranging from constitutional principles (rule of law, democracy),<sup>35</sup> human rights,<sup>36</sup> and (international) humanitarian law;<sup>37</sup> to administrative and criminal law protecting inter alia fair procedures;<sup>38</sup> to special laws that could help to mitigate the described problems such as data protection law, cybersecurity law, product safety and product liability law, competition law, consumer law; and many other fields. These laws, however, were not made with AI and smart robotics in mind.

Accordingly, it is difficult to gauge to what extent existing legislation sufficiently regulates the undesirable implications of AI.

## 2.2 *Existing Initiatives to Regulate AI and Robotics in a Nutshell*

Since the beginning of 2017, many governments in the world have begun to develop national strategies for the promotion, development, and use of AI systems. Still, as *Tim Dutton*—a Canadian Senior Policy Advisor who regularly updates a summary of different AI policies—observes, no two strategies are alike.<sup>39</sup> Instead, national (and international) initiatives focus on a wide variety of aspects such as research and development programs, skills and education, data and digital infrastructure,

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<sup>32</sup>Art. 5(2) Regulation 2019/1150 on promoting fairness and transparency for business users of online intermediation services (P2B Regulation), OJ L 186, 11 July 2019.

<sup>33</sup>Government of Canada, ‘Directive on Automated Decision-Making’, <https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=32592>. Accessed 29 Apr 2020.

<sup>34</sup>For more details see Edwards and Veale (2018).

<sup>35</sup>Cf. for example Council of Europe, European Commission for the Efficiency of Justice (CEPEJ) (2018).

<sup>36</sup>Cf. Council of Europe, Committee of Experts on Internet Intermediaries (MSI-NET) (2017); Raso et al. (2018).

<sup>37</sup>Margulies (2018).

<sup>38</sup>On AI and administrative law cf. Oswald and Grace (2016), Cobbe (2018) and Coglianese and Lehr (2017).

<sup>39</sup>Dutton (2018). Cf. also the overview by Thomas (2018).

technical standardization, AI-enhanced public services, ethics and inclusion, and sometimes also legal standards. Whereas some countries have laid down specific and comprehensive AI strategies (e.g. China, the UK, France), some are integrating AI technologies within national technology or digital roadmaps (e.g. Denmark, Australia), while still others have focused on developing a national AI R&D strategy (US).<sup>40</sup>

In the US, most notably, the government already relied heavily under the Obama administration on the liberal notion of the free market.<sup>41</sup> In its report “Preparing for the Future of Artificial Intelligence”, published in October 2016,<sup>42</sup> the White House Office of Science and Technology Policy (OSTP) explicitly refrains from a broad regulation of AI research and practice. Instead, the report highlights that the government should aim to fit AI into existing regulatory schemes, suggesting that many of the ethical issues related to AI can be addressed through increasing transparency and self-regulatory partnerships.<sup>43</sup> The Trump administration, too, sees its role not in regulating AI and robotics but in “facilitating AI R&D, promoting the trust of the American people in the development and deployment of AI-related technologies, training a workforce capable of using AI in their occupations, and protecting the American AI technology base from attempted acquisition by strategic competitors and adversarial nations”—thus maintaining US American leadership.<sup>44</sup> In January 2020, the White House published a draft memorandum outlining ten principles which federal agencies should consider when devising laws and rules for the use of AI in the private sector, but stressed—again—that a key concern was limiting regulatory “overreach”.<sup>45</sup>

By contrast, the European Union focusses in its AI strategy (published in April 2018) and its Whitepaper on AI (published in February 2020) not only on the potential impact of AI on competitiveness but also on its social and ethical implications, underpinning that compliance with European ethical norms, legal requirements and social values is essential to create “an ecosystem of trust”.

Beyond the European Union, several international organizations have also taken the initiative to reflect on the future legal framework for AI and robotics, such as the Organisation for Economic Cooperation and Development (OECD) with its principles on AI, adopted in May 2019,<sup>46</sup> and the new AI Policy Observatory which aims

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<sup>40</sup>Delponte (2018), p. 22.

<sup>41</sup>For a detailed discussion of the various AI strategies in the US, the EU, and the UK, see Cath et al. (2018).

<sup>42</sup>Executive Office of the [US] President—National Science and Technology Council Committee on Technology (2016). The report followed five workshops and a public request for Information, cf. Executive Office of the [US] President—National Science and Technology Council Committee on Technology (2016), p. 12.

<sup>43</sup>Executive Office of the [US] President—National Science and Technology Council Committee on Technology (2016).

<sup>44</sup>Trump (2019). Cf. also Shepardson (2018).

<sup>45</sup>Office of Management and Budget (OMB), the White House (2019).

<sup>46</sup>OECD (2019c).



to help policymakers to implement the AI principles;<sup>47</sup> the United Nations (UN) with its several activities on AI;<sup>48</sup> and the Council of Europe with its “European Ethical Charter on the Use of Artificial Intelligence in Judicial Systems and their environment”, adopted at the end of 2018,<sup>49</sup> and its ad hoc committee on AI (CAHAI) with the specific task to examine the possibility of creating a legal framework for the development, design and application of artificial intelligence, based on Council of Europe’s standards on human rights, democracy and the rule of law.<sup>50</sup>

Apart from these initiatives, hundreds of different ethical AI guidelines have emerged during the past years. The number of ethical guidelines developed by governments, tech companies, and industry has grown exponentially in recent years—so much that researchers had to develop special tools to provide an overview.<sup>51</sup> However as laudable as this work may be, it should be clear that soft law as such will not suffice. The work on ethical principles and guidelines can lay the groundwork for subsequent legislation, providing orientation on the possible content of legal rules. However, the main problem is that ethical guidelines and self-regulatory initiatives by industries are non-binding.<sup>52</sup> In addition, these principles are often too abstract to provide sufficiently detailed guidance. As it has been pointed out, “[m]uch of the debate about ethics seems increasingly focused on companies avoiding regulation. Unable or unwilling to properly provide regulatory solutions, ethics is seen as the ‘easy’ or ‘soft’ option which can help structure and give meaning to existing self-regulatory initiatives.”<sup>53</sup> Indeed, ethical guidelines and self-regulation should not be used as an escape from (hard) regulation.

### 3 The European Union’s AI Strategy

#### 3.1 *The EU as the Global Regulatory Standard-Setter*

The regulatory efforts of the EU are particularly noteworthy. The EU is widely acknowledged to be the regulatory standard-setter,<sup>54</sup> especially in the field of data protection and its respective flagship, the General Data Protection Regulation.<sup>55</sup> Although it has been argued that the GDPR puts European companies at a competitive disadvantage compared with firms in countries such as China and the US by

<sup>47</sup><https://oecd.ai/>. Accessed 29 Apr 2020.

<sup>48</sup><https://www.itu.int/pub/S-GEN-UNACT-2018-1>. Accessed 29 Apr 2020.

<sup>49</sup>Council of Europe, European Commission for the Efficiency of Justice (CEPEJ) (2018).

<sup>50</sup>[www.coe.int/cahai](http://www.coe.int/cahai). Accessed 29 Apr 2020.

<sup>51</sup>See Fjeld et al. (2020).

<sup>52</sup>Saurwein et al. (2015).

<sup>53</sup>Wagner (2018), pp. 108 et seq.

<sup>54</sup>Bradford (2020). Cremona and Scott (2019).

<sup>55</sup>Smuha (2019).