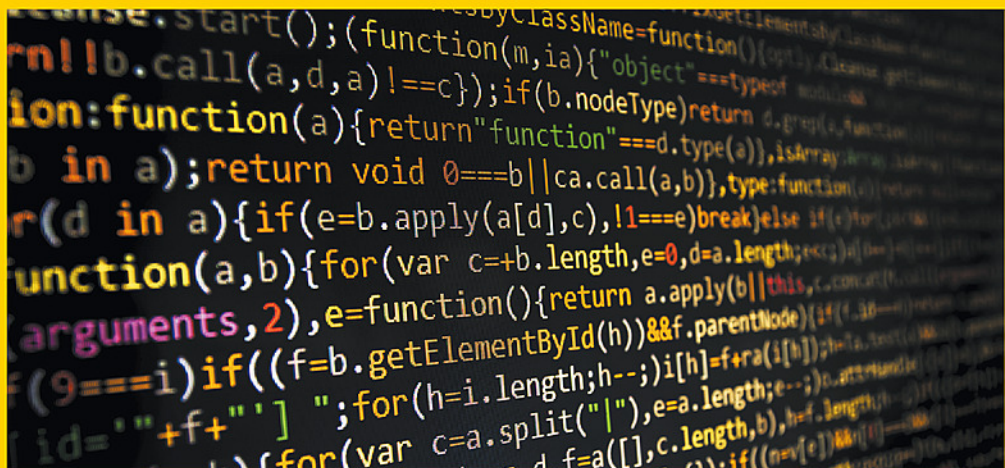


HORST EIDENMÜLLER /
GERHARD WAGNER

Law by Algorithm



Mohr Siebeck

Horst Eidenmüller and Gerhard Wagner

Law by Algorithm



Horst Eidenmüller and Gerhard Wagner

Law by Algorithm

Mohr Siebeck

Horst Eidenmüller is a Statutory Professor for Commercial Law at the University of Oxford and a Professorial Fellow of St. Hugh's College, Oxford.

Gerhard Wagner holds the Chair for Private Law, Business Law, and Law and Economics at Humboldt University of Berlin.

ISBN 978-3-16-157508-2 / eISBN 978-3-16-157509-9
DOI 10.1628/978-3-16-157509-9

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliographie; detailed bibliographic data are available at <http://dnb.dnb.de>.

© 2021 Mohr Siebeck Tübingen, Germany. www.mohrsiebeck.com

This book may not be reproduced, in whole or in part, in any form (beyond that permitted by copyright law) without the publisher's written permission. This applies particularly to reproductions, translations and storage and processing in electronic systems.

The book was typeset by Epline in Böblingen using Minion typeface, printed on non-aging paper and bound by Gulde-Druck in Tübingen.

Cover illustration: Photo 93689313 © Krisana Antharith.

Printed in Germany.

Preface

This book is about a development which is as fascinating as it is frightening: laws and contracts made – or at least deeply influenced – by computer code. “Law by Algorithm” investigates the impact of digitization, blockchain technology and Artificial Intelligence (AI) on lawmaking, legal scholarship, and legal practice.

About two decades ago, the phrase “Code is Law” was coined to denote the normative autonomy of the Internet/Cyberspace.¹ “Law by Algorithm” goes further. It is not just that certain technologies are beyond the reach of lawmakers and regulators. Human actors use sophisticated new technologies to make and shape laws and contracts. And machines may eventually even replace human lawmakers. Self-driving cars are already on our roads. When will algorithmic judges populate our courts? Would this be an improvement and, if so, for whom?

It is certainly not too early to start thinking about these and related questions. Digitization, blockchain technology and AI applications have been turbocharged in the last two years by the COVID-19 pandemic. Big Tech, i. e. Google, Apple, Facebook, Amazon and Microsoft, is leveraging its power by deploying sophisticated new technologies to shape the legal code of private transactions in its favor. How should societies address this development?

This book explores the multifaceted challenges of “Law by Algorithm”. What exactly is happening in terms of technological developments, and what are the law-related developments that we can observe? Which new challenges to legal doctrine and to regulation arise? What use can societies make of AI in lawmaking and the application of laws?

These are the main themes of our inquiry. We analyze conceptual and philosophical questions of “robot law”, investigate the (potentially negative) impact of Big Data and AI applications on consumer welfare, examine liability questions related to the rise of autonomous systems and associated conceptual issues, and deal with the impact of AI on corporate governance and corporate law. We also assess the prospect for “driverless arbitrations”, smart contracts and digital enforcement, internal complaint handling, Online Dispute Resolution

¹ See Lawrence Lessig, *Code is Law: On Liberty in Cyberspace*, HARVARD MAGAZINE 1.1.2000, <https://www.harvardmagazine.com/2000/01/code-is-law-html> (last visited on September 30, 2021).

(ODR) and the role of the courts in a world shaped by digitization, blockchain technology and AI applications.

The majority of the book's chapters have already appeared elsewhere as articles, and we acknowledge the original publication in the first footnote of each chapter and at the end of the book. The book also contains new contributions, which have not appeared elsewhere before, namely the Introduction (Chapter 1), Chapter 7 on "AI Liability" and Chapter 10 on "Digital Dispute Resolution".

A recurring theme of our analysis is that although "Law by Algorithm" might massively increase overall societal welfare, it runs the significant risk of benefitting only a few. To make it work for the good of all is a mammoth and complicated task. We are private law scholars who work on the law of contracts and torts, on commercial and corporate law, and on the manifold mechanisms of dispute resolution. While much of the scholarly and policy discourse on regulating Big Tech, AI or blockchain technology focuses on data protection and antitrust, the tools of private law should not be neglected. We hope to demonstrate their potential to deliver the benefits of "Law by Algorithm" for all with this book.

We are indebted to friends and colleagues who commented extensively on drafts of the papers which made it into this volume. Horst Eidenmüller co-authored a paper with John Armour and another one with Faidon Varesis. We are grateful for their permission to use these articles in this volume. The editing process was conducted by research assistants at Gerhard Wagner's Chair in Berlin. We thank them for their diligent work. We are especially indebted to Peter McColgan who supervised the editing process and also made many valuable comments and suggestions on the book's chapters. Leonie Steffen did superb work in the proofreading stages and created the Index. Special thanks go to Conor McLaughlin who reviewed most chapters and made many valuable suggestions. Finally, Horst Eidenmüller is grateful for a Fellowship of the Bavarian Research Institute for Digital Transformation (bidt) which allowed him to focus on this project in 2021.

This is a work of humans not machines. Hence, it surely contains many errors and shortcomings. We look forward to engaging with your comments and criticisms.

Oxford and Berlin,
October 2021

Horst Eidenmüller and Gerhard Wagner

Table of Contents

Preface	V
Chapter 1: Law by Algorithm	1
Chapter 2: The Rise of Robots and the Law of Humans	7
I. <i>Artificial Intelligence (AI) and the law</i>	7
II. <i>Varieties of robots and robot features</i>	8
A. Robot applications	8
B. Robot features	10
III. <i>Regulating self-driving cars</i>	11
A. The potential of self-driving cars	11
B. Accident liability for fully autonomous cars	13
IV. <i>Treating smart cars (machines) like humans?</i>	16
V. <i>The case against treating robots like humans</i>	17
VI. <i>The (policy) road ahead</i>	18
Chapter 3: Machine Performance and Human Failure: How Shall We Regulate Autonomous Machines?	21
I. <i>AI and Autonomous Machines</i>	24
II. <i>A Welfarist Dystopia</i>	26
A. Utilitarianism and Welfarism	27
B. Welfarism and AI	28
C. Regulatory Consequences	31
III. <i>Humanism and Machine Regulation</i>	36
A. A Critique of AI-related Welfarism	36
1. The Limits of the Welfarist Calculus	36
2. Concerns about Distributive Justice	38
3. Concerns about Fundamental Human Rights	39
B. A Humanistic Approach	40
1. Humans and Machines	40

2. Human Weaknesses and Failure	41
3. Human Rights	42
4. Distributive Justice	44
<i>Conclusion</i>	44
Chapter 4: Down by Algorithms? Siphoning Rents, Exploiting Biases, and Shaping Preferences: Regulating the Dark Side of Personalized Transactions	47
<i>Introduction</i>	48
<i>I. Siphoning Rents</i>	50
A. Personalized Pricing	50
B. Evaluating Personalized Pricing	52
C. Self-Help and Its Limits	53
D. Potential Regulatory Responses	54
<i>II. Exploiting Biases</i>	56
A. Consumers in Strategically Set Rationality Traps	57
B. Evaluating Rationality Traps and Self-Help by Consumers	58
C. Potential Regulatory Responses	59
<i>III. Shaping Preferences</i>	61
A. Consuming in the Filter Bubble	61
B. The Evaporation of Consumer Welfare	63
C. Potential Regulatory Responses	66
<i>IV. Digital Market Failure</i>	68
<i>Conclusion</i>	69
Chapter 5: Robot Liability	73
<i>I. The Concepts of Robots, Autonomous Systems and IoT-Devices</i>	73
<i>II. The European Parliament Resolution of February 2017</i>	74
<i>III. The Commission Communication on “Building a European Data Economy”</i>	75
<i>IV. Normative Foundations</i>	75
<i>V. The Range of Responsible Parties</i>	77
<i>VI. The Legal Background</i>	78
A. National Tort Law as the Default System	78
B. The Products Liability Directive	80
C. The Proposed Directive on the Liability of Service Providers	81
D. Conclusion	81

<i>VII. Shifts in Control Induced by Technology</i>	82
A. The Shift from User Control to Manufacturer Control	82
B. Dispersion of Control: Unbundling	84
<i>VIII. Liability of Manufacturers</i>	84
A. The Manufacturer as Best Cost Avoider	84
B. The Scope of the Products Liability Directive	85
C. The Requirement of a Defect	86
D. Burden of Proof – Strict Liability as a Response?	89
E. Unbundled Products	90
<i>IX. Liability of Users</i>	92
<i>X. Liability of the IoT-Device, the Robot Itself</i>	95
A. A Legal, not a Philosophical Question	95
B. Externalization of Risk through Recognition of ePersons as “Liability Subjects”	97
C. Incentives for Robots?	98
D. Risk Internalization through Asset Requirements and Insurance Mandates	99
E. The Benefit of Robots as Liability Subjects	100
<i>XI. Conclusions</i>	101
Chapter 6: Robot, Inc.: Personhood for Autonomous Systems?	103
<i>Introduction</i>	103
<i>I. ePersons and Approaches to Personhood</i>	106
A. Laundry Lists	106
B. Philosophical Theories	108
C. Legal Concepts of Personhood: Pragmatism Rather Than Dogmatism	110
<i>II. Limited Personhood and Functions of Liability</i>	112
A. Discretion of the Legal System	112
B. The Concept of a Liability Subject	113
C. Functions of the Liability System	113
<i>III. Traditional Liability Subjects</i>	114
A. The Range of Responsible Parties	114
B. Shifts in Control Induced by Technology	115
C. Product Liability as the Default System	117
D. User Liability as a Supplement	120
<i>IV. Robots as Liability Subjects</i>	121
A. The Function of Robot Liability	121
B. The Danger of Cost Externalization	122

C. Internalization Strategies	123
D. Incentivizing Robots?	124
<i>Conclusion</i>	125
Chapter 7: Liability for Artificial Intelligence:	
A Proposal of the European Parliament	127
I. <i>Introduction</i>	127
II. <i>The EU Commission Initiatives</i>	130
III. <i>Initiatives of the European Parliament</i>	131
IV. <i>Manufacturer vs. Operator Liability</i>	132
A. Liability of the Operator	132
B. Frontend and Backend Operators	133
C. The Backend Operator as Manufacturer	134
D. Comparison with the Product Liability Directive	135
E. Interplay with the Product Liability Directive	136
F. Evaluation	138
V. <i>The Choice between Strict Liability and Liability for Fault</i>	138
A. The Distinction of the European Parliament	138
B. Strict Liability for Systems with High Risk	139
C. Fault-Based Liability for Systems Causing Ordinary Risks	140
D. A General Clause of Strict Liability vs. an Incremental Approach . . .	142
1. An Enumeration Principle without Enumeration	142
2. Autonomous Robots and Cleaning Devices	143
3. Road Traffic Accidents	144
4. Unmanned aircraft	146
5. Conclusion	147
VI. <i>Compensation and Damages</i>	147
A. Reference to National Law in Case of Fault-Based Liability	147
B. Uniform Regulation of Damages in Cases of Strict Liability	148
1. Caps on Damages	148
2. Scope of Compensation for Personal Injury	149
3. Property Damage	150
C. Conclusion	151
VII. <i>Insurance Issues</i>	151
VIII. <i>Degree of Harmonization</i>	152
A. Proviso for Product Liability and Other Matters	152
B. Operator Liability	153
C. Result	154
IX. <i>Conclusion</i>	154

Chapter 8: Self-Driving Corporations?	157
<i>Introduction</i>	157
<i>I. The Trajectory of AI</i>	161
A. The History of AI	161
B. Today's AI	163
C. Tomorrow's AI?	165
<i>II. Today's AI and Corporate Law</i>	166
A. Impact of Today's AI on Business Organization	166
B. "Data Governance": How Today's AI Impacts Corporate Governance	169
1. Scope of available data	169
2. Model selection and training	170
3. Model predictions and wider corporate goals	170
4. Deployment and organizational structure	171
C. Data Governance and Corporate Law	173
<i>III. Tomorrow's AI and Corporate Law</i>	175
A. Self-Driving Subsidiaries	176
B. Calibrating Corporate Objectives for Self-Driving Corporations	177
C. Alternative Control and Liability Regimes	179
D. Regulatory Competition	183
<i>Conclusion</i>	184
Chapter 9: What Is an Arbitration?	
Artificial Intelligence and the Vanishing Human Arbitrator	187
<i>Introduction</i>	187
<i>I. Arbitration and Artificial Intelligence</i>	189
A. Artificial Intelligence Applications to Assist Arbitrators	191
1. Tools for case management	191
2. Tools for fact gathering and analysis	192
3. Tools for decision-making	194
B. Artificial Intelligence Applications to Replace Arbitrators	196
<i>II. The Anatomy of an Arbitration</i>	198
A. Involvement of an Independent/Impartial Third Party	199
B. Management of the Process	202
C. Rendering an Award	203
<i>III. Adapting the Legal Framework</i>	205
A. The Framework for International Commercial Arbitrations	205
B. Recognition and Enforcement of Awards under the New York Convention	207

C. Adapting the Domestic Legal Framework	212
1. Regulatory Experiments	212
2. Regulatory Competition	216
3. Moving Forward	219
<i>Conclusion</i>	220
Chapter 10: Digital Dispute Resolution	223
I. <i>Introduction</i>	223
II. <i>Digital Enforcement and Smart Contracts</i>	228
A. Technology-assisted Contract Management	229
B. Smart Contracts	230
C. Digital Enforcement	233
D. Digital Tools and Private Power	235
III. <i>Internal Complaint Mechanisms</i>	235
A. Network Effects and their Impact on Dispute Management	235
B. Controlling Disputes through Complaint Management	237
C. The (Missing) Theory of Complaint Management	238
D. Online Complaint Handling	239
E. (Anecdotal) Empirical Evidence	240
F. Evaluation and Critique	241
G. Reform	242
IV. <i>External Online Dispute Resolution</i>	243
A. Rise of Online Dispute Resolution (ODR)	244
B. Regulatory Challenges	246
V. <i>Courts in a Digital World</i>	248
A. Weakness of the Public Sector with a View to Innovation	248
B. Competitors of the Judicial System	248
C. Integration of ODR Elements into Judicial Proceedings	252
D. The Digital Judge	254
VI. <i>Conclusion</i>	258
Originally published	261
Index	263

Chapter 1

Law by Algorithm*

This book (“Law by Algorithm”) is about a fundamental change in the fabric of our societies, namely, the influence of digitization, blockchain technology and Artificial Intelligence (AI) on lawmaking, legal scholarship, and legal practice.

Throughout history, laws were made exclusively by humans and for humans. In democracies, members of parliaments debate new rules and regulations and eventually enact new laws. In totalitarian states, dictators or the members of the ruling caste do likewise. Human-made laws regulate human affairs and enable human activities, both in the private sphere and in business. Human judges interpret these laws, fill gaps or develop new rules. Law firms consisting of human attorneys assist clients in enforcing their rights and courts in developing the law. There is no question that legal systems around the world are anthropocentric.

This is not surprising. After all, we live in human societies, and laws structure our interactions in these societies. True, laws also structure human relations with machines, i. e. property. However, that confirms rather than refutes the human-centeredness of our legal systems.

At the same time, this human-centeredness creates well-known problems. One of them is, of course, climate change. For centuries, the focus of human laws has been on the welfare of other living humans. Effects on animals, the inanimate environment and on future generations have largely been ignored.

A very different problem relates to the process of human lawmaking and legal practice. Humans do not operate as flawlessly as well-oiled machines. We suffer from systematic irrationalities and biases in our decision-making.¹ Judges, too, are not immune to these shortcomings.² Further, human lawmaking or judging can be slow, cumbersome and costly. Can technology bring about improvements?

The answer to this question is a clear “Yes”. Legal systems as we know them are changing under the influence of new technologies, at an accelerating pace, and for the better.

* Prepared for this volume by Horst Eidenmüller and Gerhard Wagner.

¹ For a comprehensive account *see, for example*, DANIEL KAHNEMAN, *THINKING, FAST AND SLOW* (2012).

² *See, for example*, Eyal Peer & Eyal Gamliel, *Heuristics and Biases in Judicial Decisions*, 49 *COURT REVIEW* 114 (2013); LEE EPSTEIN & STEFANIE A. LINDQUIST (EDS.), *THE OXFORD HANDBOOK OF U. S. JUDICIAL BEHAVIOR* (2017).

Digitization, i. e. the process of converting information into a digital (computer-readable) format, is not a new phenomenon. However, digitization has been turbocharged in the last two years by the COVID-19 pandemic. The pandemic has shown all of us the potential (as well as the limitations and drawbacks) of “doing things online”, including in legal matters – from filing an application for a vaccination appointment to shopping on the Internet for daily supplies or even attending a virtual court hearing.

Roughly ten years before the pandemic, two other technological developments had started to influence commerce and the legal system, namely blockchain technology and advances in AI. A blockchain is a growing list of records (“blocks”), which are linked together using cryptography.³ Many will associate blockchain technology primarily or even exclusively with the digital currency Bitcoin. A few months ago, for example, the carmaker Tesla announced that it will accept payments in Bitcoin for its cars in certain circumstances.⁴ But blockchain applications go much beyond digital currencies. South Korea (and other countries) uses the same technology for its digital vaccine-passport, for example.⁵

Whereas the blockchain is used to automatically execute decisions, AI applications help us make better decisions. The greatest advances in this respect have been associated with a specific form of AI, namely Machine Learning (ML). ML is able “... to adapt to new circumstances and to detect and extrapolate patterns”.⁶ For example, AI applications based on ML allow us to predict the outcome of legal cases with great accuracy⁷ or assist (human) judges in making better decisions, for example regarding the question of whether to grant bail in criminal law.⁸ The list of law-related ML applications is already very long, and the numbers are growing rapidly – in all areas of the law.

The impact of new technologies such as digitization, AI, and blockchain on lawmaking, legal scholarship, and legal practice obviously raises a host of important questions.

³ See, for example, PRIMAVERA DE FILIPPI & AARON WRIGHT, *BLOCKCHAIN AND THE LAW: THE RULES OF CODE 1–9* (2018).

⁴ See Reuters, *Musk says Tesla will accept bitcoins when miners use more clean energy*, June 13, 2021, <https://www.reuters.com/technology/musk-says-tesla-will-accept-bitcoins-when-miners-use-reasonable-clean-energy-2021-06-13/> (last visited on June 28, 2021).

⁵ See Sangmi Cha, *South Korea to issue blockchain-protected digital ‘vaccine-passports’*, REUTERS, April 1, 2021, <https://www.reuters.com/article/us-health-coronavirus-southkorea-idUSKBN2BO43W> (last visited on June 25, 2021).

⁶ STUART RUSSELL & PETER NORVIG, *ARTIFICIAL INTELLIGENCE: A MODERN APPROACH 2* (3rd ed. 2016).

⁷ See, for example, “ArbiLex”, <https://www.arbilex.co/welcome> (last visited on June 25, 2021). On algorithmic predictions see generally AJAY AGRAWAL, JOSHUA GANS & AVI GOLDFARB, *PREDICTION MACHINES* (2018).

⁸ See Jon Kleinberg et al., *Human Decisions and Machine Predictions*, available at <https://cs.stanford.edu/people/jure/pubs/bail-qje17.pdf> (last visited on June 25, 2021).

Firstly, what exactly is happening in terms of technological developments, and what are the law-related developments that we can observe? Understanding these developments as comprehensively and precisely as possible on an empirical level is paramount to solidly grounding whatever normative inquiry of the relevant issues one pursues.

Secondly, which new challenges to legal doctrine arise? For example, already in 2017, the European Parliament passed a resolution calling on the European Commission to consider “... creating a specific legal status for robots in the long run, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons ...”⁹

Thirdly, which new regulatory challenges arise? In particular, is there a need to provide for mandatory safeguards to protect less sophisticated parties, especially consumers, from being exploited by powerful corporations?¹⁰ Is there a risk of new forms of discrimination to the detriment of certain minority groups by “smart algorithms”?¹¹

And fourthly, what use can societies make of AI in lawmaking and the application of laws? What is the potential of “eGovernment”?¹² Are “Online Courts” on the horizon anytime soon?¹³

In this book, we engage with these questions. The majority of the book’s chapters have already appeared elsewhere as articles, and we acknowledge the original publication in the first footnote of each chapter and at the end of the book. For publication in this book, these articles have been updated in respect of the sources cited. However, no substantive changes have been made. The book also contains two new contributions, which have not appeared elsewhere before, namely Chapter 7 on “AI Liability” and Chapter 10 on “Digital Dispute Resolution”.

The ordering of the chapters is as follows: In Chapters 2 and 3 (“The Rise of Robots and the Laws of Humans”, “Machine Performance and Human Failure: How Shall We Regulate Autonomous Machines?”), we analyze conceptual and philosophical questions of “robot law”. In Chapter 4 (“Down by Algorithms? Siphoning Rents, Exploiting Biases, and Shaping Preferences: Regulating the Dark Side of Personalized Transactions”) we investigate the (potentially negative) impact of Big Data and AI applications on consumer welfare. Chapters 5, 6 and 7 (“Robot Liability”, “Robot, Inc.: Personhood for Autonomous Systems?”, “AI Liability”) examine liability questions related to the rise of autonomous systems and associated conceptual issues. Chapter 8 (“Self-

⁹ See European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)), at no. 59 f), OJ C 252/239.

¹⁰ See SHOSHANA ZUBOFF, *THE AGE OF SURVEILLANCE CAPITALISM* (2019).

¹¹ See CATHY O’NEIL, *WEAPONS OF MATH DESTRUCTION* (2016).

¹² The European Commission, for one, is taking actions to develop cross-border digital public services, see European Commission, eGovernment and digital public services, <https://digital-strategy.ec.europa.eu/en/policies/egovernment> (last visited on June 26, 2021).

¹³ See RICHARD SUSSKIND, *ONLINE COURTS AND THE FUTURE OF JUSTICE* (2019).

Driving Corporations?”) deals with the impact of AI on Corporate Governance issues and Corporate Law. The final two chapters focus on dispute resolution. Chapter 9 (“What is an Arbitration? Artificial Intelligence and the Vanishing Human Arbitrator”) assesses the prospects for “driverless arbitrations”, and Chapter 10 (“Digital Dispute Resolution”) deals with smart contracts and digital enforcement, internal complaint handling, Online Dispute Resolution (ODR), and the role of the courts in a world shaped by digitization, blockchain technology and AI applications.

Given that the majority of the chapters have appeared as individual articles, it is inevitable that certain issues and themes are treated in more than one chapter. We view this as a benefit, as the reader can see how our thinking on certain issues has evolved. It also reveals different insights to be gained from different perspectives on the same or similar issues. Another beneficial feature of our approach is related to the fact that the articles have different authors, and only a few are co-authored by the authors of this book. As a consequence, certain issues are treated differently in the individual chapters, for example the usefulness or even necessity of an economic analysis when thinking about “robot liability”. This should enrich the book and make for a livelier reading, we hope.

If there is one recurring theme in all chapters it is how “Law by Algorithm” helps to massively increase the welfare in our societies and, at the same time, creates the significant risk that this increased welfare benefits only a few of its members.

On the one hand, the benefits digitization, blockchain, and AI bring to our legal systems are huge. We will be able to conclude smarter contracts, which better satisfy our needs, interact with one another and public institutions much more efficiently, and benefit from much improved dispute resolution services. Laws can be “personalized” in the sense that private and public rules are calibrated to the needs and preferences of individual members of society.¹⁴

On the other hand, it also seems clear that not all parties will benefit from this development to the same degree. We do not believe that futuristic visions of a world populated by robots with legal personality will become a reality anytime soon. But we do believe that sophisticated private actors will increasingly use the new technological tools to enrich themselves, at the expense of less sophisticated market participants, especially consumers. In fact, this is already happening right now, and the velocity and impact of the development is staggering.

The greatest beneficiary of digitization, blockchain technology and smart AI applications is Big Tech, i. e. Google, Apple, Facebook, Amazon and Microsoft. Facebook is or has been the subject of investigations by antitrust agencies in Europe and the United States.¹⁵ The company is widely criticized for its business

¹⁴ See OMRI BEN-SHAHAR & ARIEL PORAT, *PERSONALIZED LAW: DIFFERENT RULES FOR DIFFERENT PEOPLE* (2021).

¹⁵ For Germany see, for example, Bundeskartellamt (Federal Monopolies Commission),

model of aggressively collecting and analyzing the personal data of its users for profit, and for the commercial gain of its business partners.¹⁶ Another tech power player is Amazon: shaping consumers' preferences, exploiting their biases, engaging in first-degree price discrimination, and handling any disputes by an effective but biased internal complaint handling algorithm (see Chapters 4 and 10 in this volume). The European Commission has initiated antitrust proceedings against Amazon for abuse of a dominant position.¹⁷ In the United States, Amazon now faces the first serious antitrust action for allegedly breaking the law by unfairly crushing competition.¹⁸ And there is more to come: A law review article written by the FTC's newly elected chairperson reads like a playbook on how to restrict Amazon's monopoly power – perhaps by employing elements of public utility regulation.¹⁹

On the legislative front, the United States Congress is about to discuss and possibly enact a package of five legislative acts aimed not only to restore competition in the digital marketplace, but also to “rein in” the largest tech platforms.²⁰ The proposed “American Innovation and Choice Online Act” is designed to prohibit and sanction discrimination on online platforms, while the so-called “ACCESS Act” calls for interoperability and data portability. On the other side of the Atlantic, the European Union has already passed a legislative instrument which regulates the conduct of online platforms vis-à-vis commercial customers, i. e. the P2B Regulation 2019/1150.²¹ In essence, its purpose is to ensure non-dis-

Resolution of February 6, 2019, Case B6–22/16; Oberlandesgericht (Higher Regional Court) Düsseldorf, Decision of August 26, 2019, VI-Kart 1/19 (V), NEUE ZEITSCHRIFT FÜR KARTELLRECHT 2019, 495; Bundesgerichtshof (BGH) (Federal Court of Justice) June 23, 2020, KVR 69/19, NEUE ZEITSCHRIFT FÜR KARTELLRECHT 2020, 473. As to the U. S. see FTC v. Facebook, Inc., No. 1:20-cv-03590-JEB (D. D. C. Jan. 13, 2021), https://www.ftc.gov/system/files/documents/cases/051_2021.01.21_revised_partially_redacted_complaint.pdf (April 22, 2021) (press release available at: <https://www.ftc.gov/news-events/press-releases/2020/12/ftc-sues-facebook-illegal-monopolization> (last visited on June 30, 2021)).

¹⁶ See, for example, BERNARD E. HARCOURT, EXPOSED: DESIRE AND DISOBEDIENCE IN THE DIGITAL AGE 3–7, 21–24, 42–46 (2015); BRAD SMITH & CAROL ANN BROWNE, TOOLS AND WEAPONS: THE PROMISE AND THE PERIL OF THE DIGITAL AGE 89–107 (2019).

¹⁷ European Commission, Case AT.40562 – Amazon Marketplace; European Commission, Case AT.40703 – Amazon – Buy Box.

¹⁸ See Shira Ovide, *The Big Deal in Amazon's antitrust Case*, NEW YORK TIMES, May 25, 2021, available at <https://www.nytimes.com/2021/05/25/technology/amazon-antitrust-lawsuit.html> (last visited on June 26, 2021).

¹⁹ See Lina Khan, *Amazon's Antitrust Paradox*, 126 YALE L. J. 710, 797–802 (2017). See also TIM WU, THE CURSE OF BIGNESS: ANTITRUST IN THE NEW GILDED AGE (2018).

²⁰ See David Cicilline, *House Lawmakers Release Anti-Monopoly Agenda for “A Stronger Online Economy: Opportunity, Innovation, Choice”*, June 11, 2021, available at <https://cicilline.house.gov/press-release/house-lawmakers-release-anti-monopoly-agenda-stronger-online-economy-opportunity> (last visited on June 30, 2021).

²¹ Regulation (EU) 2019/1150 on promoting fairness and transparency for business users of online intermediation services, OJ L 186/57; see Martin Eifert et al., *Taming the Giants: The DMA/DSA Package*, 58 COMMON MKT. L. REV. 987 (2021).

crimination, transparency, and fairness in the commercial relationships between platforms and business users. While the P2B Regulation mostly confines itself to disclosure mandates, the recently published proposal of a Digital Markets Act²² goes much further. If enacted, it would subject the tech giants, the so-called gatekeeper platforms, to rather strict duties of equal treatment, easy access, and fair dealing, together with a prohibition of “self-preferencing”.

Despite this flurry of activity, antitrust is a blunt instrument, and it comes very late in the game.²³ Traditional antitrust remedies such as breakup are like a massive operation after the problem has almost gotten out of control. Societies must apply more and different tools on a “micro level” in different areas of the law to make sure that the benefits of new technologies accrue to the many and not just the few. With the proposal of the Digital Markets Act, Europe is moving in this direction, and it seems that the United States is about to follow.

However, the challenges for private law, and the legal system more generally, remain. Statutes like the Digital Markets Act are just one puzzle piece in the appropriate regulatory response to Big Tech. Arguably, the law should protect consumers (and SMEs) who increasingly conduct their commercial and personal affairs in the digital space much more vigorously and much earlier, i. e. before their lives and opportunities have been seriously limited by powerful private counterparties that have reached “Amazon status”. Making “Law by Algorithm” work for (all) humans is an enormous challenge and responsibility.²⁴ We hope to contribute to this task with the chapters in this book.

²² Proposal for a Regulation on contestable and fair markets in the digital sector (“Digital Markets Act”), COM(2020) 842 final; *see also* Eifert et al. (*supra* note 21).

²³ Cf. ARIEL EZRACHI & MAURICE E. STUCKE, VIRTUAL COMPETITION: THE PROMISE AND THE PERILS OF THE ALGORITHM-DRIVEN ECONOMY 218–232 (2016) (rightly suggesting that “we must be open-minded to new enforcement instruments”, *id.* at 219).

²⁴ *See, for example*, MAX TEGMARK, LIFE 3.0: BEING HUMAN IN THE AGE OF ARTIFICIAL INTELLIGENCE (2017); FRANK PASQUALE, NEW LAWS OF ROBOTICS: DEFENDING HUMAN EXPERTISE IN THE AGE OF AI (2020); JOSHUA A. T. FAIRFIELD, RUNAWAY TECHNOLOGY (2021). For a broader perspective *see* BRETT FRISCHMANN & EVAN SELINGER, RE-ENGINEERING HUMANITY (2018); YUVAL NOAH HARARI, 21 LESSONS FOR THE 21ST CENTURY 9–98 (2018).

Chapter 2

The Rise of Robots and the Law of Humans*

In this chapter, I examine fundamental questions raised by the rise of robots and the emergence of “robot law”. The main theses developed are the following: (i) robot regulation must be robot- and context-specific. (ii) (Refined) existing legal categories are capable of being sensibly applied to and regulating robots. (iii) Robot law is shaped by the “deep normative structure” of a society. (iv) If that structure is utilitarian, smart robots should be treated like humans. (v) The case against treating robots like humans rests on epistemological and ontological arguments. I develop these theses primarily in the context of accident liability for self-driving cars.

I. Artificial Intelligence (AI) and the law

When lawyers enter the discussion, the fun part is usually over. Engineers and computer scientists enjoy a similar reputation. In this chapter, I consider robots and the law. The prospects for entertainment may therefore be limited. However, the interaction of law and Artificial Intelligence (AI) poses exciting and important questions, and the answers to these questions will undoubtedly shape the future of mankind in the decades to come.

AI is now rapidly changing how we live and work. As routine tasks (both manual and cognitive) become increasingly automated, it is anticipated that robots (“embodied AI”¹) will take approximately 1/3 of jobs in traditional professions by 2025.² The law will shape the future of AI. It will determine the permissible uses of AI, the costs of new products and technologies, among other things. Further, the initial regulatory decisions will be crucial. They may create path dependencies, and make it hard to change regulatory course later.

Regulating AI is going to be challenging and difficult. After all, the law is – and always has been – made by humans and for humans. Just think of fundamental

* Originally published under Horst Eidenmüller, *The Rise of Robots and the Law of Humans*, ZEITSCHRIFT FÜR EUROPÄISCHES PRIVATRECHT 765 (2017).

¹ See Ryan Calo, *Robotics and the Lessons of Cyberlaw*, 103 CAL. L. REV. 513, 532 et seq. (2015).

² See Christoffer O. Hernaes, *Artificial Intelligence, Legal Responsibility and Civil Rights*, TECHCRUNCH, Aug. 22, 2015, <https://techcrunch.com/2015/08/22/artificial-intelligence-legal-responsibility-and-civil-rights/>. For a thorough treatment of the problem including sensible policy options, see MARTIN FORD, *THE RISE OF ROBOTS: TECHNOLOGY AND THE THREAT OF MASS UNEMPLOYMENT* (2015).

concepts such as “personhood” and “legal personality”. Historically, these concepts related to humans, i. e. natural persons. AI will thus strain the legal system: How shall we deal with robots? Shall we accord them legal personality, give them the right to acquire and hold property and to conclude contracts, etc.?³

In this chapter, I attempt to answer these and other fundamental questions raised by the rise of robots and the emergence of “robot law”. The main theses developed in this chapter are the following: (i) robot regulation must be robot- and context-specific. This requires a profound understanding of the micro- and macro-effects of “robot behavior” in specific areas. (ii) (Refined) existing legal categories are capable of being sensibly applied to and regulating robots. (iii) Robot law is shaped by the “deep normative structure” of a society. (iv) If that structure is utilitarian, smart robots should, in the not-too-distant future, be treated like humans. This means that they should be accorded legal personality, have the power to acquire and hold property and to conclude contracts. (v) The case against treating robots like humans rests on epistemological and ontological arguments. These relate to whether machines can *think* (they cannot), and what it *means* to be human.

I will develop these theses primarily in the context of self-driving cars – robots on the road with a huge potential to revolutionize our daily lives and commerce.⁴ However, in order to illustrate the massive potential influence that robots will have on the fabric of our societies, I begin with a broader range of examples.

II. Varieties of robots and robot features

A. Robot applications

Self-driving cars are currently among the most discussed robot developments.⁵ Indeed, most car manufacturers have experimented with self-driving cars, and these cars are already being tested on roads worldwide.⁶ Google appears to have the lead in this development.⁷ A key feature of its car is a rotating rooftop camera. It consists of an array of 64 laser beams that create 3D images of objects,

³ For a summary of the issues, see, for example, Jens Kersten, *Menschen und Maschinen*, 70 JURISTENZEITUNG 1, 6–8 (2015).

⁴ See Horst Eidenmüller, *Whose Fault? Firms, Products and Liability in the Age of Artificial Intelligence*, *BMW Welcomes: Artificial Intelligence*, YOUTUBE, April 21, 2016, <https://www.youtube.com/watch?v=Wl0d6yzFG24>.

⁵ See, for example, HOD LIPSON & MELBA KURMAN, *DRIVERLESS: INTELLIGENT CARS AND THE ROAD AHEAD* (2016).

⁶ See “40+ Corporations Working On Autonomous Vehicles” (updated March 4, 2020), <https://www.cbinsights.com/blog/autonomous-driverless-vehicles-corporations-list/>.

⁷ See “Waymo Bumps A Scooter – Roundup Of Self-Driving Car Headlines” (June 21, 2021), <https://www.forbes.com/sites/bradtempleton/2021/06/21/waymo-bumps-a-scooter-roundup-of-self-driving-car-headlines/?sh=9c34a8666511>.

allowing the car to orient itself. The car's driving behavior is controlled by complex software.

Another important application of robots is in medicine. For instance, prototypes of nanotech medical robots with a size of a 1–10/1,000,000 of a millimeter have been developed.⁸ These nanotech robots will travel through a patient's blood and into tumors where they will deliver a therapy that turns off an important cancer gene.

Robots are also beginning to enter the finance and financial consulting industry. "Robo financial advisers" might shake up the brokerage business with low-cost, automated investing.⁹ For example, UBS recently announced that advisers in its American wealth management division will use a robot to cater to wealthy clients.¹⁰ This technology, which will be used by the company's 7,000 advisers, has been developed by a San Francisco start-up, SigFigWealth Management, which is one of a growing group of robo-advisers.¹¹

Finally, AI is also going to fundamentally change the legal profession.¹² Indeed, AI systems already assist in the (automated) resolution of disputes,¹³ and "robo-lawyers" are entering the stage. In 2016, for example, the world's first artificially intelligent lawyer was hired by a US law firm, BakerHostedler, which licensed ROSS Intelligence for use in its bankruptcy restructuring and creditor rights department.¹⁴ "Robo-lawyers" will be deployed especially with respect to document searches and classification in discovery.¹⁵ In England, predictive coding (classification of documents for discovery) was recently backed by the

⁸ See Mike Chino, *Nanotech Robots Travel Through Blood to Turn Off Tumor Cells*, INHABITAT, March 25, 2010, <http://inhabitat.com/nanotech-robots-travel-through-blood-to-turn-off-tumor-cells/>.

⁹ See Tara Siegel Bernard, *Should a robot oversee your retirement money?*, NEW YORK TIMES, May 3, 2016, 15.

¹⁰ See Alessandra Amalito, *UBS to offer SigFig's robo-platform to its financial advisers*, INVESTMENT NEWS, May 9, 2016, <http://www.investmentnews.com/article/20160516/FREE/160519939/ubs-to-offer-sigfigs-robo-platform-to-its-financial-advisers>.

¹¹ See <https://www.sigfig.com/site/#/home/am> (last visited on November 20, 2020).

¹² See Dana Remus & Frank S. Levy, *Can Robots Be Lawyers? Computers, Lawyers, and the Practice of Law*, November 30, 2016, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2701092; RICHARD SUSSKIND & DANIEL SUSSKIND, *THE FUTURE OF THE PROFESSIONS: HOW TECHNOLOGY WILL TRANSFORM THE WORK OF HUMAN EXPERTS* 66–71 (2015); JERRY KAPLAN, *HUMANS NEED NOT APPLY: A GUIDE TO WEALTH AND WORK IN THE AGE OF ARTIFICIAL INTELLIGENCE* 145–149 (2015).

¹³ See SHAHEEN FATIMA ET AL., *PRINCIPLES OF AUTOMATED NEGOTIATION* (2014). For a detailed discussion see, Horst Eidenmüller & Gerhard Wagner, *Digital Dispute Resolution*, *infra* Chapter 10 in this volume, 223.

¹⁴ See Chris Weller, *The world's first artificially intelligent lawyer was just hired at a law firm*, BUSINESS INSIDER, May 16, 2016, <http://www.businessinsider.com/the-worlds-first-artificially-intelligent-lawyer-gets-hired-2016-5?IR=T>.

¹⁵ See Julie Sobowale, *How artificial intelligence is transforming the legal profession*, ABA JOURNAL, April 1, 2016, http://www.abajournal.com/magazine/article/how_artificial_intelligence_is_transforming_the_legal_profession.

High Court in *Brown vs BCA Trading* on 17 May 2016.¹⁶ “Robo-lawyers” will also be involved in the (online) drafting of legal documents¹⁷, and “smart contracts” based on blockchain technology are around the corner.¹⁸

AI might also come in the form of “robo-judges”. Based on a data set of 150,000 US felony cases, *Kleinberg et al.* found that a release rule (pending resolution of the cases) based on machine learning predictions would enable us to reduce the jail population by 25 % without any increase in the crime rate, or let us reduce crime rates by 20 % without changing the jail population.¹⁹ Taken together, robo-lawyering and judging seem to bring significant positive developments in making legal advice more affordable, judging more accurate, and improving access to justice for many.

B. Robot features

Reflecting on the examples discussed above, certain “robot features” emerge that are important when thinking about regulating robots. As already mentioned, robots are a form of embodied AI. They consist of a sensor or other input mechanism, a controlling algorithm, and the capacity to give feedback to the outside world.²⁰ These three features together constitute the so-called “Sense-Think-Act Paradigm”.²¹ The sensor or other input mechanism may draw from multiple sources as is the case, for example, with respect to “networked cars”.²² As described, they use cameras, traffic data from GPS, and geographical data taken from the internet.

Smart robots have machine learning capabilities, i. e. they not only use huge amounts of existing data, but also use data from experiences and other new information to adapt their behavior.²³ Therefore, to some extent, these robots are

¹⁶ *Brown v BCA Trading Ltd* [2016] EWHC 1464 (Ch).

¹⁷ On “computational law” see, for example, JERRY KAPLAN, *ARTIFICIAL INTELLIGENCE: WHAT EVERYONE NEEDS TO KNOW* 95–97 (2016).

¹⁸ See, for example, HENNING DIEDRICH, *ETHEREUM: BLOCKCHAINS, DIGITAL ASSETS, SMART CONTRACTS, DECENTRALIZED AUTONOMOUS ORGANIZATIONS* (2016); James Eyers, *Lawyers prepare for ‘driverless M&A’ as smart contract era dawns*, FINANCIAL REVIEW, June 20, 2016, <http://www.afr.com/technology/lawyers-prepare-for-driverless-ma-as-smart-contract-era-dawns-20160616-gpknyz>; for a detailed discussion see, Horst Eidenmüller & Gerhard Wagner, *infra* Chapter 10 in this volume, 223, 228–235.

¹⁹ See John Kleinberg et al., *Human Decisions and Machine Predictions* (NBER Working Paper No. 23180, February 2017), <http://www.nber.org/papers/w23180>.

²⁰ See A. Michael Froomkin, *Introduction*, in *ROBOT LAW* x, xi (Ryan Calo et al. eds., 2016).

²¹ See, for example, HENRY HEXMOOR, *ESSENTIAL PRINCIPLES FOR AUTONOMOUS ROBOTICS* 25 (2013).

²² See, for example, Sejoon Lim et al., *Intelligent Transportation with Networked Cars*, <https://groups.csail.mit.edu/drl/wiki/images/0/0f/LimMobisysDemo08.pdf> (last visited on October 15, 2021).

²³ See ETHEM ALPAYDIN, *MACHINE LEARNING: THE NEW AI* (2016); ERIK BRYNJOLFSSON & ANDREW MCAFFE, *THE SECOND MACHINE AGE: WORK, PROGRESS, AND PROS-*

Index

- access 6, 19, 30, 38, 48, 61, 89 et seq., 101, 126, 167, 194 et seq., 220 et seq., 237, 240 et seq.
- ACCESS Act 5
- access to justice 10, 214, 249, 253
- accident costs 30–37, 78, 115
- accuracy 2, 25, 164, 170, 190 et seq., 196, 251, 258
- activity level 14 et seq., 33, 84, 140, 181
- ad blockers 66
- administrative costs 76, 144
- agency costs 158 et seq., 173, 177, 184
- agency problems/issues 158, 177 et seq., 184 et seq.
- aggregation of claims 226, 242 et seq.
- AI 1 et seq., 7–19, 21–45, 47–61, 73, 95 et seq., 103 et seq., 127–155, 157–186, 187–221, 223–260
- AI applications 3 et seq., 30–36, 159 et seq., 166, 176, 184–202, 207, 219 et seq.
- AI arbitrator system 196, 205
- AI system 9, 24 et seq., 39, 127, 132 et seq., 138 et seq., 143, 147, 151 et seq., 162, 177, 190, 198 et seq., 208, 213 et seq.
- AI-assisted arbitrations 197 et seq., 206 et seq., 212–218
- AI-powered arbitrations (AI-powered arbitrator systems) 187–221
- Air Traffic Act (Luftverkehrsgesetz) 146
- algorithmic arbitrator 258
- algorithmic consumer 53, 59 et seq.
- algorithmic credit scoring 30, 39
- algorithmic discrimination 3, 39
- algorithmic judge 256 et seq.
- algorithmic transparency 67
- Alternative Dispute Resolution (ADR) 187, 199, 225 et seq., 236 et seq., 242–254, 258
- alternative legal services provider 227
- Amazon 4 et seq., 51 et seq., 66, 167, 223, 237–245
- American Innovation and Choice Online Act 5
- Anatomy of an Arbitration 189, 198–205, 220
- ancillary legal contract 231 et seq.
- Android Fallacy 41
- animal 1, 107 et seq., 134
- animal rights 107 et seq.
- anthropocentric 1, 96, 109
- anthropomorphic robots 11, 16, 95, 129
- anti-discrimination 152
- antitrust 4 et seq., 54, 152, 218
- arbitral awards 194, 202 et seq., 208 et seq., 221, 250 et seq.
- arbitral tribunal 203 et seq., 213, 251, 258
- arbitration (arbitrator) 4, 187–221, 223–260
- Arbitration Act 1996 215 et seq.
- arbitration agreement 210, 217 et seq.
- arbitration laws 202 et seq., 212, 216 et seq.
- Artificial General Intelligence (AGI) 24 et seq., 159 et seq., 165, 172 et seq.
- Artificial Intelligence 1 et seq., 7–19, 21–45, 47–61, 73, 95 et seq., 103 et seq., 127–155, 157–186, 187–221, 223–260
- artificial neural networks 24
- assisted AI 26, 166,
- Audit Committee 172
- augmented AI 26, 166
- automated vehicle 83, 115
- autonomous AI 26, 175 et seq., 185, 197 et seq., 207 et seq.
- autonomous car 7–19, 21–45, 73–102, 103–126, 127–155, 176, 223, 233 et seq.
- autonomous cleaning devices 143 et seq.

- autonomous intelligence 175, 184
- autonomous machines 3, 21–45
- autonomous robots 3, 35, 143 et seq.
- autonomous software agents 73, 95 et seq., 125
- autonomous system 3, 21–45, 73–102, 103–126, 198, 201
- autonomy 48 et seq., 54, 68, 70, 109 et seq., 125, 129 et seq., 141, 199, 213, 217 et seq., 242
- availability bias 32
- available data 167 et seq., 185, 194, 198

- B2C 47 et seq., 232, 246, 250
- back-propagation 25, 164
- backend operator 127, 133 et seq., 151 et seq.
- behavioral biases 42, 47 et seq., 58 et seq.
- Belgium 146
- Bentham, Jeremy 109
- bereavement damages 149 et seq.
- Big Data 3, 38, 48 et seq., 54, 57 et seq.
- Big Data Analytics 48, 58, 69
- Big Tech 4 et seq., 240
- Bitcoin 2, 259
- black box 15, 89, 101, 126, 165, 184, 234
- blind bidding 230
- blockchain 1 et seq., 10, 187 et seq., 228 et seq., 258 et seq.
- board 18, 157–186, 215
- boilerplate 194, 230
- Bolam test 31, 35
- breach of warranty 237, 243, 250
- Breast Implant Case 151
- Brexit 44, 206, 251
- Building a European Data Economy 75, 105, 130 et seq.
- bundled products (bundling) 101 et seq., 122
- burden of proof 89 et seq., 118, 234
- business judgment (business judgment rule) 174, 178, 185
- business organization 158 et seq., 166, 171

- C-suite 159, 169
- caps on damages/liability 100, 148 et seq., 154
- car manufacturer 8, 13 et seq., 33 et seq., 82 et seq., 128, 137
- car-sharing 12, 137
- Cardozo, Benjamin 256
- Caremark 173
- case law 117, 128, 187–193, 200 et seq.
- case management 191 et seq., 202, 245
- causation 14, 34, 80, 234
- Charter of Fundamental Rights of the European Union 43, 257
- cheapest cost avoider 14, 33, 84 et seq., 102, 116, 180
- civil law jurisdictions (civil law systems) 31 et seq., 203 et seq., 221, 226
- Civil Law Rules on Robotics 29, 35, 74, 104, 131
- Civil Resolution Tribunal (CRT) 254
- claims adjudication and enforcement 234 et seq.
- class action 226 et seq., 245
- classification of documents 9, 24, 162
- classification system for automated vehicles 83, 115
- climate change 1
- closed (software) system 84 et seq., 90, 102, 116
- co-liability 15
- Code civil 153, 215
- cognitive biases 255
- cognitive psychology 41, 56
- collective proceedings 226 et seq., 245
- Commercial Court 248 et seq.
- Commission communication 75, 105
- committee for data governance 172, 185
- common European law of torts 142, 150
- common law jurisdictions (common law systems) 29, 142, 187 et seq., 203 et seq., 219 et seq., 226
- compensation 38, 75–102, 113, 120 et seq., 138–155, 181, 201
- competition 5, 19, 53, 68, 88, 119, 161, 175–185, 187 et seq., 204 et seq., 212, 216 et seq., 228, 248 et seq.
- competitive market 47 et seq.
- complaint handling mechanism 223, 235–243, 258 et seq.
- compliance 166, 172 et seq., 242
- component manufacturers 92

- component suppliers 15, 73 et seq., 84, 91,
 114 et seq., 134
 compulsory corporate liability insurance
 161
 compulsory insurance 151 et seq., 182
 conciliation (conciliator) 199, 220,
 223–260
 confidentiality (confidentiality clause)
 170, 196, 220, 238
 consequentialist approach 108
 consumer ADR 249
 consumer contracts 66, 232
 consumer expectations 86, 118
 consumer expectations test 118
 consumer protection 60, 70, 152, 246
 consumer surplus 39, 52 et seq.
 contract management 200, 229 et seq., 235
 contractual agreement 77, 114
 control and liability regimes 179
 cookies 51 et seq.
 cooling-off period 60
 cooperative surplus 235, 259
 coordination costs 158 et seq.
 coordination problem 158
 corporate control 179
 corporate functions 166
 corporate goal (corporate objectives) 161,
 170 et seq., 175 et seq., 184 et seq.
 corporate governance 4, 169–185
 corporate law 4, 99 et seq., 111,
 121 et seq., 157–185
 corporate objectives 175–185
 corporate personhood 18, 43
 corporation 3, 18, 43, 95–102, 103–126,
 157–185, 201, 210 et seq.
 cost externalization 94, 105, 122 et seq.,
 177
 cost internalization 13, 29, 34, 77, 83, 113,
 180
 cost/benefit 27, 37 et seq., 242
 courts 3 et seq., 14, 75, 84 et seq.,
 116 et seq., 128, 142 et seq., 177, 187,
 200, 215, 223–260
 courts in a digital world 3 et seq., 223–260
 COVID-19 pandemic 2, 187 et seq., 194,
 219, 244, 248
 credit card 58
 cross-border traffic accidents 144–152
 crowding out 23, 35 et seq.
 customer complaint 228, 236 et seq.
 Customer Relationship Management 167
 cyber attack 12
 Da Vinci 117, 224
 damages 74, 80, 92 et seq., 97 et seq., 104,
 113 et seq., 120–126, 139, 144–151,
 154 et seq., 234
 dashboard myopia 171
 data architecture 168 et seq., 185
 data governance 160, 169–185
 data management 171
 data protection 29, 43, 169 et seq.
 data science 170
 data security and data breaches 234
 dataset 25, 164 et seq., 184, 190–196
 deadweight efficiency losses 54 et seq., 59
 deadweight welfare losses 38, 52
 debiasing 59 et seq.
 decision-analysis and outcome prediction
 190, 194
 decision-making 1, 23 et seq., 44 et seq.,
 53 et seq., 67, 74, 104, 128, 140, 160,
 166–177, 185–197, 225, 229, 255 et seq.
 deep learning 24, 163
 deep normative structure 7 et seq., 16, 19,
 22 et seq., 36, 39–45
 defect 12 et seq., 34 et seq., 40, 77–93,
 101 et seq., 114–122, 135 et seq.,
 232–239
 Delaware 175 et seq., 184 et seq., 216
 deontological theory 108
 design defect 80, 87 et seq., 118 et seq.
 deterrence 91, 98 et seq., 113, 121 et seq.
 development of the law 198, 225, 255
 digital arms race 66, 70
 digital assistant 51, 58 et seq., 62 et seq.,
 191, 230
 digital currency 2, 259
 digital enforcement 4, 228–235, 243, 247,
 257 et seq.
 digital judge (digital judging) 254 et seq.
 digital market failure 68 et seq.
 digital markets 5 et seq., 68 et seq., 236
 Digital Markets Act 6, 224
 Digital Services Act 243
 digital systems 127 et seq., 255

- digital tools 225 et seq., 235, 239
- digitization 188 et seq., 248, 258
- Directive on Alternative Dispute Resolution 242 et seq.
- Directive on Mediation 249
- Directive on the Liability of Service Providers 81
- director independence 172 et seq., 185
- disclosure 6, 41, 60, 66 et seq., 70
- disclosure duties (disclosure mandates) 6, 41, 54, 66 et seq., 70, 216
- discrimination 3 et seq., 39, 110, 155, 237
- dispute Resolution 4, 187–221, 224–260
- dispute resolution by contract 258
- disruptive 223 et seq.
- distributive goals 28
- distributive justice 27, 36 et seq., 44 et seq., 49
- document research and analysis (document review and analysis) 192 et seq., 202, 245
- document search 9, 190 et seq., 230
- domain knowledge 163
- doorstep-selling 41, 60
- Draft Common Frame of Reference 78, 93, 121
- drone 143 et seq.
- Dubai Islamic Bank PJSC v. Paymentech Merchant Services Inc. 215
- due process 200, 213, 246
- duress 59
- Dutch Code of Civil Procedure 215
- duty of care 120, 140
- Dworkin, Ronald 28, 256
- e-commerce 48 et seq., 57, 240 et seq., 247 et seq.
- e-discovery 192 et seq., 226, 233
- eBay 51, 227, 252 et seq.
- economic analysis of law 4, 27–36, 113, 186
- economics of business organization 159
- economies of scale 166
- efficiency 19, 28 et seq., 36, 44, 48 et seq., 52 et seq., 58 et seq., 65, 70, 74, 188 et seq., 205, 217, 225 et seq., 232, 251 et seq.
- eGovernment 3
- electronic file 252
- electronic person (ePerson) 84, 95–102, 105–112, 116, 121 et seq., 131, 201
- embodied AI 7, 10
- end-producer 77, 91
- enforceability of awards 206 et seq., 211
- enforcement of claims 224, 243
- England 9, 31, 44, 54 et seq., 92, 206, 211, 215 et seq., 220, 225 et seq., 251 et seq.
- English Commercial Court 251
- entity status for robots 95–102, 103–126, 201
- enumeration principle 142 et seq.
- environmental protection 63, 106, 152 et seq.
- epistemological 8, 17
- ethical reasoning 25
- European Commission (Commission) 3 et seq., 29, 35, 74 et seq., 81, 89, 104 et seq., 130 et seq., 154, 243
- European Convention on Human Rights 257
- European Court of Justice 150 et seq., 224
- European Group on Tort Law 78 et seq., 93
- European Parliament 3, 28, 35, 74 et seq., 84, 104 et seq., 116, 131 et seq., 138, 143 et seq., 154, 201
- European tort law 78, 93, 121, 140 et seq.
- evidentiary problems 101, 105, 125
- ex loci arbitri 202 et seq.
- Expert Group on Liability and New Technologies 130, 134 et seq., 142
- exploiting biases 49 et seq., 56 et seq., 70
- expressive function of court proceedings 257
- external online dispute resolution 243 et seq.
- externalities 174 et seq., 185, 217 et seq.
- extra-contractual liability 76–83, 97, 142, 152 et seq.
- Facebook 4 et seq., 51, 167
- facial recognition 58
- fact gathering and analysis 192 et seq., 230, 245
- fair trial 200, 258

- fairness 6, 39, 49–59, 66, 200, 211 et seq.,
 242, 253, 259
 fault principle 141, 153 et seq.
 fault-based liability 14, 79 et seq.,
 90 et seq., 102 et seq., 120, 136,
 138 et seq., 147 et seq., 153 et seq.
 fiduciary duties 173
 filter bubble 61 et seq., 66
 fine print 60, 67, 247
 first-degree price discrimination 5, 38, 44,
 49–56, 69
 first-mover 119, 219
 force majeure 90
 forum selection clause 251
 framework for international commercial
 arbitrations 189, 205 et seq., 221
 France 80, 92 et seq., 120, 133, 141 et seq.,
 153 et seq., 195, 211, 215, 242
 free speech 43, 97, 111 et seq.
 freedom of contract 78, 219
 frontend operator 133 et seq., 154
 fully specified contract 229–232
 fundamental rights 18, 23 et seq., 36,
 39 et seq., 42 et seq., 97, 180, 257

 gardien 80, 141, 153
 general clause 142 et seq., 154
 General Data Protection Regulation
 (GDPR) 43, 170
 German Code of Civil Procedure 216
 German Constitution 43
 German Road Traffic Act (Straßen-
 verkehrsgesetz) 89
 Germany 43, 86 et seq., 93, 133,
 139 et seq., 146 et seq., 154, 178, 216,
 248
 goal function 177 et seq., 184 et seq.
 goal setting 95, 161, 178
 goal specification 178
 good faith 174 et seq., 232
 Google 4, 8, 12 et seq., 51, 67, 167
 Greece 214

 Hague Convention on Choice of Court
 Agreement 250 et seq.
 harmonization 121, 141, 145 et seq.,
 152–154, 183 et seq.
 hearings 187–221, 244, 253 et seq.

 Her Majesty's Online Court 227,
 253 et seq.
 high-risk AI systems 135–155
 Holmes, Oliver Wendell 186
 House of Lords 54
 human arbitrators 187–221, 224,
 228 et seq., 245, 253 et seq.
 human dignity 79 et seq.
 human directors 160 et seq., 176–182,
 201, 214 et seq.
 human rights 18, 23, 27, 36, 39 et seq.,
 42 et seq., 97, 180, 257
 humanistic approach 36, 40 et seq.

 image recognition 24, 162
 immaterial harm 145, 149 et seq.
 incentive 34 et seq., 42, 48, 76 et seq.,
 84, 90–102, 121 et seq., 133, 139, 171,
 177, 181, 218 et seq., 225 et seq., 241,
 256 et seq.
 incentives for robots 98 et seq., 124 et seq.
 independent director 172 et seq., 185
 independent third party (impartial third
 party) 189, 199 et seq., 221
 individual autonomy 48 et seq., 70
 inefficiency 49, 70, 177 et seq., 185, 252
 information asymmetry 41, 48
 innovation 73 et seq., 103 et seq., 114, 126,
 151, 159, 181 et seq., 195, 207, 212–219,
 225 et seq., 238, 248–255
 insurance 14 et seq., 33, 75 et seq.,
 93 et seq., 99–105, 114, 121–126, 131,
 144, 149 et seq., 155, 161, 182 et seq.,
 201, 224, 232 et seq.
 insurance mandate 99 et seq., 105,
 121–126
 intelligence 11, 18, 24, 28, 95, 106 et seq.,
 129 et seq., 159, 162, 175, 184, 196
 intentionality 107
 interface 82, 115, 190 et seq., 198, 230,
 245
 interim measures 203
 internal complaint mechanisms 223,
 235–243, 258 et seq.
 Internal data 168 et seq.
 International Bar Association (IBA) 199
 international commercial arbitration
 187 et seq., 198–207, 217 et seq.

- Internet of Things (IoT) 40, 63, 74, 118, 129
- Iran 214
- Italy 146, 214
- judges 1 et seq., 10, 168, 196, 220,
226 et seq., 237 et seq., 248–260
- judgment proof 177, 181, 185
- judicial system 226, 248–260
- justice 10, 36, 38 et seq., 44 et seq., 49, 52,
70, 108, 188, 199, 211 et seq., 225, 241,
246, 253, 258
- Kaldor-Hicks efficiency 52
- Kant, Immanuel 26, 40, 108 et seq., 125
- keeper 73, 77–83, 92 et seq., 99, 114,
120 et seq., 134, 139
- labeled data 25, 164 et seq., 184, 190,
194 et seq., 202 et seq., 221
- labeling data 203, 219
- law and economics 4, 27–36, 113, 186
- law firms 1, 9, 195 et seq., 217, 225 et seq.,
253
- law market 216 et seq., 225
- law of torts 23, 42, 78 et seq., 92 et seq.,
105, 120 et seq., 128 et seq., 140 et seq.,
150, 154, 243
- Learned Hand formula 31
- legal capacity 16 et seq., 59, 107, 179, 201,
215
- legal capital 181 et seq.
- legal personality (legal personhood) 4, 8,
16 et seq., 26, 35, 43, 106–114, 201
- legal profession 9, 19, 225, 252
- legal status for robots 3, 35, 74, 103–126,
201
- legitimacy 194, 199, 210 et seq., 225, 256
- liability for fault 14, 79 et seq., 90 et seq.,
102 et seq., 120, 136, 138 et seq.,
147 et seq., 153 et seq.
- liability insurance 14 et seq., 75, 78,
93–99, 102, 114, 123, 151, 161,
182 et seq., 201
- liability of service-providers 79 et seq.
- liability of the robot 73–102, 105, 112,
121 et seq.
- liability of the shareholders 98 et seq.,
124 et seq., 181 et seq., 185
- liability subject 100 et seq., 105, 112–126,
138
- liability subsidy 100, 126
- liability system 13 et seq., 35, 73–102,
112–126, 128, 138, 145 et seq.
- limitation period 145
- limited liability 97 et seq., 122 et seq.,
177 et seq.
- limited liability to ePersons 98 et seq.,
123 et seq.
- litigation 192 et seq., 204, 226 et seq.,
236–260
- litigation risk analysis 168, 244 et seq.
- loan agreements 60
- long-term preferences 59
- Lord Denning 256
- loss aversion 57
- machine ethics 23 et seq.
- Machine Learning (ML) 2, 10, 16,
24 et seq., 39, 74, 104, 157, 163–177,
184–204, 219 et seq., 230
- mandatory consumer protection rules
41 et seq., 246, 259
- mandatory liability insurance 75, 99, 123,
151, 185, 201
- manufacturer 8, 13 et seq., 33 et seq.,
74 et seq., 80, 82–94, 98 et seq., 105,
114–126, 128, 132–138, 141, 154
- manufacturer vs. operator liability
132–138
- manufacturing defect 86 et seq.
- market dynamic 34, 212
- market efficiency 48
- market for (international commercial)
arbitrations 217 et seq., 188
- market shares 221, 248
- mass litigation 226 et seq., 245
- mediation (mediator) 244–253, 199, 220,
236 et seq.
- mediation d'entreprise 242
- medical robots 9, 18, 30, 34, 224
- microtargeting 68
- minimal state 44
- minimum asset requirement (minimum
capital requirement) 99 et seq., 105,
121 et seq., 181 et seq.
- misrepresentation 59

- Model Business Corporation Act 11
 Model Law 198 et seq., 211 et seq., 221, 246
 model laws 183 et seq.
 monopoly 5, 236, 248
 moral agency 25, 41, 95, 108
 moralism 27
 motor traffic 75, 83, 92, 120
 motor vehicle liability insurers 151
 movables 80, 85 et seq., 129
 multi-door courthouse 245, 254
- national tort law 78 et seq., 91 et seq., 154
 Natural Language Processing (NLP) 191 et seq., 230
 natural person 8, 43, 111, 129, 176, 211, 214 et seq.
 negative externalities 218
 negligence 31 et seq., 40, 79 et seq., 120, 140, 180 et seq.
 negotiation management 229 et seq.
 net surplus 29, 76, 113
 Netflix 53, 65 et seq.
 Netherlands 149 et seq., 214 et seq.
 network effect 51, 166, 235 et seq.
 networked cars 10, 37
 new technologies 42 et seq., 64, 68, 75 et seq., 130, 134 et seq., 152, 188, 219 et seq., 228, 235, 258 et seq.
 New Technologies Formation 130, 134 et seq.
 New York Convention (NYC) 189, 198, 202, 205–218, 221, 250
 non-contractual liability 76–83, 97, 142, 152 et seq.
 non-pecuniary harm 145, 149 et seq.
 Nozick, Robert 44
- obligation to disclose 6, 41, 54, 66 et seq., 70, 216
 off-chain 233 et seq.
 on-chain 233 et seq.
 one stop applications 230, 245
 online arbitration 227, 244 et seq.
 online complaint handling 239 et seq.
 online court 3, 225 et seq., 253 et seq.
 Online Dispute Resolution (ODR) 4, 214, 225 et seq., 243–253, 258
- online shopping 48, 51, 57, 240 et seq., 247 et seq.
 ontological arguments 8, 17 et seq., 28, 108
 ontologies 165
 open-system approach 84, 116
 operator 34, 77, 87 et seq., 114 et seq., 119 et seq., 128, 132–143, 149 et seq., 191, 236 et seq.
 operator liability 77, 114 et seq., 119 et seq., 132–143, 149 et seq.
 opt out (opt-out right) 50, 55 et seq., 67 et seq.
 optical character recognition (OCR) 192
 optimal algorithm test 88, 119
 original equipment manufacturer (OEM) 84, 90 et seq., 116, 121, 137
 oversight 160 et seq., 169, 172 et seq., 184 et seq., 219, 237
 oversight duty 174 et seq.
 owner 13–19, 34, 77 et seq., 93, 103 et seq., 111 et seq., 120 et seq., 134, 146, 153, 182
- P2B Regulation 5 et seq.
 pain and suffering 145, 149 et seq.
 party autonomy 213 et seq.
 path dependencies 7, 29
 performative function of court proceedings 257
 personal data 5, 39 et seq., 53 et seq., 60, 167 et seq., 195
 personal digital assistant 51, 58 et seq., 62 et seq., 191, 230
 personal injury 76, 80, 120, 135, 141, 146–153
 personal property 55, 140
 personalized algorithms 61–71
 personalized law 4, 234
 personalized offers 48
 personalized online shopping 47–71
 personalized transactions 47–71
 personhood (personality) 4, 8, 16 et seq., 26, 35, 43, 103–126, 201
 piercing of the corporate veil 177, 181 et seq.
 pragmatism 110 et seq.

- precaution 76 et seq., 85, 94, 98, 102, 113, 123, 139 et seq., 214
- precision 170, 128
- predictive analytics 159, 193 et seq., 244
- predictive coding 9, 193 et seq.
- preferences 4 et seq., 15, 38 et seq., 47–71, 212 et seq., 220, 229 et seq., 242 et seq., 258 et seq.
- price discrimination 5, 38 et seq., 44, 49–56, 69 et seq.
- price steering 51
- Principles of European Tort Law 78, 93
- prisoners' dilemma 52 et seq.
- privacy 29, 38 et seq., 43, 52, 70, 153, 174
- privacy concerns 29, 38 et seq., 52, 70, 153
- private insurance 76, 182
- private power 235, 259
- privatization of dispute resolution 247, 259
- process management 202 et seq.
- producers' surplus 39
- product defect 12 et seq., 34 et seq., 40, 77–93, 101 et seq., 114–122, 135 et seq., 232–239
- product liability 14 et seq., 75, 80–102, 105, 114 et seq., 129 et seq., 134 et seq., 152 et seq.
- Product Liability Directive 15, 81–91, 100 et seq., 130–138, 154 et seq.
- productivity gains 158, 166, 173 et seq., 185
- property damage 29, 76, 80, 120, 127–155
- public court system 225 et seq., 248–258
- public policy 61, 209 et seq., 218
- pure strict liability 86, 90
- race to the bottom 183 et seq., 217
- race to the top 217
- rational consumer 67, 118
- rationality traps 57 et seq.
- real seat theory 183
- reasonable efforts 232
- recall 77, 114, 179
- recognition and enforcement of awards 204, 207 et seq., 218 et seq., 250
- recourse action 94
- regressive effect 54 et seq., 66, 70
- regulation of risk 30
- regulatory competition 19, 161, 179, 183 et seq., 189, 212, 216 et seq.
- regulatory diversity 19
- regulatory experiments 205, 212 et seq.
- reinforcement learning 25, 165
- rendering an award 189, 197, 203 et seq., 208 et seq., 218 et seq., 245
- rent-seeking 38, 52
- repair 93, 144, 150, 234 et seq.
- reservation price 39, 51 et seq., 69
- resolution of disputes 9, 224, 250 et seq.
- respondeat superior 104
- responsabilité du fait des choses 80, 133, 141, 153
- Restatement (Third) of Torts 118 et seq.
- reversing the burden of proof 34, 90 et seq.
- right to anonymity 50, 70 et seq.
- right to be heard 202, 246, 257 et seq.
- rights of recourse 94, 100 et seq., 122 et seq.
- rights of the environment 106
- risk allocation 76, 97, 114, 12 et seq.
- risk externalization 77, 97–102, 105, 113, 121 et seq.
- risk internalization 99 et seq., 121 et seq.
- risk management 74 et seq.
- risk/utility test 86 et seq.
- road traffic liability 92 et seq., 144 et seq., 151
- robo financial adviser 9
- robo-advisers 9, 129
- robo-judges 10
- robo-lawyers 9 et seq.
- robot 7–19, 21 et seq., 29, 35, 40 et seq., 74–102, 103–126, 129 et seq., 143 et seq., 158, 167 et seq., 196 et seq., 209, 224
- robot applications 8 et seq.
- robot arbitrators 208
- robot law 3, 8, 11 et seq., 16 et seq.
- robot liability 73–102, 105, 112, 121 et seq.
- Rome II Regulation 145 et seq.
- rule of law 259

- safety 22, 32, 37, 40, 77, 80–94, 102, 115–121, 125, 129 et seq., 139 et seq., 152
- sales algorithms 48, 53, 70
- Sanders, Frank 245, 254
- Scotland 215
- second-degree price discrimination 50 et seq.
- selection and training of ML applications 170 et seq.
- self-determination 110
- self-driving arbitrations 245
- self-driving car 7–19, 21–45, 73–102, 103–126, 127–155, 176, 223, 233 et seq.
- self-driving corporations 43, 157–186, 201, 210 et seq.
- self-driving mediations 245
- self-driving securitization 176
- self-driving subsidiaries 160 et seq., 175 et seq., 185
- self-enforcing contract 228 et seq.
- self-governance 109 et seq., 125
- self-government 257 et seq.
- self-help 53–60, 65, 70
- self-learning algorithm 88 et seq.
- self-paternalism 41
- Sense-Think-Act-Paradigm 10
- service providers 79, 225 et seq., 244
- shadow of the law 247 et seq.
- shaping preferences 3, 47–71
- shareholder liability 98 et seq., 124 et seq., 181 et seq., 185
- shareholder value 171 et seq., 178
- singularity 11, 18
- siphoning rents 3, 49–56, 70
- small claims 236, 241 et seq., 250 et seq.
- smart cars 16 et seq., 45, 234
- smart contracts 4, 10, 228–235, 243, 247 et seq., 257 et seq.
- smart medical applications 9, 18, 30, 34, 224
- smart meter 234
- social robots 11, 41
- social science 159 et seq., 166–175
- social valence 11, 41
- social welfare 39 et seq., 65
- software agents 73, 95 et seq., 125, 228, 256 et seq.
- software failure 117
- software programming 87, 118
- Spain 146, 215
- speciesism 95 et seq., 109
- speech recognition 193
- stakeholder value 171, 178
- standard of care 22 et seq., 31, 34 et seq., 42, 181
- stop button 55 et seq.
- strict liability 13 et seq., 33 et seq., 40, 74, 80, 86, 89 et seq., 120 et seq., 131 et seq., 138–155, 161, 181, 185, 201
- superior machine performance 22, 34 et seq.
- Supervised Learning 25, 164 et seq., 183 et seq., 190, 198, 203, 220 et seq., 224
- Swiss Crypto Valley 183
- Switzerland 13, 17, 183, 214, 251
- system-oriented concept of design defect 88, 119
- systematic irrationalities 1, 41
- Szabo, Nick 231
- technical risks 128, 139
- technological arms race 52, 59
- Technology Committee 172
- technology-assisted contract management 229–235
- Tesla 2, 12 et seq., 22, 119
- test dataset 25, 165, 170, 190
- third-degree price discrimination 50 et seq.
- timeshare contracts 60
- today's AI 159, 163 et seq., 166–174
- tomorrow's AI 159, 165 et seq., 175–184
- tort law 23, 42, 78 et seq., 92 et seq., 105, 120 et seq., 128 et seq., 140 et seq., 150, 154, 243
- tort liability 11 et seq., 33, 78–102, 103–126, 127–155
- tracking cookies 51 et seq.
- traffic accident 82 et seq., 92 et seq., 120 et seq., 144 et seq., 151
- traffic management system 143
- trained model 25, 165 et seq., 190, 197
- training data 25, 164 et seq., 190, 202 et seq., 221
- transaction costs 63, 212, 229, 245
- transaction surplus 39, 49, 70

- transcription services 192 et seq.
Treaty of Rome 146
trial 249, 253 et seq.
Turing test 24, 35 et seq., 40 et seq., 162
- unbundled products (unbundling) 84,
90 et seq., 101 et seq., 120 et seq., 125
UNCITRAL 184 et seq., 198–206,
210 et seq., 216, 221, 246
UNCITRAL Model Law on International
Commercial Arbitration 198 et seq.,
211 et seq., 221, 246
unconscionability 54, 59
undue influence 59
Unfair Commercial Practices Directive 55
UNIDROIT 184 et seq.
United Kingdom (UK) 9, 31, 44,
54 et seq., 92, 206, 211, 215 et seq., 220,
225 et seq., 251 et seq.
United States (US) 4 et seq., 31, 66, 111,
117, 167, 172 et seq., 195, 216, 248
universal basic income 44
unmanned aircraft 143 et seq.
Unsupervised Learning 25, 165
US Supreme Court 43, 111
user 5 et seq., 15, 51, 61, 65 et seq., 70,
73–102, 105, 114 et seq., 120–126,
132 et seq., 141, 162–168, 191 et seq.,
212, 218 et seq., 230–245
- user liability 92 et seq., 120 et seq.,
127–155
utilitarianism 8, 16 et seq., 23 et seq.,
38 et seq., 108 et seq.
- veil-piercing doctrine 177, 181 et seq.
vicarious liability 104, 141 et seq.
video communication 194, 244, 253
Vienna Convention on the Law of the
Treaties (VCLT) 209
virtual reality 58
visceral notice (visceral warning)
55 et seq., 60
volenti non fit iniuria 56
voluntary creditors 100, 124
Volvo 14 et seq., 33
von Gierke, Otto 17
von Savigny, Friedrich Carl 16
- Walmart 61, 240
warranty claim 237 et seq., 243, 250
welfare economics 23, 29 et seq.,
35 et seq., 45
welfare maximization 30, 217, 235
welfarism 23, 26–38, 40, 44 et seq.
withdrawal rights 41, 50, 60 et seq., 250
Wittgenstein, Ludwig 199
- Zoom 194, 244