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WHAT IS AN ARBITRATION?
ARTIFICIAL INTELLIGENCE AND THE
VANISHING HUMAN ARBITRATOR

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Technological developments, especially digitization, artificial intelligence (AI), and blockchain technology, are currently disrupting the traditional format and conduct of arbitrations. Stakeholders in the arbitration market are exploring how new technologies and tools can be deployed to increase the efficiency and quality of the arbitration process. The COVID-19 pandemic is accelerating this trend. In this article, we analyze the “Anatomy of an Arbitration.” We argue that, functionally, fully AI-powered arbitrations will be technically feasible and should be legally permissible at some point in the future. There is nothing in the concept of arbitration that requires human control, governance, or even input. We further argue that the existing legal framework for international commercial arbitrations, the “New York Convention” (NYC) in particular, is capable of adapting to and accommodating fully AI-powered arbitrations. We anticipate significant regulatory competition between jurisdictions to promote technology-assisted or even fully AI-powered arbitrations, and we argue that this competition will be beneficial. We expect that common law jurisdictions will enjoy an advantage in this competition: machine learning applications for legal decision-making can be developed more easily for jurisdictions in which case law plays a pivotal role.

INTRODUCTION 50

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I. ARBITRATION AND ARTIFICIAL INTELLIGENCE	53
A. <i>Artificial Intelligence Applications to Assist Arbitrators</i>	55
1. <i>Tools for Case Management</i>	55
2. <i>Tools for Fact Gathering and Analysis</i>	56
3. <i>Tools for Decision-Making</i>	59
B. <i>Artificial Intelligence Applications to Replace Arbitrators</i>	61
II. THE ANATOMY OF AN ARBITRATION	64
A. <i>Involvement of an Independent/Impartial Third Party</i>	66
B. <i>Management of the Process</i>	68
C. <i>Rendering an Award</i>	71
III. ADAPTING THE LEGAL FRAMEWORK	72
A. <i>The Framework for International Commercial Arbitrations</i>	73
B. <i>Recognition and Enforcement of Awards Under the New York Convention</i>	75
C. <i>Adapting the Domestic Legal Framework</i>	82
1. <i>Regulatory Experiments</i>	82
2. <i>Regulatory Competition</i>	87
3. <i>Moving Forward</i>	91
CONCLUSION	92

INTRODUCTION

Within the universe of Alternative Dispute Resolution (ADR), arbitration enjoys a prominent status. If the disputing parties need a binding decision but do not want to go to court, arbitration is the preferred dispute resolution method. Arbitration is often described as a private and consensual method of dispute resolution:¹ instead of state courts, a private tribunal appointed by agreement of the parties renders the binding decision—the arbitral award.

Traditionally, the tribunal is composed of human arbitrators who conduct hearings in person. As the development of modern arbitration, international commercial arbitration in

1. See, e.g., NIGEL BLACKBAY & CONSTANTINE PARTASIDES QC WITH ALAN REDFERN & MARTIN HUNTER, REDFERN AND HUNTER ON INTERNATIONAL ARBITRATION 2 (6th ed. 2015), Kluwer Law International.

particular, took place during the 20th century,² human-powered arbitration was the only technologically feasible possibility. Technological developments, however, especially digitization, artificial intelligence (AI), and blockchain technology, are currently disrupting the traditional format and conduct of arbitrations.³ Stakeholders in the arbitration market are exploring how new technologies and tools can be deployed to increase the *efficiency* (lower costs, higher speed) and *quality* of the arbitration process. Empirical research has shown that the latter factor, in particular, is crucial for parties when choosing arbitration over other dispute resolution processes.⁴ Intelligent machines hold the promise of more rational, consistent, and unbiased decisions when compared to human actors.⁵

The COVID-19 pandemic will likely accelerate the trend towards using smart technologies to increase the efficiency and quality of arbitrations. For example, if physical hearings are not feasible, parties and tribunals require online meeting, desktop sharing, and video conferencing software enabling them to meet via the Internet in real-time. Practical necessities and constraints prompt rapid, technology-assisted adaptations to the traditional way of human-conducted arbitrations.

In this article, we explore more radical questions, which come up if one considers the potential endpoint of the ongoing technological revolution of arbitrations. Does an arbitration require human arbitrators? Can it be conducted entirely by (artificially intelligent) machines? More specifically, can AI-powered systems manage a legitimate and fair arbitration process? Can they render a binding decision that qualifies as an

2. See GARY B. BORN, *INTERNATIONAL COMMERCIAL ARBITRATION* 63–69 (2nd ed. 2014), Kluwer Law International.

3. See, e.g., Maxi Scherer, *Artificial Intelligence and Legal Decision-Making: The Wide Open?*, 36 J. INT'L ARB. 539 (2019), for an overview.

4. See Horst Eidenmüller, *Competition between State Courts and Private Tribunals*, 21 CARDOZO J. CONFLICT RESOL. 329, 340–41 (2020) (discussing survey results according to which 45% of respondents thought that the neutrality of the arbitrators, their expertise, and the free choice of the arbitrators by the parties was a very important factor; by contrast, less than 20% of the respondents thought that a very important factor was that arbitration proceedings are faster than litigation, and only approximately 5% considered it very important that arbitration proceedings were less costly).

5. See Horst Eidenmüller, *Machine Performance and Human Failure: How Shall We Regulate Autonomous Machines?*, 15 J. BUS & TECH. 109, 128–29 (2019).

arbitral award? If so, how good, in terms of costs and quality, are machine arbitrators compared to humans?

These questions, and the answers one gives to them, have huge practical importance for the economics of arbitrations (costs, speed) and for key legal issues, such as the quality of the delivery of justice, or the existence/challenge of an arbitral award. Even more importantly, these questions raise foundational *conceptual* issues. They force us to rethink the concept of an arbitration by considering its functions and desired effects, particularly legal effects. The concept and constitutive elements of an arbitration are “normatively loaded.” They reflect what a community of scholars, practitioners, and lawmakers (in a particular jurisdiction) believe an arbitration is, given the functions the process fulfills and the (legal) effects this community ascribes to it. These functions and standards are then translated into international and domestic legal standards.

In this article, we argue that, when fully AI-powered arbitrations become technologically feasible, they will be able to functionally perform the same tasks as human actors and should be permitted by law. There is nothing in the concept of an arbitration that fundamentally requires human control, governance, or even input. We further argue that the existing legal framework for international commercial arbitrations, the “New York Convention” (NYC)⁶ in particular, is capable of adapting to and accommodating fully AI-powered arbitrations. We anticipate significant regulatory competition between jurisdictions to promote technology-assisted or even fully AI-powered arbitrations, and we argue that this competition would be beneficial. In this competition, we expect common law jurisdictions to enjoy an advantage—machine learning applications for legal decision-making can be developed more easily for jurisdictions in which reasoning is bottom-up, with case law playing a pivotal role.

The remainder of this article is structured as follows: Part I discusses the impact of AI on arbitrations and distinguishes between AI applications to assist arbitrators and AI applications to replace arbitrators. While the latter are not yet in use,

6. United Nations Convention on the Recognition and Enforcement of Foreign Arbitral Awards, Jun. 10, 1958, 21 U.S.T. 2518, 330 U.N.T.S. 3 [hereinafter New York Convention].

we expect that they might become a possibility for simple cases in the near future. Part II focuses on the anatomy of an arbitration and discusses the three key functional elements constitutive of an arbitration: (1) the involvement of an independent/impartial third party; (2) management of the arbitration process; and (3) rendering of an award. These elements allow us to assess whether an AI-powered, “fully autonomous arbitration” qualifies as an arbitration—a question, which we answer in the affirmative. Finally, Part III analyzes important regulatory issues lawmakers could face in years to come. Lawmakers must increase the efficiency and quality of arbitrations, fully realizing the potential of AI-powered arbitrations. We set out the normative framework for international commercial arbitrations and demonstrate that the NYC is capable of accommodating fully autonomous arbitrations. We also discuss regulatory competition between jurisdictions to promote technology-assisted and fully autonomous arbitrations.

I.

ARBITRATION AND ARTIFICIAL INTELLIGENCE

In this part, we aim to give an overview of the state of technological possibility with respect to AI applications for arbitrations. We focus on AI applications and omit more general issues of digitization and blockchain technology. Blockchain applications for arbitrations exist,⁷ they are much less relevant to our inquiry than AI applications. While blockchain applications aim to efficiently execute (human) decisions. By contrast, AI applications seek to assist humans in decision-making or even replace humans as decision-makers altogether. This is central to the research question we explore (“What is an Arbitration?”).

With respect to AI applications for arbitrations, we are specifically interested in applications addressed to arbitrators, which assist them in performing their arbitral functions or, ultimately, which take over these functions themselves. We are not primarily interested in AI applications for counsel in arbi-

7. *See, e.g.*, KLEROS, <https://kleros.io/en/> (last visited Sept. 28, 2020). *See, e.g.*, Nevena Jevremoviæ, 2018 In Review: Blockchain Technology and Arbitration, KLUWER ARBITRATION BLOG (Jan. 27, 2019), <http://arbitration-blog.kluwerarbitration.com/2019/01/27/2018-in-review-blockchain-technology-and-arbitration/>, for an overview.

trations and/or in applications for arbitral institutions. Of course, there is an overlap: certain applications, for example for document searching and review or decision-analysis, can be used by different participants in the arbitration process.

AI techniques and applications come in different forms. The most recent development in AI relates primarily to “machine learning.” This is an approach to computing in which the solution to an optimization problem is not coded in advance but is derived inductively by reference to data.⁸ The technique relies on applying computing power to very large amounts of data—the availability of both has blossomed in recent years.⁹

The greatest practical successes with machine learning in legal applications to date have been in the use of “supervised learning” techniques.¹⁰ “Supervised learning” refers to a process that begins with a dataset labeled by humans according to the dimension of interest (“training data”). The system analyzes this dataset and determines the best way to predict the relevant outcome variable by reference to the other available features of the data. The “trained model”—that is, the algorithm with the set of parameters that optimized performance on the training dataset—is then put to work on a new test dataset, to see how effective it is at predicting outside the original training sample. These results are delivered via interface for human experts to check and use.

In our analysis, we focus on two general categories of AI applications. First, we examine what AI applications currently exist in the legal technology market to *assist* human arbitrators in performing their duties more efficiently in terms of time and accuracy. Second, we examine in which circumstances AI systems would be able to *replace* human arbitrators. We argue that, while this is currently not possible, fully AI-powered arbi-

8. See, for example, ETHEM ALPAYDIN, *MACHINE LEARNING: THE NEW AI* (2016), for a comprehensive treatment.

9. See Alon Halevy et al., *The Unreasonable Effectiveness of Data*, 24 *IEEE INTELLIGENT SYS.* 8 (2009); Chen Sun et al., *Revisiting Unreasonable Effectiveness of Data in Deep Learning Era*, 2017 *IEEE INT'L CONF. ON COMPUT. VISION (ICCV)* 843, for the importance of data for machine learning performance.

10. Approximately 95% of all ML applications today are based on this method. MARTIN FORD, *ARCHITECTS OF INTELLIGENCE* 11 (2018). See, e.g., STUART J. RUSSELL & PETER NORVIG, *ARTIFICIAL INTELLIGENCE: A MODERN APPROACH* 695–97 (3d ed. 2010) (1995) (discussing supervised learning).

trators might arrive in the next years for cases involving simple issues and disputes.

A. *Artificial Intelligence Applications to Assist Arbitrators*

The first category of interest is AI applications aiming to assist arbitrators in performing their duties. Focusing, as mentioned above, on AI applications and not on solely digitization solutions or blockchain products, the existing applications primarily serve three broad assistive purposes for arbitrators: (1) in the management of their cases and/or the process of an arbitration; (2) in dealing with gathering and analysis of facts; and (3) in their decision-making functions by providing prediction models.

1. *Tools for Case Management*

Current tools available for case management are primarily digitization applications that are not facilitated by AI, such as platforms for organizing online hearings.¹¹ There are, however, AI applications not specifically made for arbitrators, which use machine learning with natural language processing (NLP) technology to assist in scheduling and planning of workload. For example, “x.ai” has produced an application for smart meeting scheduling.¹² According to the developers, the smart scheduling assistant, Amy@x.ai, interacts with humans through emails, and the “machine learning models . . . capture relevant time, location and people information to help the virtual agents schedule meetings with minimal human involvement.”¹³ The smart scheduling system is connected to the user’s calendars and is trained through machine learning models to identify the key components for a meeting, including time, people, and location, in the user’s email and then to find the most suitable time within the parameters set by the user. In addition, the application allows for integration with other platforms as well as collaboration through scheduling networks consisting of multiple calendars. The system is able to identify the free/busy slots and to automatically schedule a

11. Such products are becoming increasingly available and important in the COVID-19 era.

12. x.ai, <https://x.ai/> (last visited May 15, 2020).

13. Rikhil Raju, *Machine Learning Infrastructure at x.ai*, x.ai: BLOG (May 31, 2019), <https://x.ai/machine-learning-infrastructure-at-x-ai/>.

meeting with any other network member. Other smart personal assistants (PAs) work in a similar manner, allowing for easier, more accurate, and more efficient scheduling of workloads. The input of the user is not eliminated; in some of the applications, emails and scheduling are checked by “executive operators”—backroom personnel tasked with validating the accuracy of the AI application.¹⁴

Applications of this kind are not targeted to arbitrators but, more broadly, to anyone in a management team or in need of workload scheduling with colleagues or business counterparts. They can, however, be particularly useful as an assistive mechanism in scheduling and conducting case management conferences and hearings. This is all the more valuable in complex arbitrations involving multiple parties and other interested entities that are located in different parts of the world. All the relevant parties to an arbitration can create a scheduling network, which may, potentially, include the administering arbitral institution in an institutional arbitration. Smart assistants can be used to find relevant meeting slots and arrange the possible filing dates in accordance with the arbitrators’ or the parties’ other workload, prioritizing by the importance placed on each particular case.

2. *Tools for Fact Gathering and Analysis*

Other AI applications focus on providing arbitrators—and counsel alike—with tools for fact gathering and analysis. These include systems capable of extensive document processing, data identification using NLP and optical character recognition (OCR) technologies, clustering or grouping data together by topic without prior classification, and “smart” AI transcription services. As arbitrations become increasingly more complex, and counsel become increasingly more familiar with visual aids, the number of documents, presentations, and other multimedia data appearing before arbitrators increases exponentially. This, in turn, increases the workload for arbitrators and their assisting teams in reviewing all documents and distilling the parties’ arguments and submissions.

Below, we discuss a number of tools relating to document research and analysis, which are of particular importance for

14. *How I Work*, JULIE DESK, <https://www.juliedesk.com/how-i-work/> (last visited May 13, 2020).

document and contract review. These applications are addressed primarily to counsel in litigation and to counseling services that augment litigators in their repeatable and scalable operations.¹⁵ They are also able to assist—as such or with some interface modification—arbitrators in their mandate. First, eBrevia is an e-discovery tool for the document review process that uses machine learning to determine relevant parts of documents.¹⁶ According to the company's website, the tool can analyze more than 50 documents in less than a minute and claims to be more accurate than a manual review process.¹⁷ Second, ROSS Intelligence is an AI and natural language search software application that allows users to ask questions and receive information on recommended reading, related case law, and secondary resources.¹⁸ This application could allow arbitrators to navigate swiftly through submissions, exhibits, and case law and to recognize patterns effortlessly. Third, Everlaw uses predictive coding to look into the contents and metadata of documents provided by users and then, using this information, classify other documents.¹⁹ Fourth, DISCO employs cloud technology to conduct document searches on large datasets.²⁰ Similar to Everlaw, DISCO uses predictive technology to suggest relevant documents, assigning scores on tags (on a scale of -100 to +100) in order to improve its prediction results.²¹ Fifth, Epiq's products, NexLP Story Engine²² and Brainspace Discovery²³ have, according to the company, incorporated advanced AI capabilities and analytics to provide

15. John Armour, Richard Parnham & Mari Sako, *Oxford Business Law Workshop - Week 1 - Trinity Term 2020*, YOUTUBE (Apr. 30, 2020), https://www.youtube.com/watch?v=X1_ZKJswkqU (referring to repetitive and scalable text-based work).

16. *Contract Management & Digitization*, EBREVIA, <https://ebrevia.com/contract-management-digitization> (last visited Apr. 30, 2020).

17. EBREVIA, <https://ebrevia.com/> (last visited Oct. 15, 2020).

18. ROSS INTELLIGENCE, <https://www.rossintelligence.com/> (last visited May 13, 2020).

19. EVERLAW CLOUD-BASED EDISCOVERY SOFTWARE - LEGAL, CORPORATE, GOVERNMENT SOLUTIONS, <https://www.everlaw.com/> (last visited May 13, 2020).

20. *DISCO AI*, DISCO, <https://www.csdisco.com/disco-ai> (last visited May 13, 2020).

21. *Id.*

22. NEXLP, <https://www.nexlp.com/> (last visited May 13, 2020).

23. BRAINSPACE, <https://www.brainspace.com/> (last visited Oct. 28, 2020).

clients with powerful prediction models and information management services. NexLP Story Engine uses predictive coding to identify key people, places, and topics in a given dataset (for example, the respective submissions of the parties), allowing users “. . . to see the stories behind [their] data.”²⁴ Brainspace Discovery clusters and categorizes documents, employing AI concept search and phrase extension. Brainspace claims that this combination allows the delivery of better document search results.²⁵ Sixth, Kira Systems²⁶ is a machine learning application capable of identifying, extracting, and analysing contracts and other documents, including, for example, parties’ submissions and accompanying exhibits.²⁷ It can be helpful for arbitrators to uncover relevant information from contracts regardless of their structure. Finally, CaseAssist by CasePoint provides document review and analysis by identifying patterns and key themes without labor-intensive search queries or the user having to create training sets.²⁸ It locates crucial documents and may aid in business decision-making regarding case direction.²⁹

In addition to document analysis and data extraction AI applications which currently assist arbitrators with the parties’ submissions, various forms of NLP, machine learning, and speech recognition applications could assist arbitrators and administering institutions with transcription services. Again, these are not applications calibrated specifically for arbitrators, but available more generally for instances requiring transcriptions. For example, Trint³⁰, Fireflies³¹, and Otter³² are AI-powered, automated transcription software applications that transcribe audio and video into text. Marketed for video or audio recordings, the service can be used for meetings—particularly online ones, which are becoming more prevalent in

24. *Our Story*, NEXLP, <https://www.nexlp.com/our-story> (last visited Oct. 28, 2020).

25. BRAINSPACE, *supra* note 23.

26. KIRA, <https://kirasystems.com/> (last visited May 7, 2020).

27. *Id.*

28. *Meet CaseAssist*, CASEPOINT, <https://www.casepoint.com/ediscovery/features/artificial-intelligence/> (last visited May 7, 2020).

29. *Id.*

30. TRINT, <https://trint.com/> (last visited Apr. 30, 2020).

31. FIREFLIES.AI, <https://fireflies.ai/> (last visited Apr. 30, 2020).

32. OTTER.AI, <https://otter.ai/> (last visited Apr. 30, 2020).

the COVID-19 era. Unsurprisingly, Otter has partnered with Zoom,³³ and Cisco has created Cisco Webex Assistant for Webex Meetings, which allows, among other features, a live transcription of the event.³⁴

Another possible arbitrator-assisting AI application regarding document and fact handling is the involvement of smart document analysis and clustering applications in award drafting. To the best of our knowledge, a specific AI application for award drafting does not yet exist. However, applications like the ones described above for document review and analysis can prove useful in producing the “boilerplate”³⁵ sections of awards, such as procedural history, applicable legal rules, and parties’ analysis of specific issues, thus expediting the process of award drafting.

3. *Tools for Decision-Making*

The third category of tools available to assist arbitrators in performing their duties are AI applications that focus on decision-analysis and outcome prediction. Although often designed to be used by legal counsel, these applications are useful to arbitrators as well as they allow arbitrators to deliver awards of better quality and enhance the legitimacy and acceptance of their decisions. Such applications are primarily based on predictive data analytics tools and datasets of decisions.³⁶ AI prediction applications are particularly “data-hungry”³⁷ and require access to a large pool of carefully labeled data.

For prediction applications to be deployed successfully, data must be large in volume and of sufficient variety and veracity.³⁸ In addition, the available data must be relatively stable

33. *Live Transcript for Zoom Meetings and Webinars*, OTTER.AI, <https://otter.ai/zoom> (last visited May 13, 2020).

34. CISCO WEBEX, <https://www.webex.com/ai-assistant.html> (last visited Apr. 30, 2020).

35. Thomas Snider, Sergejs Dilevka & Camelia Aknouche, *Artificial Intelligence and International Arbitration: Going Beyond E-mail*, AL TAMIMI & COMPANY (Apr. 2018), <https://www.tamimi.com/law-update-articles/artificial-intelligence-and-international-arbitration-going-beyond-e-mail/>.

36. *See generally*, AJAY AGRAWAL ET AL., PREDICTION MACHINES: THE SIMPLE ECONOMICS OF ARTIFICIAL INTELLIGENCE (2018).

37. Scherer, *supra* note 3, at 554.

38. *Id.* at 554–62.

over time (low velocity).³⁹ An example of a recently created, labelled dataset is “a standardized dataset of 100,000 U.S. court cases to test AI approaches for analyzing court decisions and predicting case outcomes.”⁴⁰ Such datasets are important in providing the original training material for supervised machine learning applications, enabling the development of prediction models. One important development in this context is France’s adopted legislation in 2019,⁴¹ aiming, *inter alia*, to widen access to judicial decisions while preserving the involved parties’ personal data by redacting parts of the now publicly available decisions.⁴² Enhanced publicity of decisions is important in creating a sufficiently broad original set of data for more accurate legal prediction applications.

Quantitative legal prediction is at the center of this analysis and defines much of the innovation and technology in legal services.⁴³ Several AI applications for legal predictions in arbitration are already used in legal practice. For example, ArbiLex⁴⁴ is a predictive data analytics tool, which leverages Bayesian machine learning.⁴⁵ Market observers see “the main benefit of ArbiLex’s product [in] mapping out risk factors associated with an arbitration case . . . [helping to] benchmark

39. *Id.* at 557.

40. Felix Steffek & Ludwig Bull, *Law and Autonomous Systems Series: Paving the Way for Legal Artificial Intelligence – A Common Dataset for Case Outcome Predictions*, OXFORD BUS. L. BLOG (May 24, 2018), <https://www.law.ox.ac.uk/business-law-blog/blog/2018/05/law-and-autonomous-systems-series-paving-way-legal-artificial>.

41. “LOI n° 2019-222 du 23 mars 2019 de programmation 2018-2022 et de réforme pour la justice (1)” (2019), <https://www.legifrance.gouv.fr/eli/loi/2019/3/23/JUST1806695L/jo/texte> (last visited May 6, 2020).

42. Antonio Musella, *Arbitration, Open Data, Justice and Artificial Intelligence: A New Step Forward*, KLUWER ARB. BLOG (Apr. 16, 2020), <http://arbitrationblog.kluwerarbitration.com/2020/04/16/arbitration-open-data-justice-and-artificial-intelligence-a-new-step-forward/>.

43. Daniel Martin Katz, *Quantitative Legal Prediction-Or-How I Learned to Stop Worrying and Start Preparing for the Data-Driven Future of the Legal Services Industry*, 62 EMORY L.J. 909, 912 (2013).

44. ARBILEX, <https://www.arbilex.co/> (last visited May 13, 2020).

45. Frederick Daso, *ArbiLex, A Harvard Law School Legal Tech Startup, Uses AI to Settle Arbitrations*, FORBES (Feb. 4, 2020, 9:07 AM), <https://www.forbes.com/sites/frederickdaso/2020/02/04/arbilex-a-harvard-law-school-legal-tech-startup-uses-ai-to-settle-arbitrations/#4fc587da52c5>.

and quantify probabilities.”⁴⁶ Another application, Ravel Law, claims to be able to predict outcomes based on cases from more than 400 law firms.⁴⁷ Solomonic⁴⁸, an AI application developed in partnership with Herbert Smith Freehills, asserts that their platform “enables statistical analysis, future pattern calculation and outcome-focused research across the corpus of cases we have analyzed.”⁴⁹ Finally, Lex Machina’s Legal Analytics Platform⁵⁰ has, among other features assisting lawyers (and arbitrators) in legal strategy, a “timing analytics” feature that uses AI to predict the estimated time for a case before a specific judge. This could also be used in relation to individual arbitrators, provided that the application has enough and sufficiently specific data on these arbitrators to make accurate predictions. Therefore, such applications could be more easily used in the investment arbitration context where appointments of arbitrators are public. Despite the lack of specific information about appointments in commercial arbitrations and confidentiality concerns, certain datasets are available, which contain information on arbitrators. For example, Arbitrator Intelligence collects information about arbitrator case management and decision-making through feedback questionnaires.⁵¹ Such information does not include parties’ names or the names of law firms or lawyers but, rather, key data such as the date of filing, the industry in which the dispute arose, the date of the award, and the names of arbitrators.⁵²

B. *Artificial Intelligence Applications to Replace Arbitrators*

The applications discussed in the previous section focus on assisting arbitrators in performing their adjudicative duties.

46. Bayesian inference is a method of statistical inference in which Bayes’ theorem is used to update the probability for a hypothesis as more evidence or information becomes available. *See, e.g.*, RUSSELL & NORVIG, *supra* note 10, at 802–03.

47. *Ravel Law – Products and Technology*, RAVEL L., <https://home.ravellaw.com/products-and-technology> (last visited May 5, 2020).

48. *Overview – Solomonic Litigation Analytics*, SOLOMONIC, <https://www.solomonic.co.uk/overview> (last visited May 7, 2020).

49. *Id.*

50. *Legal Analytics – Quickly Uncover Strategic Information*, LEX MACHINA, <https://lexmachina.com/legal-analytics/> (last visited May 5, 2020).

51. *FAQs – Arbitrator Intelligence*, ARB. INTEL., <https://arbitratorintelligence.com/faq> (last visited May 14, 2020).

52. *Id.*

They are, thus, confined in their scope—they are simply targeted at improving the speed, accuracy, and quality of the services provided by the arbitrators. Humans are not eliminated from the process; they remain at the forefront, and they are merely augmented by AI applications in specific aspects of their (repetitive and scalable) professional duties and tasks.⁵³

A fully automated “robot” AI arbitrator system, which would substitute human arbitrators, requires performance of a variety of tasks. These tasks, which involve attributes such as social intelligence, cannot be performed in their entirety by currently existing machine learning applications.⁵⁴ A full-service AI arbitrator system would require a fully automated case management process of accepting cases, performing conflict checks,⁵⁵ managing multiple appointments, cases, and hearings at the same time without the involvement of human input. In addition, it would need to perform factual analysis of a given case, including e-discovery of facts and document analysis. It would also need to assess the credibility of witnesses during questioning, using, for example, face recognition applications able to detect micro-expressions of a witness. Based on this analysis, the system would have to render a final and binding decision as well as give the reasons for reaching this decision.

53. See Armour, Parnham & Sako, *supra* note 15.

54. *Id.*

55. In a first step, AI applications currently used to screen job candidates could be used for the appointment of *human* arbitrators, either directly by the parties or by the overseeing institution. AI applications of this kind—if used within arbitration procedures—would work on the basis of data on potential appointees and the characteristics requested by the parties to select conflict free arbitrators. See Mel Andrew Schwing, *Don't Rage Against the Machine: Why AI May be the Cure for the "Moral Hazard" of Party Appointments*, 36 ARB. INT'L (forthcoming 2020), <https://doi.org/10.1093/arbint/aiaa033>. See also Dave Zielinski, *Recruiting Gets Smart Thanks to Artificial Intelligence*, SOC'Y FOR HUM. RESOURCE MGMT. (Feb. 13, 2017), <https://www.shrm.org/resourcesandtools/hr-topics/technology/pages/recruiting-gets-smart-thanks-to-artificial-intelligence.aspx>; Kathleen Paisley & Edna Sussma, *Artificial Intelligence Challenges and Opportunities for International Arbitration*, 11 NYSBA N.Y. DISP. RESOL. LAW. 36 (2018). In a second step, such an application could also be an element of an encompassing “AI arbitrator system”: the system would execute checks on itself with respect to desired characteristics, potential conflicts, etc. However, it is difficult to see how a fully AI-powered arbitrator system could *not* be independent if it is designed appropriately, i.e. if it is set up to function without bias.

AI applications described in the previous section address these different functions of an arbitrator but still require the involvement of a human arbitrator. The human element is important, especially in using the findings of AI-assisted applications to reach a final decision. A fully autonomous, AI-powered system would need to perform these tasks *in toto* without the involvement of humans. Considering the decision-making processes into which an AI arbitrator would need to delve, this is not only an issue of volume and diversity of data required for accurate prediction of a human decision. It is also an issue of being able to analyze data, make the necessary connections, identify the existing patterns, make a decision based on the trained model, and justify that decision as well as a human arbitrator would.

To the best of our knowledge, no such system currently exists. Whether and/or when such an AI-powered arbitrator might become available, depends on a number of factors. First, the type of the dispute is important. Developing an AI-powered arbitrator is not only contingent on the simplicity or complexity of a given dispute but also depends on the degree of human interaction a dispute might normally involve. Thus, it would be easier to see such systems operating for simple money claims or tax disputes where the outcome is based on the analysis of facts and the calculation of variables that are easily quantifiable.⁵⁶ By contrast, cases involving “hidden variables,” such as social or economic considerations not evident in legal or factual documents, bring a degree of outcome-relevant uncertainty to the adjudicative processes, which, at the present stage of AI development, cannot properly be accounted for by available systems.

Second, merging different AI applications to create a fully autonomous, AI-powered arbitrator creates formidable interface problems. As with commercial software applications for various business functions, the various applications should be designed according to a common architecture which allows them to work together smoothly—this is not an easy task.

56. An example of an AI application approaching this level, although not being completely automated, is “Split Up.” It provides parties (and adjudicators) with advice on property allocation following a divorce. *See, e.g.*, Nicolás Lozada-Pimiento, *AI Systems and Technology in Dispute Resolution*, 24 *UNIFORM L. REV.* 348, 361 (2019).

Third, the type of legal system within which the AI-powered arbitrator would operate and the available data are relevant. As we argue in the next section, in systems based on a judicially driven development of the law, where cases are publicly reported, there are more initial data available for the training of AI systems based on supervised learning.

II.

THE ANATOMY OF AN ARBITRATION

In this part, we investigate the anatomy of an arbitration. Our goal is to identify the key functions and elements of an arbitration and to assess whether a “fully AI-powered arbitration” is feasible. By this we do not mean technical feasibility, as we investigated this issue in Part I. Nor are we primarily concerned with legal feasibility in the sense of whether, in a particular jurisdiction, an AI-assisted arbitration or an arbitration that is completely conducted by an autonomous system is permitted. Rather, we attempt to assess whether a fully autonomous arbitration could deliver *functionally* what we think is *constitutive* of an arbitration.

Arbitrations are creatures of the law and legal practice. There is no such thing as the essence of an arbitration *in abstracto* or existing in a legal vacuum. Rather, the key elements of an arbitration can be derived from the laws, conventions, and legal practice as shared by a community of scholars and practitioners working in the field. To a certain extent, this shared understanding is jurisdiction-specific. However, at least the most important subfield of arbitration, namely commercial arbitration, is a very international subject. Its two key legal planks, the NYC and the “UNCITRAL Model Law on International Commercial Arbitration,”⁵⁷ are international conventions/texts with significant success worldwide. Moreover, there is an important scholarly and practical debate within the field of international commercial arbitration about the extent to which the subject is autonomous and distinct from national

57. U.N. COMM’N ON INT’L TRADE L., MODEL LAW ON INTERNATIONAL COMMERCIAL ARBITRATION, U.N. SALES NO. E.08.V.4 (1985) [hereinafter MODEL LAW].

legal systems.⁵⁸ Scholars and practitioners disagree about the degree of such autonomy.⁵⁹ That being said, there is no denying that over the last 50 years or so, after being promoted by the work of international institutions such as UNCITRAL and the International Bar Association (IBA),⁶⁰ a transnational practice of international commercial arbitration has emerged.⁶¹ This transnational practice reflects a shared understanding, a “consensus of *action*: a consensus of doing the same thing, reacting in the same way”—to quote Ludwig Wittgenstein.⁶² It is against this background that we set out the functional anatomy of an arbitration.

An arbitration is a dispute resolution *process* conducted by a *neutral third party*, the arbitrator. The key feature that distinguishes an arbitration from other ADR methods such as mediation or conciliation, is that, if the parties do not settle, the arbitration process ends with a binding decision, otherwise known as the *arbitral award*. The award’s function is to do justice between the parties. The award will achieve this function if it conforms to the applicable decision-making standard and if the parties view the process as fair and the arbitrator as independent and impartial.⁶³ This is what provides arbitration with legitimacy in resolving disputes. In the following sections, we examine these key features of arbitration in more detail, relating them to AI applications belonging to the two categories as we examined them in Part I, i.e., applications assisting or even replacing human arbitrators.

58. See, e.g., YVES DEZALAY & BRYANT G. GARTH, DEALING IN VIRTUE: INTERNATIONAL COMMERCIAL ARBITRATION AND THE CONSTRUCTION OF A TRANSNATIONAL LEGAL ORDER 1–30 (1996).

59. See Jan Paulsson, *Arbitration in Three Dimensions*, 60 INT’L & COMP. L. Q. 291 (2011).

60. For the work of the IBA’s “Arbitration Committee”, see *Arbitration Committee Home*, INT’L B. ASS’N, https://www.ibanet.org/LPD/Dispute_Resolution_Section/Arbitration/Default.aspx (last visited Apr. 30, 2020).

61. See, e.g., KLAUS PETER BERGER, INTERNATIONAL ECONOMIC ARBITRATION (1993).

62. LUDWIG WITTGENSTEIN, LECTURES ON THE FOUNDATIONS OF MATHEMATICS: CAMBRIDGE 1939 184 (Cora Diamond ed., 1976).

63. See BLACKABY ET AL., *supra* note 1, at 28–29; ANDREAS F. LOWENFELD, LOWENFELD ON INTERNATIONAL ARBITRATION, COLLECTED ESSAYS OVER THREE DECADES *passim* (2005).

A. *Involvement of an Independent/Impartial Third Party*

There is no arbitration without a third party arbitrator that is distinct and neutral to the disputing parties. The arbitrator must be independent from the parties and conduct the proceedings in an impartial manner.⁶⁴

These requirements follow straight from the central idea of an arbitration, as reflected in the above-referenced legal texts and practice: an *arbiter* is entrusted to do justice between the disputing parties. For this to be accomplished, the arbiter must be independent from the parties and conduct the arbitration in an impartial manner, observing fundamental standards of fairness and due process.⁶⁵

In legal practice, the appointment of an arbitrator and, more specifically, dealing with potential challenges concerning justifiable doubts as to his or her independence and impartiality,⁶⁶ are often time consuming and contentious parts of the arbitration process. The IBA has published “Guidelines of Conflicts of Interest in International Arbitration” (2014),⁶⁷ highlighting the practical relevance of the matter.

AI applications assisting in the selection of human arbitrators or selecting human arbitrators directly⁶⁸ are an intermediate development towards applications that would completely take over the function of an independent and impartial third party. In principle, AI-powered systems are capable of being designed so that the system is separate from the parties, thereby meeting the desired criteria of independence and impartiality. This should be easier to achieve for the independence test, as it is a relatively limited set of factual and legal prescriptions which need to be considered and observed, as

64. Bruno Manzanera Bastida, *The Independence and Impartiality of Arbitrators in International Commercial Arbitration*, 6 REV. E-MERCATORIA 1, 2 (2007); Pierre Lalive, *On the Neutrality of the Arbitrator and of the Place of Arbitration*, in SWISS ESSAYS ON INTERNATIONAL ARBITRATION 19 *passim* (Claude Reymond & Eugene Bucher eds., 1984).

65. See Gilles Cuniberti, RETHINKING INTERNATIONAL COMMERCIAL ARBITRATION TOWARDS DEFAULT ARBITRATION 23 (2017).

66. See MODEL LAW, *supra* note 57, at 7. See also Hong-Lin Yu & Laurence Shore, *Independence, Impartiality, and Immunity of Arbitrators—US and English Perspectives*, 52 INT’L & COMP. L. Q. 935, 937–39 (2003).

67. IBA GUIDELINES ON CONFLICTS OF INTEREST IN INT’L ARBITRATION (INT’L BAR ASS’N 2014).

68. See *supra* note 55.

evidenced by the IBA Guidelines cited above. By contrast, being impartial relates to the conduct of the proceedings. In an arbitration setting, a myriad of different factual circumstances might give rise to challenges of alleged violations of the impartiality requirement. Case law (data) on both issues exists for jurisdictions implementing the UNCITRAL Model Law primarily because decisions on arbitrator challenges are ultimately dealt with by the state courts.⁶⁹

The requirement that an independent and impartial third party be involved implies that AI-powered systems, which are used only by one of the parties to assist and/or take over its “contract management,” do not qualify as arbitrations. If one party stipulates—in its General Terms and Conditions—that a designated system should take over the handling of a dispute once it arises, such process could be an arbitration, provided that the applicable independence and impartiality criteria are met. This will become progressively more relevant as large businesses, especially platform sellers, increase their use of such stipulations, subjecting their contract partners to AI-powered dispute resolution programs for any conflicts that might arise.⁷⁰

Could an AI-powered dispute resolution system functionally be a third party, provided that it is technically capable of managing an arbitration process? This would work only if the system enjoyed some sort of legal entity status under the applicable laws. To speak meaningfully about a “third party” presupposes the existence of a legal entity. A legal reference point is needed for the rights and obligations of the third party with respect to the proceedings, for example, concerning compensation or potential liability.

Consequently, whether a fully autonomous system could function as an arbitrator depends on the much-discussed question of whether, at least for the purpose of managing an arbitration process, such a system enjoys legal capacity.⁷¹ There are different ways to answer this. In 2017, the European Parliament pondered whether “a specific legal status for robots”

69. See MODEL Law, *supra* note 57, at 7.

70. See Eidenmüller, *supra* note 4, at 332, 335.

71. See Horst Eidenmüller, *The Rise of Robots and the Law of Humans*, ZEITSCHRIFT FÜR EUROPÄISCHES PRIVATRECHT (ZEUP) 765, 774–76 (2017) (Ger.) (arguing that robots should not be granted entity status).

should be created in the long run so that at least the most sophisticated autonomous robots could establish the status of electronic persons responsible for making good any damage they may cause, and possibly applying electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently.⁷² If this route were taken, a new type of legal personality would be created specifically for sophisticated robots (“e-personality”).

Another, simpler route could be to allow a “self-driving corporation” to act as arbitrator. This would imply waiving the requirement of human directors for corporations and allowing corporations to be managed exclusively by AI-systems.⁷³ This policy step should be considered only if appropriate safeguards are in place, namely strict liability of the corporation for “algorithmic failure,” combined with sufficiently calibrated mandatory liability insurance.⁷⁴ Additionally, the scope and scale of a corporation’s activities are an important factor. A “self-driving corporation” in the business of developing, producing, and installing nuclear power-plants on a global scale poses much higher risks than an entity that manages arbitrations. We might see fully autonomous systems for corporations with limited functions being developed earlier, and we might also permit such entities before we allow risky “all-purpose corporations.” An incorporated entity managed by an algorithm, and providing arbitration services, would conceptually qualify as an independent third party, i.e., an arbitrator.

B. *Management of the Process*

An arbitration is a dispute resolution *process*. It involves establishing and reviewing the facts of the case (both undisputed and disputed), applying procedural rules agreed by the parties and/or mandated by the *lex loci arbitri* (equal treatment of the parties, right to be heard, etc.),⁷⁵ applying substantive

72. European Parliament Resolution of 16 February 2017 with Recommendations to the Commission on Civil Law Rules on Robotics, para. 59(f).

73. See John Armour & Horst Eidenmüller, *Self-Driving Corporations?*, 10 HARV. BUS. L. REV. 87, 106 (2020).

74. *Id.* at 109–13.

75. For countries which have implemented the UNCITRAL Model Law, the arbitration process is governed by the arbitration law of the state in which the arbitral seat is located unless the parties have expressly agreed otherwise. See MODEL LAW, *supra* note 57, at 1, 20.

rules of law as selected by the parties or directed by the *lex loci arbitri*, and a variety of case management tasks.⁷⁶

There is no conceptual reason why these tasks can only be performed by humans. Currently, as examined in Part I, no general AI-application exists which would be able to manage the arbitration process *in toto*. AI-applications which assist human arbitrators in performing their process management tasks are available.⁷⁷ The limiting factor for more ambitious applications is not software development challenges, but the availability of carefully labelled training data for machine learning tools.

Over time, more and more data of this nature can, and will, be collected. It is true that most commercial arbitrations, by agreement of the parties, are confidential. But this should not significantly impede the data collection exercise, for various reasons. First, arbitration laws and the court decisions that interpret them are public. Hence, to the extent that the management of the arbitration process requires observance of arbitration laws and regulations, labelling should be feasible. This is all the more so the case in relation to the UNCITRAL Model Law and the NYC. UNCITRAL has its own database, Case Law on UNCITRAL Texts (CLOUT), which can be used as a source of raw data material for both of the aforementioned legislative texts.⁷⁸ In addition, in relation to the NYC, case law and commentary are included in an ever-expanding separate database.⁷⁹ Second, there is a trend in international commercial arbitration towards publicizing arbitral awards and decisions.⁸⁰ Third, tools for document review and factual analysis do not depend on the availability of data that is specific to a particular arbitration. Rather, such tools can be successfully used for all kinds of disputes.

76. For an overview see James Hope, *Chapter 7: Can a Robot be an Arbitrator?*, 2019 STOCKHOLM ARB. Y.B. at 103.

77. See *supra* Part I.

78. Case Law on UNCITRAL Texts (CLOUT), U.N. COM. ON INT'L TRADE L., <https://www.uncitral.org/clout/> (last visited May 8, 2020).

79. Court Decisions, N.Y. ARB. CONVENTION, <http://www.newyorkconvention.org/court=decisions> (last visited May 8, 2020).

80. For an overview see Joshua Karton, *A Conflict of Interests: Seeking a Way Forward on Publication of International Arbitral Awards*, 28 J. LONDON CT. INT'L ARB. 447 (2012).

Two other important elements of the process are: (1) the hearing during which the parties have the opportunity to present their cases, and (2) the ability to get interim measures from the tribunal to regulate the status quo, pending the final resolution of the dispute. First, in relation to the hearing, if an AI-powered system can ensure technologically that the parties are heard (and seen) in a hearing, there is no conceptual objection against characterizing this part of the process as a “hearing.” This is not to suggest that a hearing conducted by an AI-powered system would mimic a conventional hearing administered by human arbitrators. Rather, an AI-powered hearing would deliver functionally what is constitutive for a hearing, namely, providing a forum for the parties to be heard and present their case. Second, the precise requirements for interim measures are regulated by the relevant applicable laws and rules of the process. Under the Model Law, for example, apart from establishing *prima facie* jurisdiction and a reasonable possibility of success on the merits, the request must establish that urgency exists for the grant of such orders, in the sense that otherwise irreparable harm would be suffered otherwise.⁸¹ Furthermore, the ICC Rules require provisional measures to be appropriate.⁸² There is no conceptual reason why an AI-powered system could not evaluate, on the basis of the material facts of the case, the application of these prerequisites and decide on the appropriate type and extent of provisional measures, pending the final resolution of the dispute.

Observing applicable arbitration laws is another important element of managing the arbitration process. Supervised learning systems depend on carefully labelled data, as has already been discussed. Consequently, we expect common law systems to have an advantage over civil law systems when it comes to labelling training data for supervised learning applications. Civil law systems are based on top-down reasoning, starting from a general statutory rule and using “expert knowledge” to apply the general statutory rule to the specific facts of a case. By contrast, common law systems are based on bottom-up reasoning, starting from individual cases and then detecting similarities and differences in data patterns and court decisions or arbitral awards. Clustering and labeling applica-

81. See MODEL LAW, *supra* note 57, at 10.

82. See ICC Int’l Ct. of Arb., *Arbitration Rules*, art. 28(1) (Mar. 1, 2017).

tions analyzed in Part I can be used to aid the lawyer/tech personnel in the process of labeling raw data for machine learning applications. This will be even more important when it comes to rendering an arbitral award.

C. *Rendering an Award*

The third key function of an arbitrator or arbitral tribunal is to render a final and binding decision, i.e. an award, if the parties do not settle their dispute during the arbitration process. Rendering an award involves applying the applicable substantive laws to the facts of the case. Under the UNCITRAL Model Law, the parties can choose the applicable substantive law;⁸³ in international commercial arbitrations, they usually do.⁸⁴ Parties often choose the law of the jurisdiction in which the arbitral tribunal is seated, thus ensuring that the *lex loci arbitri* and the applicable substantive law are the same jurisdiction.⁸⁵

Applying substantive law rules to established facts requires jurisprudential reasoning. In civil law jurisdictions, this involves reasoning from statutory rules and using different methods of interpretation (e.g., wording of the statute, plan or will of the lawmaker, purpose of the rule, meaning of the rule in the context of other applicable rules).⁸⁶ By contrast, in common law jurisdictions, identifying applicable precedents, reasoning by analogy, and distinguishing the present case from existing precedents are central to the reasoning process.⁸⁷

It seems clear that, both functionally and in principle, AI-powered systems can undertake case analysis and give a decision on a specific case. It seems also clear that, for the reasons already discussed, common law legal systems are better suited

83. See MODEL LAW, *supra* note 57, at 17.

84. See Stefan Vogenauer, *Regulatory Competition Through Choice of Contract Law and Choice of Forum in Europe: Theory and Evidence*, in REGULATORY COMPETITION IN CONTRACT LAW AND DISPUTE RESOLUTION 227, 243–86 (Horst Eidenmüller ed., 2013).

85. See *id.*

86. See, e.g., William Tetley, *Mixed Jurisdictions: Common Law vs. Civil Law (Codified and Uncodified) (Part I)*, 4 UNIF. L. REV. 591, 596 (1999); RENÉ DAVID & JOHN E. C. BRIERLEY, MAJOR LEGAL SYSTEMS IN THE WORLD TODAY: AN INTRODUCTION TO THE COMPARATIVE STUDY OF LAW 94 (3d ed. 1985).

87. See, e.g., MARTIN PARTINGTON, INTRODUCTION TO THE ENGLISH LEGAL SYSTEM 53 (14th ed. 2019); John Bell, *Sources of Law*, in ENGLISH PRIVATE LAW 3, 11 (Andrew Burrows ed., 2013).

to generating sufficient data for machine learning applications than are civil law systems. In fact, the existing AI-based applications for litigation analysis discussed in Part I have all been developed in and for common law jurisdictions.

An important hurdle for the widespread adoption of AI-based judging could be the application's ability to explain the reasoning for a particular outcome. According to the UNCITRAL Model Law, "[t]he award shall state the reasons upon which it is based, unless the parties have agreed that no reasons are to be given or the award is an award on agreed terms"⁸⁸ In practice, it is extremely rare for parties to agree that no reasons be given. Parties usually demand reasons, if only to assess the prospects of setting aside an award or to anticipate problems with respect to recognition and enforcement.⁸⁹

Hence, whether we can expect fully AI-powered arbitral awards to be accepted by the arbitration community will, to a significant degree, depend on how well AI-powered systems are able to explain and justify the outcome. Thus, probabilistic assessments are unlikely to be sufficient, as gaining the acceptance and trust of the stakeholders in the arbitration process will require a detailed and comprehensive assessment of facts and rules, as well as elaborate statements of the grounds for decisions. We are certainly not there yet. However, the question is one of technical capability and progress, not of principle. Functionally and conceptionally, humans need not necessarily apply when it comes to rendering an award.⁹⁰

III.

ADAPTING THE LEGAL FRAMEWORK

Against the background we established in part I, fully AI-powered arbitrator systems could be technically operational at some point in the future. If such systems are able to perform the same functions as human arbitrators at equivalent or greater levels of efficiency and quality, questions regarding the applicable legal framework will inevitably arise. In this part, we are not concerned with the description of current treatment of

88. MODEL LAW, *supra* note 57, at 18.

89. *See id.* arts. 34, 36.

90. We borrow this phrase from JERRY KAPLAN, HUMANS NEED NOT APPLY (2015).

AI arbitrators in various jurisdictions.⁹¹ Rather, we are concerned with the key regulatory issues lawmakers face, currently or in the years to come, in order to increase the efficiency *and* quality of arbitrations, utilizing AI's potential.

As analyzed below, although the current legal framework is not extensively developed in relation to the use of AI, jurisdictions are expected to experiment with their regulations on AI arbitrator systems in the future. We argue that both the current legal framework and future regulatory experiments should be assessed primarily against the international regime set by the NYC.

A. *The Framework for International Commercial Arbitrations*

This section considers the legal architecture of international commercial arbitrations, setting the foundation for the analysis in the remainder of this part. Despite the diversity in various jurisdictions and legal systems in their substantive and procedural laws, international commercial arbitration is a field where regulatory convergence has been achieved to a significant degree.⁹² This is primarily so because of two key international legal instruments: the NYC and the UNCITRAL Model Law. Despite their differences in nature—one being an international treaty and the other a model law instrument—both are widely accepted in the international community. The NYC has been ratified by 166 contracting States,⁹³ and the Model Law has been accepted in 84 States for a total of 116 jurisdictions.⁹⁴ These figures evidence a regulatory convergence in in-

91. See Hope, *supra* note 76; Irene Ng (Huang Ying) & Valeria Benedetti del Rio, *When the Tribunal Is an Algorithm: Complexities of Enforcing Orders Determined by a Software Under the New York Convention*, in 60 YEARS OF THE NEW YORK CONVENTION: KEY ISSUES AND FUTURE CHALLENGES 121 (Katia Fach Gómez & Ana Mercedes López-Rodríguez eds., 2019).

92. Richard Garnett, *International Arbitration Law: Progress Towards Harmonisation*, 3 MELB. J. INT'L L. 400 (2002); Loukas Mistelis, *Is Harmonisation a Necessary Evil? The Future of Harmonisation and New Sources of International Trade Law*, in FOUNDATIONS AND PERSPECTIVES OF INTERNATIONAL TRADE LAW 3, 12 (Ian Fletcher et al. eds., 2001).

93. *Status: Convention on the Recognition and Enforcement of Foreign Arbitral Awards (New York, 1958) (the "New York Convention")*, UNITED NATIONS COMM'N ON INT'L TRADE LAW, https://uncitral.un.org/en/texts/arbitration/conventions/foreign_arbitral_awards/status2 (last visited Nov. 30, 2020).

94. *Status: UNCITRAL Model Law on International Commercial Arbitration (1985), with Amendments as Adopted in 2006*, UNITED NATIONS COMM'N ON

ternational arbitration and demonstrate the important role of both instruments in the legal architecture of the subject.

The rules of the NYC and those proposed in the Model Law are of particular importance in setting standards for the enforceability of awards. Empirical evidence shows that such enforceability is the main consideration for parties when choosing arbitration as the resolution of their dispute. In an empirical survey, undertaken from January to March 2015, approximately 50% of respondents considered the enforceability of awards to be a very important factor when deciding whether to arbitrate a case instead of litigating.⁹⁵ In addition, according to another survey, “[e]nforceability of awards” continues to be perceived as arbitration’s most valuable characteristic.⁹⁶

Considering the number of ratifications, the NYC is rightly seen as the benchmark in setting international enforceability standards for awards. Hence, it is unsurprising that the adoption of the NYC is one of the primary considerations when choosing a seat for arbitration. This is also one of the reasons why the arbitration community does not expect Brexit to have important consequences on the use of London as a seat for arbitrations.⁹⁷

The role of these two instruments is key in considering the landscape of AI and arbitration regulation in the future. The Model Law is important because it sets a widely accepted standard for states wishing to pass arbitration legislation for the first time or to modernize existing laws. In its current version, as we will set out below, the Model Law is silent with respect to technology-assisted or AI-powered arbitrations without being biased against them.⁹⁸ Explicitly allowing AI-assisted or even AI-powered arbitrations in the Model Law would be an important step. This could be achieved at the international

INT’L TRADE LAW, https://uncitral.un.org/en/texts/arbitration/modellaw/commercial_arbitration/status (last visited Nov. 30, 2020).

95. See Eidenmüller, *supra* note 4, at 340.

96. QUEEN MARY UNIV. OF LONDON & WHITE & CASE, 2018 INTERNATIONAL ARBITRATION SURVEY: THE EVOLUTION OF INTERNATIONAL ARBITRATION 2, 7 (2018), <https://www.whitecase.com/sites/whitecase/files/files/download/publications/qmul-international-arbitration-survey-2018-19.pdf>.

97. *Id.* at 12; Marco Torsello, *The Effect of Brexit on the Resolution of International Disputes: The Impact of Brexit on International Commercial Arbitration*, in NEGOTIATING BREXIT 73, 73 (John Armour & Horst Eidenmüller eds., 2017).

98. See *infra* Section III.C.1.

level with an amendment of the Model Law, such as the one which took place in 2006 with a resolution of the United Nations General Assembly.⁹⁹

Based on the technological developments and possibilities already analyzed in the previous sections, national lawmakers are expected to focus their regulatory attention in the future on fully autonomous AI applications performing arbitrator functions. Engaged in a competition between themselves as we argue below,¹⁰⁰ states are expected to experiment with new legislation to provide different tools and vehicles to accommodate technological advances.

Against the background of innovative and diverse regulatory approaches in this area, the international standards reflected in the NYC assume a particular importance as they set a uniform ceiling for the cross-border enforcement of awards. While states are able to adapt the Model Law to their needs and particular national interests, they are unable to change the provisions of the NYC unilaterally. This is not to suggest that the NYC could not be amended in principle. However, its enormous success, evidenced by more than 84% of the states worldwide having ratified it during the last 70 years, makes such an amendment a practically challenging venture—to say the least. As such, the standards set out in the NYC reflect normative constraints, which are unlikely to change in the foreseeable future. Consequently, since the international enforceability of awards is a crucial motivation for parties resorting to arbitration in international disputes, the NYC plays a key role (“gateway”) regarding the degree to which legal innovation on the level of individual states will spread internationally.

B. *Recognition and Enforcement of Awards Under the New York Convention*

Keeping in mind the background of the analysis above, in this section we consider whether AI-assisted or fully autonomous, AI-powered arbitrations can be accommodated within the NYC, following a teleological interpretation of its provisions. As previously explained, an analysis of the NYC’s provisions is particularly important as it sets the ceiling for interna-

99. See G.A. Res. 61/33 (Dec. 4, 2006) (amending the original 1985 Model Law on International Commercial Arbitration).

100. See *infra* Section III.C.2.

tional enforcement standards. This is especially relevant if we consider a scenario where a national legal regime, expressly or implicitly, allows for non-human, AI-powered arbitrator systems. If such national regulations do not fit through the gateway of the NYC, the international currency of the award in terms of enforceability would be severely diminished.

AI-assisted arbitrations do not present conceptual issues and are much more easily reconciled with the NYC than fully autonomous, AI-powered ones. Awards resulting from AI-assisted arbitrations are still the product of a human, who is merely assisted in providing their services by technology.¹⁰¹ There is, therefore, no serious room for argument on whether such awards are to be considered awards within the meaning of the NYC.

However, fully autonomous, AI-powered arbitrations and the awards resulting from them require a closer examination with respect to their compatibility with the relevant provisions of the NYC. Hence, they are the main focus of our analysis in this section.

Being relatively short in length and minimal in wording, the NYC does not include any references to the nature of the arbitrator or tribunal. The NYC only prescribes that the contracting states shall recognize and enforce agreements to arbitrate and arbitral awards subject only to limited grounds for refusing to do so.¹⁰² Despite this lack of specific provisions on an arbitrator's attributes or characteristics, if we consider the available technology when the NYC was adopted in 1958, its provisions were drafted with the implicit understanding that arbitrators could only be humans. This is, for example, reflected in provisions such as Article IV, which requires a duly authenticated original or certified copy of an award.¹⁰³ This provision has been interpreted to require the signatures of arbitrators as natural human beings.¹⁰⁴ This serves to show that

101. See *supra* Section I.A.

102. See New York Convention, *supra* note 6, art. II, V.

103. There is no mention in the drafting history of the NYC as to the content of the requirement that the award is "authenticated."

104. The Austrian Supreme Court has found that the authentication requirement is fulfilled when the signatures of the arbitrators are authentic, hence requiring the signatures of all three arbitrators in the case before the Court. See Oberster Gerichtshof [OGH] [Supreme Court] Sept. 3, 2008, 3 Ob 35/08f, https://www.ris.bka.gv.at/Dokumente/Justiz/JJR_19690611_

the implicit understanding of the drafters was based on existing conventions at the time, namely that only humans could be arbitrators. “Robot arbitrators” did not exist at the time, nor do they exist today. Hence, methodologically, the NYC presents a hidden and unintended gap in relation to the regulation of fully autonomous, AI-powered arbitrations.

As considered in Parts I and II, fully autonomous AI systems are expected to be operational at some point in the future¹⁰⁵ and might be able to deliver more efficient processes and better quality awards than human arbitrators.¹⁰⁶ The question is thus framed as to whether the NYC is open to a teleological interpretation, which accommodates awards rendered by AI-powered systems. More specifically, consideration of the various legal issues involved raises two key doctrinal problems: (a) whether a decision rendered by an AI-arbitrator could be an “award” under the NYC, and (b) whether public policy considerations under Article V(2)(b) could hinder the cross-border enforcement of such an award.

We argue, from the outset, that the NYC is a living international instrument and can be interpreted teleologically to accommodate such AI-powered systems and awards.

First, in considering the fundamental requirement of an “arbitral award” in Article 1(1),¹⁰⁷ the decision of a national court as to whether a decision brought before it for recognition and enforcement is an arbitral award must be based on a consideration of the object and purpose of the NYC.¹⁰⁸ As the

OGH0002_0030OB00062_6900000_001/JJR_19690611_OGH0002_0030OB00062_6900000_001.html. See ALBERT JAN VAN DEN BERG, *THE NEW YORK ARBITRATION CONVENTION OF 1958*, 251 (1981); Dirk Otto, *Article IV*, in *RECOGNITION AND ENFORCEMENT OF FOREIGN ARBITRAL AWARDS: A GLOBAL COMMENTARY ON THE NEW YORK CONVENTION* 143, 177–78 (Herbert Kronke et al. eds., 2010); Albert Jan van den Berg, *The New York Convention of 1958: An Overview*, in *ENFORCEMENT OF ARBITRATION AGREEMENTS AND INTERNATIONAL ARBITRAL AWARDS: THE NEW YORK CONVENTION IN PRACTICE* 39, 55 (Emmanuel Gaillard et al. eds., 2008).

105. See *supra* Part II.

106. See *supra* Part I.

107. Article 1(1) of the NYC prescribes that it “shall apply to the recognition and enforcement of arbitral awards. . .” New York Convention, *supra* note 6, art. I.

108. BGH, Oct. 8, 1981, III ZR 42/80, https://www.prinz.law/urteile/bgh/III_ZR_42-80-ok (Ger.); Corte Suprema de Justicia [C.S.J.] [Supreme Court], enero 26, 1999, M.P.: J. Gomez, Expediente 7474 (Colom.).

NYC is an international treaty, its interpretation must follow the rules of Articles 31-32 of the 1960 Vienna Convention on the Law of the Treaties (VCLT).¹⁰⁹ Under these articles, emphasis is placed on the “the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose.”¹¹⁰ Identifying the purpose and object of the NYC is a functional exercise. Its purpose is to facilitate cross-border enforcement of arbitral awards between contracting states and to promote international commerce.¹¹¹ A decision is considered to be an “award” under the NYC when it finally¹¹² and bindingly resolves a dispute, either in whole or in part.¹¹³ Hence, if, as discussed in Part II, a decision originating from an AI-powered system performs these functions, interpreting the NYC according to its object and purpose would lead to the conclusion that such a decision is an “award” within the meaning of the NYC.

In addition, under Article I(2) of the NYC, an arbitral award must be made by an arbitrator or by “permanent arbitral bodies to which the parties have submitted.”¹¹⁴ The second prong of this provision was inserted into the NYC at the specific request of the (then-existing) U.S.S.R. and Czechoslovakia.¹¹⁵ There is no indication in the relevant drafting documents that it was inserted as a general exclusion of legal per-

109. Vienna Convention on the Law of Treaties, May 23, 1969, 1155 U.N.T.S. 331.

110. *Id.* at art. 31.

111. INTERNATIONAL COUNCIL FOR COMMERCIAL ARBITRATION, ICCA’S GUIDE TO THE INTERPRETATION OF THE 1958 NEW YORK CONVENTION 14–15 (Pieter Sanders ed., 2011).

112. “The Sixth Circuit’s requirement of a ‘separate independent’ claim is only a necessary, but not by itself sufficient, prerequisite to immediate confirmation of an interim award.” *See Hall Steel Co. v. Metalloyd Ltd.*, 492 F. Supp. 2d 715, 719 (E.D. Mich. 2007).

113. UNCITRAL SECRETARIAT, GUIDE ON THE CONVENTION ON THE RECOGNITION AND ENFORCEMENT OF FOREIGN ARBITRAL AWARDS 14 (Emmanuel Gaillard & George A. Bermann eds., 2017).

114. Article I(2) of the NYC has been interpreted to include also the Iran-US Claims Tribunal, which is located at The Hague in the Netherlands and which was granted jurisdiction over all claims by US nationals against Iran and vice versa, as well as any claims between the respective governments against one another. *See Otto*, *supra* note 104, at 162–63.

115. U.N. SCOR, United Nations Conference on International Commercial Arbitration, 8th mtg. at 6–8, U.N. Doc. E/CONF.26/SR.8 (Sept. 12, 1958).

sons acting as arbitrators within the meaning of the first prong of the test.¹¹⁶ The historical understanding that only humans could be arbitrators must not be considered an *intentional* exclusion of non-human entities as potential “originators” of awards under the NYC. Therefore, if a self-driving corporation, as discussed in part II, is capable of managing an arbitration process and delivering a decision that is final and binding on the parties, the requirements of the NYC, which stem from its purpose and object, would be satisfied. This should be especially true if, as we have discussed in Part II, at some point such AI-powered arbitrators are able to conduct the process more efficiently and with higher levels of quality and hence, with more legitimacy than human arbitrators.¹¹⁷

This interpretation of the NYC is a teleological one, giving due regard to its object and purpose, rather than to the technology available at the time of its adoption. Thus, it treats the NYC as a living instrument able to regulate the needs of commercial relationships in an era more technologically advanced than 1958. Such a “technology adaptive interpretation” of the NYC is not a novel one. For example, Article II(2) of the NYC refers to an exchange of letters or telegrams. In 1958, this was considered the pinnacle of technological progress.¹¹⁸ Such means, particularly telegrams, are now relics of the past, as contracts are often made through emails or other applications of instant communication. In 2006, UNCITRAL issued a recommendation to the effect that Article II(2) of the NYC should be applied “recognizing that the circumstances described therein are not exhaustive,”¹¹⁹ suggesting that the provision does encompass electronic communications. Emails and other instantaneous means of communication serve the function of the formal requirement of writing as set in Article

116. *Id.*

117. See *supra* Section II.C.

118. Reinmar Wolff, *Chapter 7: The UN Convention on the Use of Electronic Communications in International Contracts: An Overlooked Remedy for Outdated Form Provisions under the New York Convention?*, in 60 YEARS OF THE NEW YORK CONVENTION: KEY ISSUES AND FUTURE CHALLENGES 101, 102 (Katia Fach Gomez & Ana M. Lopez-Rodriguez eds., 2019) (discussing that the drafters of the NYC were at the cutting edge when they drafted the provision this way).

119. U.N. GAOR, 61st Sess., U.N. Doc A/61/17, annex II (July 7, 2006).

II(2), that is to ensure a sufficient degree of certainty in concluding arbitration agreements.¹²⁰

Similar to this adaptive and functional interpretation of Article II(2) concerning electronic means of communication, the NYC can be interpreted to accommodate developments in AI technology. Final and binding decisions rendered by AI-powered, self-driving corporations should be considered “arbitral awards” rendered by “arbitrators” within the meaning of the Convention.

Another hurdle for the recognition and enforcement of an award rendered by an AI-powered arbitrator could be the grounds of (non-) enforceability of awards listed in Article V of the NYC. More specifically, we are particularly concerned with potential obstacles arising from the public policy exception of Article V(2)(b) of the NYC. According to this provision, “[r]ecognition and enforcement of an arbitral award may . . . be refused if the competent authority in the country where recognition and enforcement is sought finds that: . . . (b) The recognition or enforcement of the award would be contrary to the public policy of that country.”

Public policy under the NYC refers to domestic conceptions of the enforcement forum.¹²¹ As such, the award of an AI arbitrator could, in principle, be refused enforcement due to alleged violations of public policy of the enforcement forum. In certain forums, such as France, where there is a prescription that the arbitrators should be natural persons,¹²² awards

120. *Proctor v. Schellenberg*, 2002 Man. C.A. 496, 170 Man. R. 2d 154, para. 18 (Can. Man.) (holding that the interpretation should be a functional and pragmatic one).

121. The debate as to whether there is an even narrower notion of international public policy is not affecting the discussion here. Even an international public policy conception would be giving considerable leeway to state courts, especially in relation to fundamental issues, such as the provision of justice. See Margaret L. Moses, *Chapter 11: Public Policy under the New York Convention: National, International, and Transnational*, in 60 YEARS OF THE NEW YORK CONVENTION: KEY ISSUES AND FUTURE CHALLENGES 169, 173 (Katia Fach Gomez & Ana M. Lopez-Rodriguez eds., 2019); see also Guillermo Argerich, María Blanca Noodt Taquela & Juan Jorge, *Could an Arbitral Award Rendered by AI Systems be Recognized or Enforced? Analysis from the Perspective of Public Policy*, KLUWER ARBITRATION BLOG (Feb. 6, 2020), <http://arbitration-blog.kluwerarbitration.com/2020/02/06/could-an-arbitral-award-rendered-by-ai-systems-be-recognized-or-enforced-analysis-from-the-perspective-of-public-policy/> (last visited May 11, 2020).

122. See *infra* Section III.C.1.

originating from AI arbitrators would most likely be found to be contrary to public policy. In other forums, such as England or other Model Law countries, where the requirement of a human arbitrator is only an implicit understanding of the local arbitration provisions,¹²³ the decision would likely be based on arguments regarding the justice rendered or the fairness provided by the AI arbitrator.

As we analyzed in Part II, however, if AI-powered arbitrations become a technical possibility, they are capable of performing the same functions as conventional ones. As such, awards that are generated by AI-powered systems should receive the same degree of scrutiny as awards rendered by humans. A higher bar for AI-powered awards would not be justified. Again, if AI-powered arbitrations become a technical possibility, and if market actors demand such services, it is reasonable to assume that such processes would perform adjudicatory functions more efficiently than human arbitrators and result in awards of higher quality.¹²⁴ Consequently, AI-powered arbitrations and awards would benefit from enhanced legitimacy—the process is equally fair and potentially more efficient than conventional arbitrations, and decisions are more accurate. States seeking to rely on the public policy exception to refuse enforcement would have to explain why such a better and more legitimate outcome is contrary to their fundamental notions of justice and fairness.

In summary, the NYC can be interpreted to accommodate technological developments of the modern era and the recognition and enforcement of awards rendered by fully autonomous, AI-powered arbitrators. If such awards are able to pass the gateway of the NYC, we can expect states to experiment with innovative, technology-driven arbitration processes. We can also expect that market dynamics will prompt states to try such experiments and innovations, hoping to attract “arbitration business.” Thus, such regulatory competition will put pressure on states to exercise caution and restraint in relation to public policy when it comes to the enforcement stage. We investigate these issues in the final part of this article.

123. *Id.*

124. *See supra* Section II.C.

C. *Adapting the Domestic Legal Framework*

Individual states cannot change the NYC, but they can decide whether to adopt the UNCITRAL Model Law with or without changes, whether to copy the arbitration statute of another state, or whether to develop a new arbitration statute from scratch. In all this, states need to weigh different factors, such as the preferences of the target group of arbitration users—the local business community, international clientele, or a more specific group of users from a particular industry (for example, construction or finance)—as well as the transaction costs of new legislation (as affected by the degree of experimentation versus using tested models), the state’s desire to innovate and take risks, etc.

In this section, we investigate the question of whether states should adapt their arbitration laws to accommodate AI-assisted arbitrations or fully autonomous arbitrations. We also investigate regulatory dynamics and regulatory competition. Even though states are free in principle to enact or not to enact specific arbitration legislation, they might be pressured in a certain direction by market forces. States compete for arbitration business, and such competition may push them to innovate and modernize their arbitration laws, making them more technology-friendly and AI-friendly.

1. *Regulatory Experiments*

As we discussed in a previous part, the UNCITRAL Model Law on International Commercial Arbitration has been adopted by 84 States in 116 jurisdictions.¹²⁵ In consequence, it is reasonable to take the Model Law’s provisions as a starting point for an analysis of necessary or desirable adaptations for AI-assisted or AI-powered arbitrations. To the extent that the Model Law can accommodate technology-friendly experimentation by the parties, states need not make changes.

One, if not *the*, defining principle of the Model Law is party autonomy.¹²⁶ Arbitration is private adjudication within the confines established by state law. Within these confines, the parties are free to craft their own process rules and design a process that best fits their dispute resolution preferences.

125. *See supra* Section III.A.

126. ALEX MILLS, PARTY AUTONOMY IN PRIVATE INTERNATIONAL LAW § 6 (2018).

This is expressed in Article 19 of the Model Law as follows: “Subject to the provisions of [the Model Law], the parties are free to agree on the procedure to be followed by the arbitral tribunal in conducting the proceedings.”¹²⁷ The Model Law envisages a process designed according to the needs of the disputing parties. Most of the Model Law’s provisions are enabling in nature. An exception is the due process guarantee enshrined in Article 18: “The parties shall be treated with equality and each party shall be given a full opportunity of presenting his case.”

Against this background, the Model Law’s provisions should be given a broad reading, accommodating the parties’ preferences regarding process design. If the parties opt for an arbitration in which human arbitrators are assisted by AI systems, this should be allowed within the confines of the requirement that parties must be treated with equality and that each party shall be given a full opportunity of presenting its case. Similarly, if parties wish to conduct an AI-powered, fully autonomous arbitration without involvement of a human decision-maker, this should be allowed.

The analysis in the preceding part on the scope of the NYC supports this assessment. We demonstrated that, conceptually and functionally, the NYC is open to accommodating fully autonomous arbitrations.¹²⁸ The Model Law uses terms and concepts also found in the NYC. This is not surprising as the Model Law (1985) is the newer legal text, building on the architecture of the NYC (1958) which was finalized 27 years earlier.

As with the NYC, there is no denying that *historically* the Model Law was conceptualized with human arbitrators in mind. AI had made certain advances since 1958, but in 1985, the neutral third-party decision-maker was still conceived to be human. Even in 2006, when the Model Law was partially amended, there was no mention of anything other than human arbitrators. Article 2(b) defines “Arbitral Tribunal” as “a sole arbitrator or a panel of arbitrators.” Article 11 provides that “[n]o person shall be precluded by reason of his nationality from acting as an arbitrator, unless otherwise agreed by the parties.” Article 12(1) describes the “Grounds for challenge”

127. MODEL LAW, *supra* note 57, at 14.

128. *See supra* Section III.B.

of an arbitrator as follows: “When a person is approached in connection with his possible appointment as an arbitrator, he shall disclose any circumstances likely to give rise to justifiable doubts as to his impartiality or independence.” These provisions do not explicitly speak of “human” arbitrators or “natural” persons. But clearly, this is what the creators of the Model Law had in mind when it was developed. Nothing in the historical documents on the deliberations regarding the Model Law suggests that legal persons, let alone legal persons without human directors, could be “arbitrators.”¹²⁹

However, the Model Law is just that: a model set of legal rules. States are free to explicitly allow AI-assisted and even fully autonomous arbitrations, and if they do so, such proceedings qualify as “arbitrations” within the meaning of the NYC, as we have demonstrated in Section III.B. States are expected to increasingly experiment with legal innovations to facilitate technology-assisted arbitrations. In the Netherlands, the Arbitration Act, which forms part of the Code of Civil Procedure, provides that an arbitral award may be made and signed electronically.¹³⁰ In Italy, deliberations of arbitrators are explicitly allowed to take place via video-conferencing.¹³¹ Similarly, the Swiss Supreme Court has held that arbitrators can conduct deliberations electronically, observing suitable precautionary measures.¹³² In the context of consumer dispute resolution, the European Union (E.U.) established an Online Dispute

129. The preparatory works, especially in relation to Article 11 Model Law (which remained unchanged in 2006) are silent. *See* U.N. GAOR, 40th Sess., U.N. Doc A/40/17 (June 21, 1985). According to the 2012 Digest, only one Spanish case is referred where the court upheld an award based on an arbitration agreement appointing a legal person as arbitrator. A.P., July 29, 2005 (R.J., No. 585/2005) (Spain); Composition of Arbitral Tribunal, UNCITRAL 2012 DIGEST OF CASE LAW ON THE MODEL LAW ON INTERNATIONAL COMMERCIAL ARBITRATION, ch. 3, at 59.

130. Art. 4:1072b para. 3 Rv (Neth.).

131. Article 837 of the Italian Code of Civil Procedure, entitled “Deliberation of the Award,” expressly states: “The award shall be deliberated by a majority of the votes of the arbitrators meeting in personal conference or in video conference, unless the parties have provided otherwise, and shall be subsequently set down in writing.” Art. 837 Codice di procedura civile [C.p.c.] (It.).

132. *See* ARBITRATION IN THE DIGITAL AGE: THE BRAVE NEW WORLD OF ARBITRATION 132 (Maud Piers & Christian Aschauer eds., 2018).

Resolution (ODR) platform in 2016, aimed at providing access to quality dispute resolution tools.¹³³

With regard to the ability of legal persons to act as arbitrators, some states explicitly provide for such possibility. For example, according to Article 871(1) of the Greek Code of Civil Procedure, “One or several persons as well as a court in its entirety may be appointed as arbitrators.” Furthermore, Article 1 of the Iranian Law on International Arbitration, in defining what is considered as arbitration, specifically provides for natural person/s or legal entity/ies being appointable as arbitrators.¹³⁴ Finally, a Spanish court held that accounting firms, as legal entities, can be appointed as arbitrators in accounting disputes.¹³⁵

By contrast, some jurisdictions specifically require the arbitrators to be natural persons. Referring to domestic arbitrations, Article 1450 of the French Civil Code specifically requires that an arbitrator be a natural person, thus prohibiting the use of non-human arbitrators.¹³⁶ Similarly, Article 1023 of the Dutch Code of Civil Procedure provides that “[a]ny natural person of legal capacity may be appointed as arbitrator.” In Scotland, the Scottish Arbitration Act 2010 provides that it is only “an individual [who] may act as an arbitrator”.¹³⁷ Simi-

133. Regulation 524/2013, of the European Parliament and of the Council of 21 May 2013 on Online Dispute Resolution for Consumer Disputes and Amending Regulation 2006/2004 and Directive 2009/22/EC (Regulation on consumer ODR), 2013 O.J. (L 165).

134. Article 1(a) of the Act of 17 Sept. 1997 (International Commercial Arbitration) (Iran). See generally Hamid G. Gharavi, *The 1997 Iranian International Commercial Arbitration Law: The UNCITRAL Model Law à L'Iranienne*, 15 *ARB. INT'L* 85 (1999).

135. A.P., July 29, 2005 (R.J., No. 585/2005) (Spain); BORN, *supra* note 2, at 1745.

136. BORN, *supra* note 2, at 1744–45. As Scherer points out, this is a provision applicable only to domestic arbitrations and not to international ones. Regarding, however, the possibility of allowing non-human arbitrators there is no reason to functionally distinguish between domestic and international arbitrations. See Maxi Scherer, *International Arbitration 3.0 – How Artificial Intelligence Will Change Dispute Resolution*, in *AUSTRIAN YEARBOOK ON INTERNATIONAL ARBITRATION* 503–14 (Christian Klausegger et al. eds., 2019).

137. See Arbitration (Scotland) Act 2010, (ASP 1) sch. 1 (mandatory Rule 3: “Only an individual may act as an arbitrator”; mandatory Rule 4: “An individual is ineligible to act as an arbitrator if the individual is — (a) aged under 16, or (b) an incapable adult (within the meaning of Section 1(6) of the Adults with Incapacity (Scotland) Act 2000 (asp 4)).”).

larly, an English court held in 2015 that, under the Arbitration Act 1996, “Only a natural person, not a legal person or a group of persons such as a firm, can be an arbitrator.”¹³⁸ However, despite this ruling, the wording of the Arbitration Act 1996 does appear to be open to a purposive interpretation, which would include non-human arbitrators. For example, in *Dubai Islamic Bank PJSC v. Paymentech Merchant Services Inc.*,¹³⁹ neither of the parties considered that arbitration by a committee or by a board of directors was invalid under English law. While this authority is certainly not directly on the question of the availability of non-human arbitrators under the Act, it shows that English courts and parties are ready to accept pragmatic solutions in accommodating the parties’ needs and the circumstances of the case.

In contrast to the jurisdictions that either explicitly allow or disallow non-human arbitrators, most jurisdictions worldwide are silent on the matter. However, they are based, like the NYC and the Model Law, on the *implicit* understanding that arbitrators must be humans rather than any other entity. However, this is not to suggest immediate exclusion of an entity as an arbitrator. Rather, as argued above, this was a lacuna based on the technical feasibilities available to the drafters of such arbitration laws during the 20th century. For example, the use of human-associated pronouns such as “he/she” or “his/her” in the UNCITRAL Model Law,¹⁴⁰ the English Arbitration Act 1996,¹⁴¹ or Section 1036(1) of the German Code of Civil Pro-

138. *Crowther & Anor v. Rayment & Anor* [2015] EWHC (Ch) 427, [2015] Bus LR 690 [30]; see also MICHAEL J. MUSTILL, SIR. & STEWART C. BOYD, *THE LAW AND PRACTICE OF COMMERCIAL ARBITRATION IN ENGLAND* 247 (2d ed. 1989) (“The person appointed as arbitrator must be a natural person. A limited company, possessing only corporate personality, cannot validly be appointed. Nor can a group of people, such as a partnership firm, be nominated to act as an arbitrator.”).

139. *Dubai Islamic Bank PJSC v. Paymentech Merch. Servs. Inc.* [2000] EWHC (Comm) 288 (Eng.).

140. For example, Article 12 provides that “When a person is approached in connection with his possible appointment as an arbitrator, he shall disclose any circumstances likely to give rise to justifiable doubts as to his impartiality or independence. [. . .].” MODEL LAW, *supra* note 57, at 7.

141. For example, Section 26(1) of the Act, however, provides that “[t]he authority of an arbitrator is personal and ceases on his death.” English Arbitration Act 1996, c. 23, § 26(1) (UK). This section has been interpreted by some, like Mustill and Boyd in the previous decade, as indicative of an underlying assumption that the arbitrator is assumed to be a natural person.

cedure¹⁴² does not automatically rule out legal entities acting as arbitrators. Both the NYC and the UNCITRAL Model Law are living documents, which have been and must be interpreted functionally to accommodate new technological developments.

However, to date and to the best of our knowledge, there is no jurisdiction worldwide which explicitly allows a legal person without human directors to run an arbitration or an unincorporated AI system to do this. Given the current state of technical possibilities, which we investigated in a previous section, this is not surprising.¹⁴³ But AI systems for arbitrations are being developed at an accelerating pace. States may be forced to modernize their arbitration laws under the influence of regulatory competition, as discussed below.

2. *Regulatory Competition*

Regulatory competition between jurisdictions in various fields of the law is a well-known and extensively researched phenomenon. The most conspicuous example is probably Delaware's dominance of the "market for corporate charters" in the U.S.¹⁴⁴ Various segments of the law market have been studied in detail both empirically and normatively, especially in the U.S. and in the E.U.¹⁴⁵

MUSTILL & BOYD, *supra* note 138. However, other scholars, such as Merkin and Flannery in their most recent commentary, explicitly mention that this provision would not be applicable to non-human arbitrators. See ROBERT MERKIN & LOUIS FLANNERY, MERKIN AND FLANNERY ON THE ARBITRATION ACT 1996 at 310 (6th ed. 2020).

142. Section 1036(1) reads as follows: "A person asked to serve as an arbitral judge is to disclose any and all circumstances that might give rise to doubts as to his impartiality. An arbitral judge is under obligation to disclose such circumstances to the parties without undue delay, also after his appointment and until the close of the arbitration proceedings, if he has failed to so inform them previously." Zivilprozessordnung [ZPO] [Code of Civil Procedure], § 1036, para. 1, https://www.gesetze-im-internet.de/englisch_zpo/ (Ger.).

143. See *supra* Part I.

144. For a recent account, see, for example, Marcel Kahan, *The State of State Competition for Incorporations*, in THE OXFORD HANDBOOK OF CORPORATE LAW AND GOVERNANCE 105 (Jeffrey N. Gordon & Wolf-Georg Ringe eds., 2018).

145. For an overview, see ERIN A. O'HARA & LARRY E. RIBSTEIN, THE LAW MARKET (2009); Horst Eidenmüller, *The Transnational Law Market, Regulatory Competition, and Transnational Corporations*, 18 IND. J. GLOB. LEGAL STUD. 707

Regulatory competition is a defining characteristic of the market for international commercial arbitrations.¹⁴⁶ Such arbitrations are big business, in particular for the law firms involved and the arbitral institutions handling the administration of the arbitration (most international commercial arbitrations are so-called institutional arbitrations¹⁴⁷).¹⁴⁸ Hence, states attempt to attract international commercial arbitrations.¹⁴⁹ The key connecting factor is the seat of the arbitration, which defines the jurisdiction in which the award is made for the purposes of Article I(1) of the NYC.

Competition in the international commercial arbitration market is likely a “race to the top”—in terms of both the efficiency and quality of the arbitration process—rather than a “race to the bottom.” This is because parties cannot be forced to arbitrate a case. An arbitration is based on party autonomy and consent. Its basis is the agreement to arbitrate (arbitration agreement) between the parties. Parties to such an agreement are usually sophisticated and well-represented commercial actors who know what they are doing.¹⁵⁰ Consequentially, *inter*

(2011); JOHANNA STARK, *LAW FOR SALE: A PHILOSOPHICAL CRITIQUE OF REGULATORY COMPETITION* (2019).

146. See Catherine Rogers, *Is International Arbitration in a Race to the Top?*, KLUWER ARB. BLOG (Mar. 15, 2018), <http://arbitrationblog.kluwerarbitration.com/2018/03/15/is-international-arbitration-in-a-race-to-the-top/>.

147. For example, out of the London Court of International Arbitration’s 285 new cases in 2017, 52 were ad hoc. See James Clanchy, *Arbitration Statistics: A Reality Check*, LEXISNEXIS BLOGS (July 26, 2018), <https://www.lexisnexis.co.uk/blog/dispute-resolution/arbitration-statistics-a-reality-check>.

148. “The aggregate value of all pending disputes before the ICC Court of Arbitration at the end of 2018 was US\$ 203 billion, with an average value of \$131 million and a median value of US\$ 10 million.” *ICC Arbitration Figures Reveal New Record for Awards in 2018*, INT’L CHAMBER OF COM. (June 11, 2019), <https://iccwbo.org/media-wall/news-speeches/icc-arbitration-figures-reveal-new-record-cases-awards-2018/>.

149. See, e.g., Eidenmüller, *supra* note 4; Jason Fry, *Arbitration and Promotion of Economic Growth and Investment*, 13 EUR. J. L. REFORM 391 (2011); Daniel Berkowitz et al., *Legal Institutions and International Trade Flows*, 26 MICH. J. INT’L L. 163 (2004).

150. Consumer arbitrations are a different story. Safeguards are needed to prevent consumers being “dragged” into arbitrations by businesses in their “General Terms and Conditions” (GTCs) if consumers thereby lose the procedural protections available to them before the state courts, notably being no longer able to bring a class action suit. See Christopher R. Drahozal & Raymond J. Friel, *Consumer Arbitration in the European Union and the United States*, 28 N.C. J. INT’L L. & COM. REG. 357 (2002); David Horton & Andrea

partes there is little (if any) reason to believe that arbitration agreements are not welfare-maximizing.

The key issue of concern with respect to regulatory competition is potential externalities. States offering laws in the international law market and parties choosing them may know what they are doing. But these choices can negatively affect third parties who are not parties to a transaction. A good example is forum shopping by a financially distressed firm. Some creditors and debtors might benefit from such a move. However, other creditors, who cannot or do not influence the move, might face a new insolvency regime which puts them in a worse position than the one they would have been in had forum shopping not occurred.¹⁵¹

Fortunately, with respect to arbitration agreements and arbitrations, such negative externalities do not exist. Those affected by the consequences of parties opting for arbitration to settle a dispute in a particular state are the parties choosing to arbitrate and only these parties. By opting into a specific arbitration framework, the parties can influence only their own welfare and not the welfare of third parties. Even if one would fear that certain externalities could still occur—for example, if the parties decide to arbitrate an antitrust matter or a dispute in which bribery may be a factor—the applicable arbitration framework contains safeguards which force the parties to internalize such consequences. In particular, according to Article V of the NYC, recognition and enforcement of an arbitral award may be refused if it would be contrary to public policy in the country in which such recognition and enforcement is sought.¹⁵² This prevents extreme innovations (with respect to AI-assisted or fully AI-powered arbitrations) from becoming established in the arbitration community. If there is a serious risk that an award would not be recognized/enforced in other countries, states will think twice before enacting innovative but highly contentious arbitration laws.

Cann Chandrasekher, *After the Revolution: An Empirical Study of Consumer Arbitration*, 104 GEO. L.J. 57 (2015).

151. See, e.g., LYNN M. LOPUCKI, *COURTING FAILURE: HOW COMPETITION FOR BIG CASES IS CORRUPTING THE BANKRUPTCY COURTS* (Univ. of Mich. Press 2006); Horst Eidenmüller, *Free Choice in International Company Insolvency Law in Europe*, 6 EUR. BUS. ORG. REV. 424, 435-436 (2005).

152. See New York Convention, *supra* note 6, art. V(2)(b).

Within the constraints of the public policy exception just described, and subject to other grounds for refusing recognition/enforcement specified in the NYC,¹⁵³ an arbitral award rendered in one state is a highly valuable international “currency.” Consequently, states have strong incentives to modernize their arbitration frameworks in the light of new technological developments, making them as user-friendly, efficient, and qualitatively appealing as possible. This includes allowing AI-tools to assist human arbitrators and, at some point in the future, fully autonomous arbitrations administered by AI. If fully AI-powered arbitrations are capable to deliver better (fairer, more predictable, less costly) results than human arbitrators, disputing parties will surely want to make use of this superior service, and states should allow them to do so.

Regulatory competition will also put pressure on states to exercise caution when applying the public policy exception under the NYC during the enforcement stage in relation to an AI-powered arbitral award. States who acquire a reputation of being unwelcoming with respect to new technologies (by exercising broad discretion to refuse recognition/enforcement of AI-powered awards) will fall behind in the competition for attracting arbitrations to their jurisdictions. A state cannot have it both ways: attracting technologically-driven arbitrations and exercising broad discretion when “policing” foreign, AI-powered awards.

Given the high economic stakes in the international commercial arbitration market, states might allow fully autonomous arbitrations sooner rather than later. A state which has not yet been able to capture a sizable share of the commercial arbitration market has a strong incentive to take a significant leap into the technological modernity, attempting to establish a reputation for innovation and user-friendliness. Hence, we can expect that whatever turns out to be technologically feasible and sensible will be reflected in the arbitration laws of first-mover states who wish to attract more arbitration business. For reasons already discussed, common law jurisdictions probably will have an advantage in the competition for arbitration cases.¹⁵⁴

153. *See id.* art. V.

154. *See supra* Section II.B.

3. *Moving Forward*

What steps might we see by states who are cautious about becoming radical innovators in the field of technology-assisted or technology-driven arbitrations, but who nevertheless wish to modernize their domestic framework so that they are well-prepared should a technological breakthrough occur? Such states will be reluctant to allow arbitrations by legal entities without human oversight. Nevertheless, there are at least two avenues of reform that could be safely pursued.

First, states should generally review their arbitration laws for unnecessary mandatory elements. As discussed, private autonomy and freedom of contract are the backbone of arbitration.¹⁵⁵ Arbitration laws should be enabling, rather than mandatory, unless compelling reasons suggest otherwise. The right to be treated equally and to present one's case are such compelling reasons. But when it comes to more practical procedural rules, party autonomy should reign. For example, a jurisdiction should not mandate that hearings must be attended in person or that witnesses have to testify in person. If this were required, many hearings or forms of evidence-taking could not take place under a variety of circumstances, such as under quarantine regulations imposed on travelers in the context of the COVID-19 pandemic.

Second, states should seek to assist the labelling of legal data in order to improve the development of machine learning tools for arbitrations. Such tools currently (and in the foreseeable future will continue to) dominate the market of AI applications for arbitrations. Court judgments should be made easily and freely accessible, including in the English language (the *lingua franca* of international commerce). Arbitral institutions should publish their decisions, at least in an anonymized form. Furthermore, tribunals should also publish awards in an anonymized form, at least as a default.¹⁵⁶ Clearly there is a tension between the preference of most commercial actors for confidentiality on the one hand and access to technology-

155. *See supra* Section III.C.1.

156. The ICC is moving in this direction. *See ICC, Note to Parties and Arbitral Tribunals on the Conduct of the Arbitration under the ICC Rules of Arbitration* ¶¶ 40–46 (Jan. 1, 2019), <https://iccwbo.org/content/uploads/sites/3/2017/03/icc-note-to-parties-and-arbitral-tribunals-on-the-conduct-of-arbitration.pdf>.

friendly arbitration laws on the other. In a sense, reduced or lifted confidentiality can be conceived as the price that disputing parties may have to pay for a better service.

CONCLUSION

For a long time, arbitration has been the preferred mode of dispute resolution for international businesses. For example, if the court system in a particular jurisdiction is not working well or if the parties cannot agree to submit to the courts of a jurisdiction for fear of home-state bias, arbitration is the preferred mode of dispute resolution—at least if mediation or conciliation does not lead to a settlement.

Arbitration has the image of an old-fashioned and secretive process—self-styled gentlemen meeting in fancy locations to hear arguments over complex cases after truckloads of documents have been exchanged. The process is not necessarily faster than court proceedings and is often more expensive. Nonetheless, parties like its confidentiality and the quality of service by the private judges (arbitrators) whom they can select.

But the world of arbitration is changing, as is legal practice generally. AI applications based on machine learning (especially supervised learning) that can assist arbitrators in performing their functions are now available. At some point in the future, it will become possible to conduct an arbitration entirely without human involvement via AI-powered arbitrator systems.

But would this still be an arbitration? Does an arbitration require human arbitrators, or can it be conducted entirely by (artificially intelligent) machines? More specifically, can machines run a legitimate and fair arbitration process? Can they render a binding decision that qualifies as an arbitral award? If and to the extent that arbitrators' functions are substituted by AI applications, these questions must be answered.

This requires us to analyze the "Anatomy of an Arbitration." What are, functionally, its constitutive elements? What is, functionally, the task of an arbitrator? Reduced to its defining functional characteristics, an arbitration is a dispute resolution process that is managed by an independent/impartial third party that renders a final and binding award. Functionally, this task can be performed by an AI application that man-

ages an incorporated arbitration business without human input. The limits to this happening in practice are technological and legal, not conceptual.

We have shown that the legal framework for international commercial arbitrations, notably the New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards (NYC) and the UNCITRAL Model Law on International Commercial Arbitrations, is capable of accommodating AI-driven technological advances in the practice of arbitration. More specifically, we have demonstrated that fully AI-generated arbitral awards are awards within the meaning of the NYC, enjoying the status of a strong international “legal currency.”

In principle, states worldwide are free to define the degree of openness to new technologies in general and AI applications in particular with regard to their arbitration statutes. However, in practice, regulatory competition will affect the degree of freedom that states enjoy. International commercial arbitrations are big business. States compete with each other to attract arbitrations to their jurisdictions. If available AI applications are capable of delivering more efficient and qualitatively better arbitration processes and awards than human arbitrators, we should expect arbitration users to demand such services and states to supply the necessary legal infrastructure in order to capture (or avoid losing) market shares. We expect common law jurisdictions to have an edge in this competition over civil law jurisdictions as supervised learning applications require a lot of carefully labelled training data. In the context of a legal process, this means coded decisions, which are more easily available in common law jurisdictions.

States that do not wish to compete vigorously in the new market for technology-assisted or technology-driven arbitrations will nevertheless want to review their arbitration statutes and domestic legal systems generally to prepare themselves for more radical change should this be required by market developments. This implies making arbitration laws enabling rather than mandatory unless compelling reasons require otherwise. Furthermore, it supports easing the coding of arbitration-related decisions and regulations and arbitral awards by making them public and easily accessible.