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Artificial intelligence and global trade governance: A pluralist agenda

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Artificial Intelligence and Global Trade Governance: A Pluralist Agenda

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This Article is the first of its kind to map out imminent challenges facing the World Trade Organization (WTO) against the emergence of artificial intelligence. It does so by examining critically AI's normative implications for four issue areas—robot lawyers, automated driving systems, computer-generated works, and automated decision-making processes. By unpacking the diverse governance approaches taken in addressing these issues, this Article highlights the underlying economic, societal, cultural, and political interests in different jurisdictions and identifies the growing normative relevance of global legal pluralism. In light of the changing fabric of international law, this Article seeks to reconceptualize AI and global trade governance by offering three recommendations and two caveats. First, more institutional flexibility within the WTO is essential to allow for rigorous and dynamic cross-sectoral dialogue and cooperation. Less focus should be laid on the specificity and predictability of rules, but on their adaptability and optimal design. Second, while we acknowledge that the human rights-based approach to AI governance offers a promising baseline for many, it is crucial to point out that the global trading system should be more deferential to local values and cultural contexts in addressing AI-related issues. One must exercise greater caution and refrain from pushing strong harmonization initiatives. The third recommendation highlights incrementalism, minilateralism, and experimentalism. We propose that the global trading system should accommodate and encourage emerging governance initiatives of AI and trade governance. Two crucial caveats, however, should be noted. For one, we must bear in mind the "pacing problem" faced by law and the society in keeping up with rapid technological development. For another, the changing power dynamic and interest groups landscape in the age of AI cannot be neglected. In contrast to the conventional power dynamics in international law, states with stronger technology and more quality data will likely dominate, and one may envisage a new North-South divide reshaping the international economic order.

I. INTRODUCTION

The rapid technological development of computing power, advances in algorithms, and the availability of vast amounts of data have together reanimated "artificial intelligence" (AI)—a term coined by John McCarthy and his collaborators in 1955 yet left dormant for half a century—which not only promises a new wave of industrial revolution but also to generate sig-

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nificant social, economic, and political ramifications.[1] Today, AI is no longer a mere expression in science fiction. Rather, it has emerged as an enabling technology that holds the power to reshape the real world we live in, with self-driving cars,[2] digital assistants,[3] robo-advisors,[4] and automated legal practices,[5] just to name a few. Soon, we shall see AI's transformative impacts on the world economy.[6] According to McKinsey, by 2030, AI could create additional global economic activity of around US $13 trillion.[7] Another macroeconomic study by Accenture further indicates that 12 developed countries are expected to greatly increase their annual economic growth rate by 2035 because of AI.[8] Other sources also suggest that AI could facilitate international trade and improve economic efficiency in numerous ways.[9]

As promising as it may be, AI does present unprecedented challenges in terms of scale and complexity, which have, or are about to, trigger diverse domestic regulatory responses across continents.[10] Various regulatory approaches underpinned by different local values and public morals in different societies are likely to emerge and create trade frictions not envisaged by the drafters of many of today's international trade agreements.[11] While a handful of tech giants, mostly in the developed countries, control big data and

1. John McCarthy et al., *A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence: August 31, 1955,* AI MAG., Winter 2006, at 12 (reproducing the proposal). According to the International Telecommunication Union ("ITU"), much of AI's progress has been driven by three major factors: improvements in computing power and capacity, an explosion of data, and progress in algorithms. INTERNATIONAL TELECOMMUNICATION UNION, ASSESSING THE ECONOMIC IMPACT OF ARTIFICIAL INTELLIGENCE 1–2 (2018).

2. *See, e.g.*, Stephen McBride, *The Driverless Car Revolution Has Begun—Here's How to Profit*, FORBES (Sept. 6, 2018, 10:08 AM), https://perma.cc/2CRT-VN7Y.

3. *See, e.g.*, Olivia Solon, *Google's Robot Assistant Now Makes Eerily Lifelike Phone Calls for You*, THE GUARDIAN (May 9, 2018), https://perma.cc/B467-2GPZ.

4. *See, e.g.*, Tara Siegel Bernard, *Robots Can Manage Your Money. But Even They Need Humans*, N.Y. TIMES (Sept. 7, 2018), https://perma.cc/86WB-W6X9.

5. *See generally* CLIFFORD CHANCE, ARTIFICIAL INTELLIGENCE AND THE FUTURE FOR LEGAL SERVICES (2017), https://perma.cc/WSP9-339W (discussing how AI is currently transforming the market for legal services).

6. *See, e.g.*, RICHARD BALDWIN, THE GLOBOTICS UPHEAVAL: GLOBALIZATION, ROBOTICS, AND THE FUTURE OF WORK 13 (2019).

7. Jacques Bughin et al., *Notes from the AI frontier: Modeling the Impact of AI on the World Economy*, MCKINSEY GLOB. INST. (Sept. 2018), https://perma.cc/6ZFR-2LRT.

8. These countries include Austria, Belgium, France, Finland, Germany, Japan, Italy, the Netherlands, Spain, Sweden, and the U.S. and U.K. *Artificial Intelligence is the Future of Growth,* ACCENTURE, https://perma.cc/BWK2-69Z5 (last visited Aug. 15, 2019).

9. Erik Brynjolfsson et al., *Does Machine Translation Affect International Trade? Evidence from a Large Digital Platform* (Nat'l Bureau of Econ. Research, Working Paper No. 24917, 2018), https://perma.cc/F3GY-PS89.

10. The trolley problem is a prime example. Countries—even different groups of people within the same country or community—may not share the same view as to how to manage a runaway vehicle equipped with an automated driving system. *See infra* Section III.B.

11. *See, e.g.*, USMAN AHMED & ANUPAM CHANDER, INFORMATION GOES GLOBAL: PROTECTING PRIVACY, SECURITY, AND THE NEW ECONOMY IN A WORLD OF CROSS-BORDER DATA FLOWS 3 (The E15 Initiative, Int'l Centre for Trade and Sus. Dev. and World Econ. Forum, 2015), https://perma.cc/XC5U-9KH3 ("When the WTO came into being in 1995, the Internet was in its relative infancy as a global communication platform.").

advanced algorithms,[12] the adoption of these technologies has been gradually diffused to the rest of the world via cross-border business activities, online or offline.[13] The resulting distribution of wealth and power is not only reshaping the interplay between different social classes within a nation, but putting into question our trust—trust in governments, trust among states, and furthermore, trust in our rules-based international economic order.

The emergence of AI poses formidable challenges to the configuration and reconfiguration of global trade governance. However, despite a growing literature in both international law and global governance exploring AI's challenges,[14] scant attention has been devoted to these questions from the standpoint of international trade law. This is where this Article kicks in. By virtue of a detailed analytical framework to address these questions, this Article seeks to make several claims. First, AI is not a science fiction term, nor has it reached its tipping point.[15] As AI's potential continues to be unleashed, critical challenges have surfaced for policymakers at both the domestic and international levels. While AI often interacts with cyberspace and shares some similarities with the Internet, its unique features have posed new challenges that many trade lawyers have never seen.[16] Some governments have showcased their adaptability to the shifting socio-techno landscape, while others find it difficult to capture such a moving target.[17] This Article argues that multi-speed developments across countries to react to

12. Vince Cable, *The Tech Titans Must Have Their Monopoly Broken—and This Is How We Do*, GUARDIAN (Apr. 20, 2018), https://perma.cc/Q5PW-NZP4.

13. *See, e.g.*, Ai Lei Tao, *Indonesia Leads ASEAN Region in AI Adoption*, COMPUTER WEEKLY (July 12, 2018), https://perma.cc/8C38-XAXD (reporting that "Indonesia is leading the ASEAN region in adopting artificial intelligence. . . ."). According to McKinsey Global Institute, however, developing countries have other ways to improve their productivity, and may "have less incentives to push for AI (which, in any case, may offer them a relatively smaller economic benefit than it does advanced economies)." *See* Bughin et al., *supra* note 7, at 3.

14. *See, e.g.*, Eyal Benvenisti, *Upholding Democracy Amid the Challenges of New Technology: What Role for the Law of Global Governance?*, 29 EUR. J. INT'L L. 9 (2018) (contending that tech companies wield their normative power and act as governors while voicing his concerns about the legitimacy and accountability issues); *see also* Lorna McGregor, *Accountability for Governance Choices in Artificial Intelligence: Afterword to Eyal Benvenisti's Foreword*, 29 EUR. J. INT'L L. 1079 (2018) (arguing that the focus should not be only technology-led. Rather, what really matters are the governance choices made by actors to employ technologies in the decision-making process and how to subject them to transparent and open "bidirectional communication.").

15. *See, e.g.*, Naveen Joshi, *How Far Are We from Achieving Artificial General Intelligence?*, FORBES (June 10, 2019), https://perma.cc/V99W-8VRN ("Although it might be theoretically possible to replicate the functioning of a human brain, it is not practicable as of now. . .A survey of AI experts recently predicted the expected emergence of AGI or the singularity by the year 2060.").

16. *See, e.g.*, Daniel J. Gervais, *Exploring the Interfaces Between Big Data and Intellectual Property Law*, J. INTELL. PROP., INFO. TECH. & ELECTRONIC COM. L. (2019) (discussing the emerging ramifications of big data for the TRIPs/WTO regime).

17. According to one survey complied by Algorithm Watch, for instance, there is a growing interest for governments and private sectors to engage AI governance. Yet, many of these efforts would still come out of the developed world, with China being the most active player in the camp of developing countries. *See AI Ethics Guidelines Global Inventory*, ALGORITHM WATCH, https://perma.cc/F9E7-C2KQ (last visited Jan. 21, 2020).

AI's ramifications are emerging. Such variations reflect, on the one hand, a country's institutional capacity and resources to manage the notoriously difficult "pacing problem"—technological development evolves faster than the policymakers' ability to keep up,[18] and on the other, the power struggles among interest groups to even out redistributive effects while a society reorients itself towards automation.[19] To add further complexity, these divergent models can be the deepest manifestation of cultures and moralities that go beyond instrumental concerns.[20] Such dynamics lead us to argue that a new wave of global legal pluralism is on the horizon while countries embrace the mixed opportunities along the way.

All of these points prompt us to reflect upon the institutional resilience of the global trading system as it stands today—what is, in particular, the proper role of international trade law in tackling trade conflicts arising from these diversities? In building a new agenda to manage these challenges, this Article advocates a more deferential, non-interventionist approach towards local values and cultural contexts that focuses more on institutional legitimacy and flexibility and refrains from strong harmonization. In particular, several broader points are of importance.

First, despite the emerging diversities, several governance sites that can arguably shape or least affect how governments will regulate AI are already in the making. In some areas, certain forerunner countries, notably, the US, China, and the European Union (EU) have attempted to govern AI and other disruptive technologies.[21] For latecomers—these new solutions may serve as a boilerplate for them to adopt, in whole or part, via legal transplant, regulatory competition or otherwise. In others, governments have begun to reach out to their counterparts to update the existing framework—be it loosely organized trans-governmental networks or treaty-based mecha-

18. Gary E. Marchant, *The Growing Gap Between Emerging Technologies and the Law*, *in* THE GROWING GAP BETWEEN EMERGING TECHNOLOGIES AND LEGAL-ETHICAL OVERSIGHT: THE PACING PROBLEM, 23 (Gary E. Marchant et al., eds., 2011) (coining the term "pacing problem"); *see also* Lyria Bennett Moses & Monika Zalnieriute, *Law and Technology in the Dimension of Time*, *in* TIME, LAW AND CHANGE: AN INTERDISCIPLINARY STUDY (Sofia Ranchordas & Yaniv Roznai eds., forthcoming, 2020) (unpacking the relationship between law and technology in the dimension of time and arguing the so-called "pacing problem" can happen when a technology or design-based technical fix fails to keep up with social and legal change).

19. *See, e.g.*, CARL BENEDIKT FREY, THE TECHNOLOGY TRAP: CAPITAL, LABOR, AND POWER IN THE AGE OF AUTOMATION 318 (2019) (observing from a historical perspective informed by the Industrial Revolution and assessing how automation will similarly divide between the winners and losers and result in considerable social costs); *see also* Anton Korinek & Joseph E. Stiglitz, *Artificial Intelligence and Its Implications for Income Distribution and Unemployment* (Nat'l Bureau of Econ. Research, Working Paper No. 24174, 2017), https://perma.cc/647E-5GMU.

20. This is especially true in the case of public morals. *See* discussion in *infra* Section III.B.

21. DANIEL CASTRO, MICHAEL MCLAUGHLIN & ELINE CHIVOT, WHO IS WINNING THE AI RACE: CHINA, THE EU OR THE UNITED STATES? 2 (Aug. 2019) (noting that these three have emerged as the main competitors for global leadership in AI and that overall, the U.S. currently takes the lead with China rapidly catching up and the EU behind both).

nisms.[22] Further, various industry stakeholders have also engaged one another or even teamed up with regulatory agencies to coordinate their activities.[23] These efforts may arguably result in a confluence between different regulatory approaches through dynamic interactions with multiple governance sites, thereby moderating trade concerns. Admittedly, even with such a confluence, one may still expect some level of regulatory diversity. The remaining variations are inevitable; they reflect different political, cultural, religious, and spiritual traditions. When acting on AI's developments to reconfigure the norms by virtue of negotiation and adjudication, a more cautious tone is warranted when it comes to harmonization and using relevant international standards to address clashes.[24] To be clear, our point is not to reject the role of regulatory cooperation to facilitate trade. Instead, this Article advocates for the proposition that regulatory cooperation can and should be done in a softer, less intrusive way to allow countries to search for an optimal regulatory model that better suits their local needs when exploring the unknown terrain created by AI developments.

Some caveats are in order before we proceed. This Article does not intend to exhaust all of AI's normative implications; nor does it seek to advocate for a particular set of new global norms for the WTO—the focal point of this Article—at this stage.[25] This Article does however intend to present a narrative about emerging challenges to the institutional resilience of the interna-

22. For the former, the rise of the sandbox approach to Fintech is a prime example where a growing number of governments have cooperated with each other through bilateral memorandum of understanding and/or the Global Financial Innovation Network (GFIN). For the latter, the efforts to update the 1968 Vienna Convention on Road Traffic is an example in point. On the normative diffusion of sandbox approach, see Chang-Hsien Tsai, Ching-Fu Lin & Han-Wei Liu, *The Diffusion of the Sandbox Approach to Disruptive Innovation and Its Limitation*, 53 CORNELL INT'L L. J. (forthcoming 2020), https://perma.cc/B6DA-XFT7; *UNECE Paves the Way for Automated Driving by Updating UN International Convention*, UNECE (Mar. 23, 2016), https://perma.cc/CC6A-QY97; *see also infra* note 200 and its accompanying text.

23. For example, Standards Australia, a non-governmental organization, recently published a Discussion Paper regarding potential industry self-regulation through AI Standards and requesting input from industrial stakeholders for this process. The Paper also discusses the AI Principles published by Google and Microsoft, which share technical recommendations with wider AI ecosystems. *See* STANDARDS AUSTRALIA, DEVELOPING STANDARDS FOR ARTIFICIAL INTELLIGENCE: HEARING AUSTRALIA'S VOICE (2019) https://perma.cc/VK62-BSQ3.

24. By requiring the WTO Members to base their technical regulations on international standards, for instance, Article 2.4 of the Agreement on Technical Barriers to Trade (TBT) can convert voluntary international standards to binding treaty obligations. As TBT can arguably create normativity to international standards often driven by private or public-private organizations from outside of the WTO, legitimacy and accountability are of paramount significance. This is particularly so in the context of AI. We will return to the role of harmonization and a State's duty to cooperate in Section IV.B. For a discussion of TBT Article 2.4, see, e.g., Robert Howse, *A New Device for Creating International Legal Normativity: The WTO Technical Barriers to Trade Agreement and 'International Standards'*, *in* CONSTITUTIONALISM, MULTILEVEL TRADE GOVERNANCE AND SOCIAL REGULATION 383, 383–84 (Christian Joerges & Ernst-Ulrich Petersmann eds, 2006); Agreement on Technical Barriers to Trade, Jan. 1, 1995, 1868 U.N.T.S. 120 [hereinafter TBT Agreement]; Marrakesh Agreement Establishing the World Trade Organization, Apr. 15, 1994, 1867 U.N.T.S. 154.

25. Although we will also consider, whenever relevant, other bilateral, regional, or mega-regional free trade agreements, the WTO remains the major focus of this analysis.

tional trade system and seeks to map the major agenda items for academics, negotiators, and practitioners alike by critically assessing four major issue areas that are riper for discussion. Of course, these selected issues are only illustrative and by no means capture the entire complexity and richness of AI's challenges facing the global trading system.[26]

With this in mind, the rest of this Article proceeds as follows. Part II begins by clarifying the notion of AI from both technical and normative perspectives. These terminologies are the building blocks for any constructive dialogue among policymakers. To appreciate why we should be concerned about AI's normative implications for the global trading system, one must understand how AI distinguishes itself from others—in particular, digital technologies. In Part III, we map out AI's essential characteristics along technical, social and economic dimensions in our selection of case studies to illustrate AI's potential impacts on the existing WTO framework. We consider four issue areas that not only feature such characteristics, but also are riper to engage in in-depth analysis. These areas include blurred boundaries between services and goods in classifying AI such as robot law-

26. Among others, personal data protection, the linkage between data and competition, and data "propertization" have emerged as critical challenges facing domestic regulators. The way in which each government designs its regulatory framework and enforces it might raise trade concerns. In the realm of personal data protection, for instance, an increasing number of countries have adopted measures to restrict cross-border data flow. Some of these countries, notably, China, have adopted "data localization" measures by forcing local data storage. Such measures have raised concerns in the WTO. In one of the recent meetings of the Council for Trade in Services (CTS), for instance, the U.S. has questioned China's Cybersecurity Law and various implementing measures that could have a "significant adverse effect on trade in services." Council for Trade in Services, *Report of the Meeting Held on 7 December 2018: Note by the Secretariat*, WTO Doc. S/C/M/137 (Jan. 24, 2019). Interestingly though, the U.S. was also under attack for the ramifications of its CLOUD Act for cross-border information flow. Beyond data protection, big data has emerged on the radar of many antitrust agencies. For instance, the European Commission has considered big data aspects in assessing merger control. More recently, the Australian government has followed the footsteps of the "Open Banking" initiatives in the EU and UK by adopting the so-called "Consumer Data Right" (CDR) regime—with the banking industry being one of its first designated sectors. The CDR, managed through the Australian Competition and Consumer Commission, enables greater transferability of consumer data from one data holder to another and is seen as a tool to reinvigorate its competition policy. From data portability under GDPR, Open Banking, to CDR, these regulatory initiatives indicate the trend towards a greater mobility of personal data, which in turn leads some scholars to reflect upon the possibility of propertizing data as an alternative model to data protection. Some also consider the role of EU Database Directive to explore data ownership through copyright or the "sui generis" database right. Some of the aforementioned issues have been addressed in the mega-regional context. Notably, Article 14.13 of CPTPP requires that "No Party shall require a covered person to use or locate computing facilities in that Party's territory as a condition for conducting business in that territory." Comprehensive and Progressive Agreement for Trans-Pacific Partnership (entered into force on Dec. 30, 2018) [hereinafter CPTPP], art. 14.13. For discussion about data localization in the WTO context, see, e.g., Council for Trade in Services, *Report of the Meeting Held on 7 December 2018: Note by the Secretariat*, WTO Doc. S/C/M/137 (Jan. 24, 2019). For a legal analysis of data localization under the international economic law, see, e.g., Shin-Yí Peng & Han-Wei Liu, *The Legality of Data Residency Requirements: How Can the Trans-Pacific Partnership Help?*, 51 J. WORLD TRADE 183 (2017); Andrew Mitchell & Jarrod Hepburn, *Don't Fence Me In: Reforming Trade and Investment Law to Better Facilitate Cross-Border Data Transfer*, 19 YALE J.L. & TECH. 182 (2017). For big data in the EU competition law context, see, e.g., Jay Modrall, *Big Data and Merger Control in the EU*, 9 J. EUR. COMP. L. & PRACTICE 569 (2018). For CDR in Australia, see generally Treasury Laws Amendment (Consumer Data Right) Bill 2019 (Cth) (Austl.).

yers, automated driving systems and the normative significance of plural morality in reshaping the global trading system, computer-generated works and IPRs, and automated decision-making process and its legitimacy concerns. Having unpacked major legal and policy issues and critically examined eminent options to manage these ramifications, Part III underscores the major challenges and opportunities ahead and maps out three fundamental dimensions and two caveats for future institutional designs in response to the new wave of global legal pluralism and the demand for good AI and trade governance. We conclude in Part V.

II. The Concept of AI: A Contextual Analysis

To begin, we clarify the concept of AI and identify the core components that regulators need to understand and develop procedures to assess and govern. Unpacking the notion of AI is more than a technical exposition; rather, it is of normative value. This normative value is multifaceted. First, it has long been a daunting task for scientists and engineers to capture what AI is.[27] It is equally, if not more, challenging for countries to come up with a satisfactory definition through legislation or normative/policy documents. Some governments however have attempted to transform leading academic texts on the definition of AI as part of its legislation.[28] In such a process, some countries are flexible enough to be attentive to the industry dynamics by dividing AI as falling into two broad categories, namely, narrow AI and general AI to reflect the state of the technology.[29] These normative developments at the domestic level will in turn have implications for international trade law, as a WTO dispute typically starts with parties arguing around the ordinary meaning of the relevant terms of a commitment. The ability of a country to define AI (or the lack thereof), of course, will affect whether and how trade negotiators build up a common vocabulary for the next generation of trade disciplines. We now consider below.

A. *Defining AI as a Moving Target: Earlier Scholarly Attempts*

For trade lawyers, a dictionary is a good starting point to explore the ordinary meaning of a term.[30] As per the Oxford Dictionary, "artificial" means something made by "human beings rather than occurring naturally," while "intelligence" refers to the ability to "acquire and apply knowledge

27. Pei Wang, *On Defining Artificial Intelligence*, 10 J. Artificial Gen. Intelligence 1, 7–8 (2019).
28. *See infra* discussion in Part II.B.
29. *Id.*
30. *See, e.g.*, Appellate Body Report, *United States—Measures Affecting the Cross-Border Supply of Gambling and Betting Services*, ¶ 164 WT/DS285/AB/R (Apr. 20, 2005) [hereinafter AB Report, *U.S.—Gambling*] (holding that to identify the ordinary meaning, "a Panel may start with the dictionary definitions of the terms to be interpreted").

and skills."[31] Together, "artificial intelligence" is understood as the "theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages."[32] It is clear from the above that AI roughly refers to man-made systems with a certain degree of capacity to learn and apply knowledge. It is far from clear, though, what level of capacity is required for this term to apply: can we say, for instance, that those tasks such as speech recognition and translation serve as an adequate yardstick to determine whether a system possesses "human intelligence"? As the terms "such as" and "normally" imply some degree of openness, and technologies can evolve over time, the answer is most likely no. Thus, the dictionary may in fact be of little help and could potentially raise more questions than it resolves. To build up a common vocabulary and facilitate dialogue among the international trade community, a contextual analysis of the concept of AI is warranted.

The idea of creating an artificial man can be traced back to some 2,500 years ago, when the ancient Greeks thought of making machines to act as humans: a well-known example is Talos, a killer android built by Hephaestus to guard the island of Crete.[33] Millennia later, technological advancements have gradually made such ideas conceivable. Among other pioneers that laid down the building blocks of today's AI were Alan Turing and John McCarthy. Alan Turing's groundbreaking work in 1950 posing the question "Can machines think?" and the famous "Imitation Game" (known as the "Turing Test") to answer this question further crystalized the idea of machine intelligence.[34] The Turing Test assesses whether a machine can generate human-like responses well enough that its behavior cannot be distinguished from that of a human.[35] The Turing Test nicely avoids the hard questions about what "intelligence" is, but even today, it has arguably proven difficult to pass.[36] While Turing is often regarded as the father of modern intelligent machines, the phrase "artificial intelligence" first ap-

31. *Artificial*, Oxford Living Dictionary, https://perma.cc/9YHL-BKMB (last visited Aug. 15, 2019); *Intelligence*, Oxford Living Dictionary, https://perma.cc/NAH5-PCTW (last visited Aug. 15, 2019).

32. *Artificial Intelligence*, Oxford Living Dictionary, https://perma.cc/BW8E-V9WL (last visited Aug. 15, 2019).

33. *See generally* Adrienne Mayor, Gods and Robots: Myths, Machines, and Ancient Dreams of Technology (2018) (arguing that while historians tend to trace the idea of automation back to medieval craftsmen who designed self-moving machines, those "made, not born" as found in Greek myths were perhaps the first to foreshadow modern AI and robots).

34. The question of whether a machine can think was, in Turing's eyes, "too meaningless to deserve discussion." In the Imitation Game, a human interrogator has to, by way of a series of questions to a human participant and a computer trained to mimic human behavior, distinguish between a human and a machine. *See* Alan M. Turing, *Computing Machinery and Intelligence*, 59 Mind 433, 433, 442 (1950). For a recount, see e.g., Ayse Pinar Saygin et al., *Turing Test: 50 Years Later*, 10 Minds and Machines 463 (2000).

35. Turing, *supra* note 34, at 434.

36. *See, e.g.*, Aleksandar Todoroviæ, *Has the Turing Test Been Passed? No.*, Has The Turing Test Been Passed?, https://perma.cc/34FR-AH37 (last visited Aug. 15, 2019). *Cf.* Richard Nieva, *Alphabet Chair-*

peared in a paper titled "A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence" in 1955 by a group of scholars led by John McCarthy.[37] However, McCarthy did not offer a solid definition of AI; he admitted that it is problematic to "characterize in general what kinds of computational procedures we want to call intelligent."[38] For that reason, McCarthy loosely referred to AI as the "science and engineering of making intelligent machines."[39]

B. *From Textbooks to Rulebooks*

Over the years, new innovations have produced another wave of excitement in search of the definition of AI.[40] Among other attempts to offer a solution is that of Stuart Russell and Peter Norvig, the authors of a leading AI textbook, who summarize dozens of accounts along four dimensions: thinking humanly (i.e., the cognitive modeling approach), acting humanly (i.e., the Turing Test approach), thinking rationally (i.e., the "laws of thoughts" approach), and acting rationally (i.e., the "rational agent" approach).[41] Such taxonomies are referenced in the U.S. White House's 2016 report on AI and later seem to find their place in the bill for the FUTURE of Artificial Intelligence Act of 2017.[42] This bill gives AI a rather broad definition by covering not only any "artificial systems that perform tasks under varying and unpredictable circumstances, without significant human oversight" but a set of "techniques, including machine learning. . . to approximate some cognitive task."[43] Moreover, it shows greater flexibility to include not only academic definitions of the term (e.g., "think like humans" and "act like humans") as noted above, but also those definitions promulgated by practitioners in the industry (e.g., narrow AI or general AI, as explained below).[44]

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man Says Google Duplex Passes Turing Test in One Specific Way, CNET (May 10, 2018, 2:26 PM), https://perma.cc/B3UE-EHNQ.

37. McCarthy et al., *supra* note 1, at 12–13.

38. John McCarthy, *What Is Artificial Intelligence?* 2–3 (Nov. 12, 2007) (unpublished paper), https://perma.cc/DKK3-QJA8.

39. *Id.*

40. For a recount, see generally Selmer Bringsjord & Naveen Sundar Govindarajulu, *Artificial Intelligence*, Stanford Encyclopedia of Philosophy (July 12, 2018), https://perma.cc/A2SG-MH2C.

41. Stuart J. Russell & Peter Norvig, Artificial Intelligence: A Modern Approach 2–14 (3rd ed. 2010).

42. Nat'l Sci. & Tech. Council Comm. on Tech., Exec. Office of the President, Preparing for the Future of Artificial Intelligence 6–7 (2016) [hereinafter Preparing for the Future of AI]. More recently, the Algorithmic Accountability Act of 2019 does not define the term AI. Rather, it uses a more generic term "automated decision system" to broadly include "a computational process, including one derived from machine learning, statistics, or other data processing or artificial intelligence techniques, facilitates human decision making, that impacts consumers." Algorithmic Accountability Act of 2019, H.R. 2231, 116th Cong. § 2(1) (2019).

43. FUTURE of Artificial Intelligence Act of 2017, H.R. 4625, 115th Cong. § 3(a)(1)(A), (D) (2017).

44. *Id.* § 3(a)(1)(B), (C), (E).

While some WTO Members seem to follow the American approach by capturing AI along the same line,[45] an operative definition of AI still eludes many other countries when contemplating their new laws or policies. Notably, China, another global leader in shaping AI development, has yet to offer a clear-cut definition of this term.[46] Other countries, too, seem reluctant to crystalize AI further at this stage. The U.K. House of Lords, for instance, simply refers to AI as technologies with the ability to "perform tasks that would otherwise require human intelligence," bearing in mind that contemporary AI systems generally have the capacity to "learn or adapt to new experiences."[47] In the EU, the Commission in a 2018 communication refers to AI as "systems that display intelligent behavior by analysing their environment and taking actions—with some degree of autonomy—to achieve specific goals,"[48] while on other occasions considering AI to be a generic term covering an array of technologies and one which should be defined flexibly to promote innovation.[49] The most recent attempt, made by the European Commission's High-Level Expert Group on Artificial Intelligence in April 2019, describes AI as "systems that display intelligent behaviour

45. Taiwan, for instance, has attempted to define AI as broadly covering, among others, "systems acting as humans" and "systems acting rationally." *See, e.g.*, Rengong Zhihui Fazhan Jibenfa Caoan (人工智慧發展基本法草案) [Draft Bill of Basic Law Governing Development of Artificial Intelligence (Taiwan)], art. 2. [hereinafter *Taiwan AI Development Basic Law (Bill)*].

46. *See, e.g.*, Guowuyuan guanyu yinfa xin yidai rengong zhineng fazhan guahua de tongzhi (国务院关于印发新一代人工智能发展规划的通知) [Notice of the State Council on Issuing the Development Plan on the New Generation of Artificial Intelligence] (promulgated by the State Council, July 8, 2017). We notice however that in the once valid rules on 'Artificial Intelligence-assisted Diagnostic Technology Management Specification', there is a provision defining the term AI-assisted diagnostic technology. *See* Weisheng bu bangong ting guanyu yinfa 'rengong zhineng fuzhu zhenduan jishu guanli guifan (shixing) de tongzhi
(卫生部办公厅关于印发《人工智能辅助诊断技术管理规范(试行)》的通知) [Notice of the General Office of the Ministry of Health on Printing and Distributing the 'Management Specifications for Artificial Intelligence-Assisted Diagnostic Techniques' (Trial)] (promulgated by Ministry of Health, Nov. 13, 2009).

47. House of Lords Select Committee on Artificial Intelligence, AI in the UK: Ready, Willing and Able?, 2017–19, HL 100, at 14 (UK) [hereinafter AI in the UK]. Likewise, other common law countries seem to loosely define the term AI. For instance, Singapore in the proposed "Model Artificial Intelligence Governance Framework" describes AI as "a set of technologies that seek to simulate human traits such as knowledge, reasoning, problem solving, perception, learning and planning. AI technologies rely on AI algorithms to generate models. The most appropriate model(s) is/are selected and deployed in a production system." Personal Data Protection Comm'n (Sing.), Model Artificial Intelligence Governance Framework 15 (2019). The Australian government in a recently published discussion paper refers to AI as "[A] collection of interrelated technologies used to solve problems autonomously and perform tasks to achieve defined objectives without explicit guidance from a human being." Dave Dawson et al., Artificial Intelligence: Australia's Ethics Framework 14 (2019) [hereinafter *AI: Australia's Ethics Framework*].

48. *Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions on Artificial Intelligence for Europe*, COM (2018) 237 final (Apr. 25, 2018) [hereinafter *Communication on AI for Europe*].

49. European Commission Joint Research Centre, Artificial Intelligence: A European Perspective 18 (2018) (describing AI as "a generic term that refers to any machine or algorithm that is capable of observing its environment, learning, and based on the knowledge and experience gained, taking intelligent action or proposing decisions" while noting that many different technologies can be covered by this broad definition).

by analysing their environment and taking actions–with some degree of autonomy–to achieve specific goals" and AI-based systems can be "purely software-based, acting in the virtual world" or "embedded in hardware devices."[50]

Although AI lacks a universally agreed definition, one can nevertheless distill from these emerging regulatory approaches adopted by major trading powers some common denominators. First, most seem to share the view that the concept of AI is a generic one encompassing various technologies—algorithms, big data, expert systems, machine learning, deep learning, robotics, and so forth.[51] Many would also agree that AI is not limited to a specific form: it can operate via software (e.g., a virtual assistant) or be embodied in hardware devices (e.g., a robotic vacuum).[52] Second, while the term "intelligence" remains a context-specific term, it has become increasingly common for many policymakers to join industries and academics by classifying AI as "*narrow (weak) AI*" and "*general AI*" (also known as artificial general intelligence, AGI) based upon the scope of tasks.[53] Narrow AI is capable of carrying out specific tasks.[54] AGI, by contrast, refers to that which "exhibits apparently intelligent behavior at least as advanced as a person across the full range of cognitive tasks";[55] AGI is essentially "intellectually indistinguishable from a human being."[56] It is generally agreed that we have not yet reached the stage of AGI; most contemporary AI works like disease diagnosis, car driving, and drone aircraft still fall within narrow AI.[57] Trade policymakers can utilize these denominators to create a common ground for initial talks on managing the challenges of AI. In designing a new legal framework, one should also bear in mind the shifting landscape of technology and the inequality among countries to capture this trendy term by allowing flexibility to accommodate different approaches to defining AI. For the sake of our analysis, the term AI is broadly understood to cover both narrow AI and AGI. On this basis, we now turn to examine the challenges below.

50. High-Level Expert Group on Artificial Intelligence—Set up by the European Commission, A Definition of AI: Main Capabilities and Disciplines (2019), https://perma.cc/46NZ-7MCG.

51. *See, e.g.*, AI in the UK, *supra* note 47, at 14–15; *Communication on AI for Europe*, *supra* note 48, at 8–10.

52. *Communication on AI for Europe*, *supra* note 48, at 1; *Taiwan AI Development Act (Bill)*, *supra* note 45, at art. 2.

53. *See, e.g.*, AI in the UK, *supra* note 47, at 15; Preparing for the Future of AI, *supra* note 42, at 7; *AI: Australia's Ethics Framework*, *supra* note 47, at 5.

54. AI in the UK, *supra* note 47, at 15.

55. Preparing for the Future of AI, *supra* note 42, at 7.

56. AI in the UK, *supra* note 47, at 15.

57. *See id.* at 15.

III. Why Should We Be Concerned About AI and Trade?

The above analysis not only indicates the difficulty of capturing the concept of AI, but also implies where we are now in terms of AI developments. AI continues to mature, and some of its applications have already had normative implications. While some issue areas emerge from an existing sociotechno continuum where differences (hence challenges to the existing legal framework) seem to be *a matter of degree rather than kind*, others feature the below characteristics that distinguish AI from the traditional digital trade discourse.

First, with the help of big data, powerful algorithms, and fast computation, narrow AI systems are now able to perform a specific task in an optimal manner with remarkable performance, precision, and efficiency.[58] This level of labor and skillfulness is beyond the reach of their human counterparts.[59] Increasingly, various human tasks will be performed, partly or entirely, by narrow AI systems on an unprecedented scale.[60] As disruptive and revolutionary as the Internet and global digitalization, AI goes beyond enabling, assisting, and amplifying human jobs and can itself complete these jobs.[61] Such a *replacement* effect of AI has serious social and economic consequences, particularly when a system takes a physical shape—not necessarily a humandroid robot—that can interact with the real world.[62]

Second, there seems to be a wide, if not universal awareness among governments and industry members worldwide about the key roles of this general-purpose technology—in terms of technological development, economic growth, and geopolitical strategy.[63] Massive amounts of funding and investment have flooded in to develop AI systems across sectors capable of executing commands and adapting to circumstances through programming with or without human involvement.[64] Given AI systems heavily rely on the availability of large, contextual, and quality data sets, the design and development of these systems inevitably reflect local values, social preferences,

58. *See*, *e.g.*, David G. Victor, *How Artificial Intelligence Will Affect the Future of Energy and Climate*, *in* A Blueprint for the Future of AI: 2018-2019 (Jan. 10, 2019) (reporting that AI can increase efficiency by lowering demand for energy and lower emissions), https://perma.cc/S7LL-FZRN.

59. Carl B. Frey & Michael A. Osborne, *The Future of Employment: How Susceptible Are Jobs to Computerization?*, 114 Technological Forecasting & Soc. Change 254, 259–60 (2017).

60. Edvard P.G. Bruun & Alban Duka, *Artificial Intelligence, Jobs and the Future of Work: Racing with the Machines*, Basic Income Stud., Dec. 2018, at 1.

61. *See* Frey & Osborne, *supra* note 59, at 258–59.

62. *See id.* at 259–60.

63. According to the OECD, artificial intelligence is "at the top of policy agendas for stakeholders and governmental institutions at both national and international levels." A multitude of AI initiatives have been implemented at the national and international levels, as well as by private stakeholders. *See AI Initiatives Worldwide*, OECD, https://perma.cc/56MF-6TQ4 (last visited Jan. 23, 2020) [hereinafter *AI Initiatives Worldwide*].

64. For example, the OECD estimates that more than USD 50 billion was invested in AI start-ups during the period from 2011 to mid-2018. OECD, Private Equity Investment in Artificial Intelligence 1 (2018) https://perma.cc/G2ZE-URJS.

cultural traits, and demographic status quo.[65] Indeed, while AI systems are able to interact with the physical world and behave intelligently, they are constructed by humans (more specifically, by training data produced, selected, labeled, and input by humans).[66] Such a feature makes it much more diverse, dynamic, and unpredictable in terms of AI's reactions to the environment and could arguably change the way that a government reassign the liabilities and the associated risks through public and private laws.[67]

Last and relatedly, AI systems enjoy a high level of autonomy in making decisions and movements towards the world.[68] While there exists no consensus on the emergence of AGI in the long run, the public perception of AI has been anchored upon anthropomorphizing even narrow AI systems.[69] From time to time, human beings project their emotions to AI,[70] and such social valence blurs the line between the "thing" and "humans." For the moment, as more and more AI systems are in practice working in a semi or fully-autonomous fashion, their legal and social consequences are rather indeterminate and complex.[71] Should we treat it, for a regulatory purpose, as a tool, legal person, a non-biological autonomous agent, or even create a new ontological category somewhere in between?[72] In short, the aforementioned three distinct yet mutually interacting features inform our selection of the case studies below, which pose new challenges in the traditional digital trade context and test the very fabric of international economic law under the WTO. We now examine in turn.

A. Classifying AI against the Traditional Goods-Services Dichotomy

Among agreements that underpin the WTO are two major ones: the General Agreement on Tariffs and Trade (GATT) and the General Agreement on Trade in Services (GATS).[73] The former governs international trade in goods, while the latter applies to services defined under four modes—Mode 1 (cross-border supply), Mode 2 (consumption abroad), Mode 3 (commercial

65. Nizan Geslevich Packin & Yafit Lev-Aretz, *Learning Algorithms and Discrimination*, *in* Research Handbook on the Law of Artificial Intelligence 88, 90–92, 96–97 (Woodrow Barfield & Ugo Pagallo eds., 2018).

66. *See id.* at 88–89.

67. *See* Ryan Calo, *Robotics and the Lessons of Cyberlaw*, 103 Calif. L. Rev. 513, 542 (2015). For a critique of Calo's view, see generally Jack M. Balkin, *The Path of Robotics Law*, 6 Calif. L. Rev. Cir. 45 (2015).

68. Woodrow Barfield, *Towards A Law of Artificial Intelligence*, *in* Research Handbook on the Law of Artificial Intelligence 2, 15, 22 (Woodrow Barfield & Ugo Pagallo eds., 2018).

69. *See* Calo, *supra* note 67, at 545–49.

70. *See id.*

71. Matjaź Perc, Mahmut Ozer & Janja Hojnik, *Social and Juristic Challenges of Artificial Intelligence*, 5 Palgrave Comm. at 2 (2019), https://perma.cc/HLB7-8MZ7.

72. *See* Peter H. Kahn et al., *The New Ontological Category Hypothesis in Human-Robot Interaction*, *in* Proceedings of HRI (2011).

73. General Agreement on Tariffs and Trade, 30 Oct. 1947, 61 Stat. A-11, 55 U.N.T.S. 194 [hereinafter GATT]; General Agreement on Trade in Services Article XIV, 15 Apr. 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1B, 1869 U.N.T.S. 183 [hereinafter GATS].

presence), and Mode 4 (cross-border movement of natural persons supplying services).[74] These disciplines, created at a time when many of today's online activities did not exist, are by and large agnostic as to the medium through which trade is conducted.[75] The rise of e-commerce over the past two decades has identified their limitations, as delineating under the GATT-GATS framework various sorts of "digital products" with conventional characteristics of both goods and services has proven to be difficult.[76] There have been recurring debates on, for instance, whether a business providing content-based products like mp3 or e-books via the Internet should be subject to the GATS, GATT, or both—the former adopts the positive-list approach and has no guarantee for market access.[77] The WTO has attempted, through its Electronic Commerce Work Programme, to grapple with the challenge posed by socio-technological change, but the endeavor has largely been in vain.[78] Many issues remain unresolved, despite the fact that some gaps are closed through efforts by WTO Members in the context of preferential trade agreements (PTAs)—in particular those concluded amid mega-regionalism such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP),[79] and by WTO adjudicators in landmark decisions, notably, *US-Gambling* and *China-Publications and Audiovisual Products.*[80]

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74. GATS defines services as supplying through one of the four modes. Mode 1, known as "Cross border trade" refers to services supplied from the territory of one WTO Member into the territory of any other; Mode 2 is called "Consumption abroad," meaning services supplied in the territory of one WTO Member to the service consumer of any other Member. Mode 3 known as "Commercial presence," refers to services supplied by a service provider of one WTO Member, through commercial presence, in the territory of any other Member. Mode 4 or otherwise known as "Presence of natural person" or "Movement of natural person" means services supplied by a service provider of one WTO Member, through the presence of natural persons of a Member in the territory of any other Member. GATS, *supra* note 73, art. I:2.

75. Peter K. Yu, *Trade Agreement Cats and the Digital Technology Mouse*, *in* Science and Technology in International Economic Law: Balancing Competing Interests 185, 185 (Bryan Mercurio & Kuei-Jung Ni eds. 2014); Kristina Irion & Josephine Williams, Prospective Policy Study on Artificial Intelligence and EU Trade Policy 18–19 (2019), https://perma.cc/WU3F-28SE.

76. For a detailed account, see generally Rolf H. Weber & Mira Burri, Classification of Services in the Digital Economy (2013); for a negotiating history, see Sacha Wunsch-Vincent, *Unresolved Horizontal E-Commerce Questions*, *in* The WTO, The Internet and Trade in Digital Products: EU-US Perspectives 35, 55–62 (2006).

77. *See generally* Mark Wu, Digital Trade-Related Provisions in Regional Trade Agreements: Existing Models and Lessons for the Multilateral Trade System (2017).

78. World Trade Organization, Work Programme on Electronic Commerce: Adopted by the General Council on 25 Sept. 1998, WTO Doc. W/T/L/274. Some Members, notably, the U.S., focused on the "durability" and "inseparability" from the physical medium, arguing that digitally delivered content products should be treated as goods rather than services. Others, led by the EU, suggested instead that such products lack physical attributes and should be dealt with under the GATS. For a recount, see Wunsch-Vincent, *supra* 76.

79. For instance, while Article 14.1 of CPTPP defines the term "digital products" it nevertheless states that such a definition "should not be understood to reflect a Party's view on whether trade in digital products through electronic transmission should be categorized as trade in services or trade in goods."

80. Appellate Body Report, *China—Measures Affecting Trading Rights and Distribution Services for Certain Publications and Audiovisual Entertainment Products*, WTO Doc. WT/DS363/AB/R (adopted Jan. 19, 2010) [hereinafter AB Report, *China—Publications and Audiovisual Products*]; AB Report, *U.S.—Gam-*

With technologies evolving rapidly, AI-embedded products or services can further complicate the matter, making it extremely difficult (if not impossible) to classify an item based on a fixed and formalistic basis.[81] A more holistic yet flexible approach may be desirable. To see this, let us consider robot lawyers or otherwise known as automated legal advice tools (ALATs).[82] Depending on their the level of sophistication, one can divide ALATs into the following categories: (1) specialized standalone technologies (e.g., legal chatbots); (2) enablers of legal advice (e.g., automated document review); (3) further enablers of legal advice (e.g., legal data analytics); and (4) human-free smart contracts.[83] These ALATs have been gradually transforming the landscape of legal service sectors. Some of them, for instance, have formed part of judicial systems and big corporate law firms.[84] As per one recent survey, between 2017 and 2018, over half of American law firms with over 50 lawyers have utilized technologies to replace human resources;[85] it is expected that AI will further eliminate human lawyers—paralegals and first-year associates in particular—over the next five to ten years.[86]

Such shifting sands are driven by, on the one hand, evolving technology over the past few years, and on the other, the clients' needs and expectations for cost effectiveness and alternative technology solutions offered by competitors.[87] A variety of ALATs have gradually reshaped virtually every segment of the legal value chain by further unbundling services.[88] This in turn poses new challenges to regulators with various ramifications to the international trading system. For instance, whether and the extent to which can non-

bling, supra note 30. For a critique of the Appellate Body's approach to distinguish between "goods" and "services," see Joost Pauwelyn, *Squaring Free Trade in Culture with Chinese Censorship: The WTO Appellate Body Report on China-Audiovisuals*, 11 Melb. J. Int'l L. 119, 124–28 (2010).

81. *See, e.g.*, Yu, *supra* note 75, at 185.

82. For a detailed account of ALATs, see Judith Bennett et al., Current State of Automated Legal Advice Tools: Discussion Paper 1 (Apr. 2018), https://perma.cc/HG9S-4ZLY.

83. Commentators have pointed out that the mash-ups of sets of these ALAT technologies have led to what they call "NewLaw business" models. *See id.* The term "NewLaw," originally coined by Eric Chin, was popularized by George Beaton and Imme Kashner. In contrast to "Big Law"—traditional large law firms, it refers to law firms having "reacted to client demands and anticipated changes in an increasingly mature market for legal services by changing aspects of how work is won and how work is done, while maintaining a partnership-based governance structure." *See Interview with Eric Chin, the Man Who Coined the Phrase "NewLaw,"* Josef, https://perma.cc/SEY2-5L6S (last visited Oct. 15, 2019); George Beaton & Imme Kaschner, Remaking Law Firms: Why and How 15 (2016).

84. *See, e.g.*, Daniel Ben-Ari et al., *"Danger, Will Robinson"? Artificial Intelligence in the Practice of Law: An Analysis and Proof of Concept Experiment*, 23 Rich. J.L. & Tech. 1 (2017).

85. Statista, *Methods Used by U.S. Law Firms to Increase Efficiency of Legal Services 2017-2018*, https://perma.cc/84HS-BU7A (last visited Aug. 15, 2019).

86. Thomas S. Clay & Eric A. Seeger, 2015 Law Firm in Transition: An Altman Weil Flash Survey 82-83 (2015), https://perma.cc/46XN-P8JX [hereinafter Law Firms in Transition 2015].

87. *See, e.g.,* The Law Society of New South Wales: Commission of Inquiry, The Future of Law and Innovation in the Profession 14-45 (2017).

88. Karl Chapman, *How Technology and AI is Changing the Legal Value Chain*, *in* AI *in* Application: An In-depth Examination from the Legal Profession 55-62 (Alex Davies ed., 2018).

lawyer entities enter the legal service market?[89] Are these ALATs being used to provide "legal information" and "legal advice"[90]—the former is typically outside the reach of regulations, but the latter can trigger professional qualifications and specific commitments under the GATS/WTO framework.[91]

For our present purpose, more crucially, is the perennial problem of classification. Consider, for instance, ROSS Intelligence, a leading AI-powered program that uses natural language processing to help conduct legal research and document review on American laws.[92] Anyone can sign up for a ROSS account for just US$69 per month to access a comprehensive body of case law from all levels of courts, a selection of administrative boards, and more.[93] Although its founders describe ROSS as an "AI lawyer" built upon IBM's cognitive computer system,[94] nowhere is it close to a human lawyer.[95] For now, at least, it seems to be a more advanced, smarter version of legal research services such as Westlaw or LexisNexis; thus, the way we treat this system under the WTO will most likely revive old debates: is any tangible

89. A prime example is LegalZoom—a NewLaw company that use machines to generate legal documents (e.g., a draft non-disclosure agreement based upon a client's input for a fixed fee) has been under attack in various states in the US for "engaging in the unauthorized practice of law." In Missouri, LegalZoom's services were considered as the unauthorized practice of law. In South Carolina, LegalZoom agreed to a settlement which included, among others, a disclaimer that "*LegalZoom is not a law firm, and the employees of LegalZoom are not acting as your attorney. LegalZoom's legal document service is not a substitute for the advice of an attorney. LegalZoom cannot provide legal advice and can only provide self-help services at your specific direction. LegalZoom is not permitted to engage in the practice of law.*" (emphasis added). *See* Janson v. LegalZoom.com, Inc., 802 F. Supp. 2d 1053, 1065 (W.D. Mo. 2011); Medlock v. Legalzoom.com, Inc., 2013 S.C. LEXIS 362, *7-*8 (Oct. 25, 2013). For a succinct recount, *see generally* Scott B. Garner, *Artificial Intelligence and Its Not-So-Artificial Legal Ethics Implications*, 59 ORANGE CTY. LAW. 64–66 (2017).

90. In theory, these two concepts are distinguishable: legal information generally refers to "generic information, not addressing the particular circumstances of the individual," while legal advice is "more tailed and specific to the needs of the consumer." On this score, *see, e.g.,* Jeff Giddings & Michael Robertson, *'Informed Litigants with Nowhere to Go': Self-Help Legal Aid Services in Australia*, 25 ALT. L. J. 184 (Aug. 2001). In practice, however, the line is not always clear and may well affect whether it can be—technically and lawfully—automated by ALATs. Some of the NewLaw companies—who tend to see themselves as a high-tech firm, rather than law firm (e.g., LegalZoom)—operate in a grey zone, thereby raising concerns in recent years.

91. In the context of GATS/WTO, the "Sectoral Classification List" (W/120), as developed based on the United Nations Central Product Classification (CPC), is a major reference for Members' specific commitments. CPC divided the entry of "legal services" as covering: (1) "legal advisory and representation services concerning criminal law" (86111), "legal advisory and representation services in judicial procedures concerning other fields of law" (86119), "legal advisory and representation services in statutory procedures of quasi-judicial tribunals, boards, etc." (86120), "legal documentation and certification services" (86130) and "other legal and advisory information" (8619). The term "advisory services" is broadly construed—for instance, "advisory services" under the entry of 86190 means those services provided to "clients related to their legal rights and obligations and *providing information on legal matter not elsewhere classified* . . ." (emphasis added).

92. ROSS INTELLIGENCE, https://perma.cc/78XC-WTCC (last visited Aug. 15, 2019) [hereinafter ROSS INTELLIGENCE].

93. *Id.*

94. *Ross Intelligence: Siri for the Law. We Provide Cited Answers to Natural Language Legal Questions,* WEFUNDER, https://perma.cc/M8AR-222B (last visited Aug. 15, 2019).

95. William J. Connell, *Artificial Intelligence in the Legal Profession: What You Might Want to Know,* 35(9) COMPUTER & INTERNET LAW. 32, 35 (Sept., 2018).

medium involved (determining whether it is subject to either GATS or GATT)?[96] If services, should it be classified as Mode 1 or 2? In this narrow light, there is not much difference between AI and traditional digital discourse.[97]

Presumably, as AI continues to mature, one may envisage a scenario where ROSS (or its equivalents) can evolve to generate well-structured, human-like responses like a lawyer providing legal services. This can then raise several critical questions. First, can a WTO Member, say China, ban ROSS's website entirely because ROSS is not, technically, a lawyer? While it is indeed the case that China inscribes "None" in relation to legal services under Modes 1 and 2, it is equally true that one should take into account the overall context in search of the ordinary meaning of these commitments: foreign lawyers under China's Mode 3 concession can consult on the laws of the jurisdiction where "the lawyers of the law firm are permitted to engage in lawyer's professional work."[98] This could inform one's reading into China's Mode 1 or Mode 2 commitment. To further this view, one can argue along the same line by posing more questions like: Does ROSS receive legal education and training (however defined) to be eligible for sitting in a state bar exam?[99] Is it subject to any ethical rule or code of professional responsibility, enabling the disciplining of misconduct and ensuring the client's interests?[100] Are there relevant international standards, guidelines, or recommendations (or recognized international standard-setting bodies) that

96. Arguably, such a system can be conceptualized as "data processing services" under CPC 843 or "database service" under CPC 844 because of its underlying data-driven techniques. But this view can be problematic. As Andrew Michell and Neha Mishra remarked, a WTO Member's commitments on a service sector or subsector are "exclusive," search engine like Google "cannot be simultaneously classified under computer and related services (more specifically, data processing services), telecommunications services (online information and data processing services), and advertising services." Thus, it is better to place the system in the category that is more specific than one that is of general description. *See* Andrew Mitchell and Neha Mishra, *Data at the Docks: Modernizing International Trade Law for the Digital Economy*, 20 VAND. J. ENT. & TECH. L. 1073, 1090 (2018).

97. To be sure, however, ROSS is just one type of ALATs. Numerous other ALATs, depending upon the way they are adopted in the market, can raise different challenges. It is particularly problematic if we place these ALATs in the context of the NewLaw model. Can a non-lawyer entity like LegalZoom be permitted to offer legal services under a country's Mode 3 commitment? The provision of legal services in China under Mode 3, for instance, is subject to the establishment of "representative offices" and that such "representatives of a foreign law firm shall be practitioner lawyers who are members of the bar or law society in a WTO member." Here, it is thus questionable as to the extent to which LegalZoom (or the like) can fit into the Mode 3. *See People's Republic of China—Schedule of Specific Commitments*, WTO Doc. GATS/SC/135 (Feb. 14, 2002) [hereinafter *China—GATS Commitments*]. While it is not so clear as to the compatibility of NewLaw companies with the WTO Members' practices, it is clear that these new business models have been reproduced elsewhere beyond the U.S. LegalZoom, for instance, has teamed up with Lawpath to provide similar (Australian) legal services to local clients. *LawPath Partners with LegalZoom to Expand Legal Services Throughout Australia,* LEGALZOOM (July 10, 2018), https://perma.cc/CJ8W-WZGB.

98. *China—GATS Commitments, supra* note 97.

99. *See e.g.*, *Bar Exam Eligibility*, N.Y. ST. BOARD L. EXAMINERS, https://perma.cc/G995-9DCC (last visited Aug. 15, 2019).

100. *See e.g.*, *Rules of Professional Conduct*, THE STATE BAR OF CALIFORNIA, https://perma.cc/9U9A-JXVG (last visited Aug. 15, 2019).

governments should refer to when adopting regulatory measures on AI lawyers?

But what if a state bar association amends its laws and formally recognizes AI lawyers under certain conditions? In such a case, how far can an advanced ROSS go under the existing WTO framework? It may not be so difficult to tweak the law to bring ROSS-like AI systems into the cohorts of qualified practitioners. What is problematic, however, are the issues around granting "personhood" to certain AI systems (not necessarily AGI ones). Japan, for instance, requires that in regards to its Modes 1 and 2 commitments, foreign law consultancy can be supplied by a "natural person" who is a qualified lawyer in the relevant jurisdiction.[101] Thus, schedules of this kind leave little room for ROSS-like AI systems, even if their professional qualifications—or even personhood—is duly granted. Whatever the answer may be, ROSS cannot neatly square with Japan's commitments under Mode 1 or 2.

Let us take one step further by considering a recent European Parliament resolution adopted on February 16, 2017, which suggests that AI-enabled robots may someday be granted by law a status such as "electronic personalit[ies]" under certain conditions.[102] Under this proposal, ROSS-like AI systems may enjoy a more formal recognition either as a corporate person or a new category of person under the law to assume legal rights and responsibilities.[103] Granting digital personhood can further complicate things on multiple levels and lead to debates regarding the allocation of legal rights and obligations of autonomous, self-learning machines in future economic activities.[104] Notably, in an open letter to the European Commission prepared by over 150 computer scientists, lawyers, and other professionals in different sectors as a response to the European Parliament resolution, it was argued that giving AI-enabled robots personhood is legally and ethically "inappropriate."[105] Given the policy debates over whether to recognize AI's legal status domestically and if so, how, the implications of granting AI systems legal personhood for the international trading system are significant. For instance, AI can (but need not) take the shape of a humanoid robot, which may well be able to move beyond borders to provide legal services like its human counterparts.[106] Mode 1 or 2 is irrelevant here, and the question becomes whether trade policymakers should treat such systems under Mode 3, 4, or neither of them. Apparently, Mode 4 is not applicable either, as it governs "natural persons who are service suppliers of a Mem-

101. *Japan—Schedule of Specific Commitments*, WTO Doc. GATS/S/C/46 (Apr. 15, 1994).

102. Resolution of 16 Feb. 2017 with Recommendations to the Commission on Civil Law Rules on Robotics, Eur. Parl. Doc. (2015/2103(INL)) ¶ 59(f) (2017) [hereinafter *Civil Law Rules on Robotics*].

103. *See id.*; Aída Ponce Del Castillo, *A Law on Robotics and Artificial Intelligence in the EU?*, FORESIGHT BRIEF, Sept. 2017, at 1, 6.

104. *See* Ponce Del Castillo, *supra* note 103, at 2.

105. Open Letter to the European Commission Artificial Intelligence and Robotics (May 4, 2018), https://perma.cc/9HYX-KZA3.

106. *See* IRION & WILLIAMS, *supra* note 75, at 32, 37.

ber," or "natural persons of a Member who are employed by a service supplier of a Member, in respect of the supply of a service."[107] The only option left is Mode 3. This is far from ideal, though. Mode 3 often involves establishing a local presence in the host country, be it as an affiliated company, a subsidiary or a representative office. But this is not the case for robot lawyers. As it turns out, none of the four modes of service supplies can perfectly meet the demands of AI-embedded lawyers. It seems necessary to develop additional new mode(s) of service supply to address the challenges posed by AI systems.

There is yet another related issue. If an advanced ROSS-like AI system is embodied in a physical form, then should it still be governed by GATS or GATT? As the Appellate Body (AB) made clear in *China—Publications and Audiovisual Products*, "where the content of a film is carried by a physical delivery materials," China's restrictions will "inevitably regulate who may import goods for the plain reason that the content of a film is expressed through, and embedded in, a physical good."[108] Thus, insofar as the physical medium is involved, GATT is also potentially applicable.[109] This result can be suboptimal because on the one hand, it is the services, rather than the medium carrier, that creates the value of such a robot lawyer. It is, on the other, a paradox if a robot is given personhood: how can an item (for lack of a better term) be treated as a legal person while subject to the agreement on trade in goods? The idea of "Mode 5" proposed by some in recent years may appear to have a role—if only a rather limited role—to play here.[110] As we argue below, however, hurdles remain. Central to them is the personhood issue.

B. The Design of AI and Public Morals

Most, if not all, free trade agreements, including the WTO and abovementioned CPTPP, have a standard clause allowing parties to derogate from their obligations on the grounds of public morals.[111] GATT Article XX (a) for instance, allows members to maintain trade-restrictive measures if they are "necessary to protect public morals."[112] Similar clauses can be found elsewhere such as GATS Article XIV (a) and Article 2.2 of the TBT Agree-

107. *See* GATS, *supra* note 73, at Annex on Movement of Natural Persons Supplying Services under the Agreement.

108. AB Report, *China—Publications and Audiovisual Products*, *supra* note 80, at ¶ 188 (emphasis omitted).

109. *See* Sam Fleuter, *The Role of Digital Products Under the WTO: A New Framework for GATT and GATS Classification*, 17 CHI. J. INT'L L. 153, 156 (2016).

110. For an overview of the concept of "Mode 5," see generally Lucian Cernat & Zornitsa Kutlina-Dimitrova, *Thinking in a Box: A "Mode 5" Approach to Service Trade*, 48(6) J. WORLD TRADE 1109 (2014).

111. Other WTO agreements contain a similar moral exception, including the agreements on services, procurement, and intellectual property. *See* Steve Charnovitz, *The Moral Exception in Trade Policy*, 38 VA. J. INT'L L. 689, 743-44 (1998).

112. GATT *supra* note 73, at art. XX(a).

ment.[113] The public moral exception had been sitting in limbo for years until Antigua and Barbuda in 2003 lodged a complaint against the U.S. for certain measures concerning online gambling.[114] The WTO adjudicator in this case read the term "public morals" as "standards of right and wrong conduct maintained by or on behalf of a community or nation" and hence "Members should be given some scope to define and apply for themselves the concepts of 'public morals'. . . according to their own systems and scales of values."[115] Since then, there have been several disputes involving public morals,[116] and the growing number of disputes indicate that balancing trade and non-trade concerns (in the name of public morals) has emerged as an important battleground in the WTO.

This balancing act will become even more problematic in the age of AI. The emergence of AI raises a number of difficult ethical questions on how such technologies can be designed and applied in a manner that protects fundamental human rights as well as the public interests and moral integrity of society.[117] A concrete example is the imminent challenge for policymakers in more and more jurisdictions when automated vehicles hit the road. For years, there has been an arms race among major players like Baidu, General Motors, Google, Mercedes, and Tesla to compete for the future of transportation markets.[118] The trendy term "self-driving car" is predicted to save 600,000 lives by 2045 and boost the global economy by some US$7 trillion over the next few decades.[119] While these automated vehicles offer huge benefits, they come with ethical, legal, and social challenges.[120] The notoriously difficult "trolley problem"—a tough call for the driver of a runaway car to choose between killing one person through action or five through inaction, or other even more complicated scenarios—is a telling

113. GATS *supra* note 73, at art. XIV(a); TBT Agreement *supra* note 24, at art. 2.2.

114. Panel Report, *United States—Measures Affecting the Cross-Border Supply of Gambling and Betting Services*, ¶ 2.1, WT/DS285/AB/R (adopted Nov. 10, 2004) [hereinafter Panel Report, *U.S.—Gambling*].

115. *Id*. at ¶¶ 6.461, 6.465.

116. *Id*. AB Report, *China—Publications and Audiovisual Products*, *supra* note 80; Appellate Body Report, *European Communities—Measures Prohibiting the Importation and Marketing of Seal Products*, WT/DS400/AB/R, WT/DS401/AB/R (adopted May 22, 2014) [hereinafter AB Report, *EC—Seal Products*].

117. *See generally* European Comm'n, High-Level Expert Grp. on Artificial Intelligence, Ethics Guidelines for Trustworthy AI (Apr. 8, 2019); AI Now Institute, AI Now Report 2018 (Dec. 2018); Peter Stone et al., Artificial Intelligence and Life in 2030: One Hundred Year Study on Artificial Intelligence' (Sept. 2016); Matthew U. Scherer, *Regulating Artificial Intelligence Systems: Risks, Challenges, Competences, and Strategies,* 29 Harv. J. L. & Tech. 353 (2016).

118. Niall McCarthy, *The Self-Driving Car Companies Going The Distance*, Statista (Feb. 25, 2019), https://perma.cc/JJJ8-JKSV (ranking companies whose automated cars by distance, with top five companies being Google, GM, Zoox, Nuro, PonyAI, Nissan, Baidu, Aurora, Drive.ai, Nvidia, Mercedes-Benz, Apple, and Uber).

119. Aarian Marshall, *Robotcars Could Add $7 Trillion to the Global Economy,* Wired (May 3, 2017), https://perma.cc/CX95-PVS2.

120. Nick Belay, *Robot Ethics and Self-Driving Cars: How Ethical Determinations in Software Will Require a New Legal Framework*, 40 J. Legal Prof. 119, 120, 122-28 (2015); Jean-François Bonnefon, Azim Shariff & Iyad Rahwan, *The Social Dilemma of Autonomous Vehicles*, 352 Science 1573, 1573, 1575 (2016); Sabine Gless, Emily Silverman & Thomas Weigend, *If Robots Cause Harm, Who Is To Blame? Self-Driving Cars and Criminal Liability*, 19 New Crim. L. Rev. 412, 413-15 (2016).

example.[121] Before delving into the details, some discussion of the technical aspects is necessary.

While social media often uses the expression self-driving cars, the reference is, technically, to vehicles with automated driving systems (ADS).[122] As per the U.S. Department of Transportation and the National Highway Traffic Safety Administration (NHTSA), there are six levels of automation sitting on a continuum from Level 0 (no automation at all) to Level 5 (full automation).[123] A level 1 vehicle equipped with systems can sometimes assist a human driver with either steering or braking or accelerating, but not both simultaneously.[124] A car with conventional cruise control is a prime example. At Level 2, vehicles are capable of both steering and braking or accelerating simultaneously under some conditions, but a human driver is required to pay full attention at all times. Level 3 is a tipping point. Although a vehicle fitted with any features of automation between Levels 1 to 5 can be called an "automated vehicle," the term ADS only describe those vehicles at or above Level 3, as they require only limited human intervention.[125] Constant human supervision is needed at Level 3, but far less so at Level 4.[126] At Level 5, cars are equipped to engage in "all aspects of the dynamic driving task under all roadway and environmental conditions" without human interference.[127] This categorization is based on the standard "Taxonomy and Definitions for Terms Related to On-Road Motor Vehicle Automated Driving Systems" maintained by SAE International.[128] Strictly, it is only Level 5 that can be called "self-driving cars." From a normative perspective, the more autonomy the vehicles have, the more concerns they may raise.

There are various hurdles for scaling ADS on the global market. Articles 8 and 39 of the Vienna Convention on Road Traffic, for instance, require human drivers to be able to control the vehicles.[129] Although there are al-

121. *See* Nick Belay, *supra* note 120, at 120-21; Sven Nyholm & Jilles Smids, *The Ethics of Accident-Algorithms for Self-Driving Cars: An Applied Trolley Problem?*, 19 Ethical Theory Moral Prac. 1275, 1276 (2016).

122. U.S. Dep't of Transp., Preparing for the Future of Transportation: Automated Vehicles 3.0 45 (2018) [hereinafter U.S. DoT, Automated Vehicles 3.0].

123. *Id.* at vi.

124. *Id.*

125. *Id.*

126. *Id.*

127. *Id.* For our purpose, we use the term "automated vehicles (or cars)" to refer to those at Level 1 and above, and denote "autonomous vehicles (or cars)" or "self-driving cars" as those at the most advanced level.

128. *See* Soc'y of Auto. Eng'rs Int'l, Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles (2018), https://perma.cc/C28J-J2WL [hereinafter SAE J3016_201806]. Based on the level of human intervention, these categories can be divided into three types of approaches: human in the loop (Levels 0-2), human on the loop (Level 3-4), and human out of the loop (Level 5). *See* Antje von Ungern-Sternberg, *Autonomous Driving: Regulatory Challenges Raised by Artificial Decision-making and Tragic Choices*, *in* Research Handbook on the Law of Artificial Intelligence 251, 253-54 (Woodrow Barfield & Ugo Pagallo eds., 2018).

129. Vienna Convention on Road Traffic arts. 8, 39, May 21, 1977, 1042 U.N.T.S. 17.

ready amendments to relax this requirement to foster the development of automated vehicles, it remains to be seen how governments will reshape the concept of drivers in this new setting.[130] Another crucial issue touches on the ethical dimension of algorithmic decision-making. For a vehicle to be able to move itself from one location to another safely, its automated driving system typically operates through a "sense-plan-act" pattern underpinned by technologies like cameras, lasers, radar, GPS, and algorithms.[131] The design of algorithms is determinative: while human drivers can speed or jump a red light due to their habits, emotions, health condition, and so on, automated vehicles act upon the programs. In a perfect world, these automated vehicles can be shaped via fully law-compliant algorithms, thus avoiding human errors. No world is perfect, however. For one, law is defined by humans, and thus, is value-laden. Translating the law into a code is not a simple, mechanical exercise.[132] For another, while embedded algorithms are used to tackle human bias, these algorithms and more crucially the dataset, are provided by humans, and could contain bias, too.[133] A complex web of values, be they monetary, ethical, or religious, makes ADS's design problematic.

The above complexity can be manifested through different reactions to the trolley problem. In late 2018, scholars at the Massachusetts Institute of Technology (MIT) published "The Moral Machine Experiment," exploring the answers of the public to a series of trolley dilemma questions designed to examine people's ethical preferences for male, female, young, elderly, low-status, or high-status pedestrians upon a fictional car crash.[134] Based upon the 40 million decisions made by millions of individuals from 233 jurisdictions, this MIT team mapped global moral preferences, recorded demographic variations, and most importantly, showed that public moral diversity exists along "modern institutions" and "deep cultural traits."[135] Respondents from East Asian countries influenced by hierarchical norms like Confucianism, such as China, Japan, Taiwan, and South Korea, for instance, prefer saving the elderly over the young; by contrast, in much of the West, including the U.S. and Europe, the result is the opposite.[136] Setting aside the ethical dilemmas, for a practical reason, the anchoring effect of varying tort systems in different jurisdictions can play a crucial role in the design of algorithms, too.[137] As one commentator has remarked, the dis-

130. *See infra* discussion in Section IV.A.

131. For a detailed analysis, see generally HANNAH Y. LIM, AUTONOMOUS VEHICLES AND THE LAW: TECHNOLOGY, ALGORITHMS AND ETHICS 5-19 (2018).

132. von Ungern-Sternberg, *supra* note 128, at 258, 262-64.

133. *See generally* Packin & Lev-Aretz, *supra* note 65.

134. *See generally* Edmond Awad et al., *The Moral Machine Experiment*, 563 NATURE 59 (2018).

135. *Id.*

136. *Id.* at 62-63.

137. Bryan Casey gives an example as follows: in a jurisdiction that holds firms "strictly liable" for any damages their autonomous vehicles cause – that is, they must pay for harm done regardless of whether or not they are at fault for an accident – the algorithm of any profit-maximizing firm will be

course on the trolley problem will likely be shaped not by ethical principles but by predictive legal liabilities that readily translate into realist constraints on automated car manufacturers driven by profits.[138]

Presumably, these complex ethical dilemmas and amoral factors may well be translated into heterogeneous regulatory measures that could emerge as a cause for concern. To what extent can the WTO permit, say China, in the name of public morals, to condition the sale of fully autonomous vehicles on the redesign of the algorithms to reflect the local values (i.e., save the elderly rather than the young)? Without overly complicating things, let us assume that this measure takes the form of TBT-sense technical regulation and is applied by China in an even-handed manner,[139] regardless of its origin. Of particular concern for our purpose are two elements under the TBT: "likeness" and "necessity." The non-discrimination under TBT Article 2.1 applies only to "like products." As the AB expounded in *U.S.—Clove Cigarettes*, likeness is a "determination about the nature and extent of a competitive relationship between and among the products at issue."[140] Underlying regulatory concerns "may play a role" only if "they are relevant to the examination of certain 'likeness' criteria and are reflected in the products' competitive relationship."[141] Thus, whether two types of automated vehicles with divergent approaches to the trolley problem will be taken as like products is assessed against certain factors (e.g., end-uses, consumer tastes and habits, etc.) in the marketplace.[142] How the Chinese consumers judge the morality of these systems will therefore influence the likeness between "youth-friendly" and "aged-friendly" vehicles.

As for necessity under TBT Article 2.2, according to the AB in *U.S.—Tuna II (Mexico)*, it involves a holistic weighing and balancing exercise among certain factors (i.e., degree of contribution; trade restrictiveness; and

designed to kill one person through action rather than five people through inaction, as compensatory payout to one victim is cheaper than payouts to five victims. *See* Bryan Casey, *Amoral Machines, or: How Roboticists Can Learn to Stop Worrying and Love the Law*, 111 NW. U. L. REV. 1347, 1359 (2017).

138. *See generally id.*

139. TBT Annex 1.1 refers to "technical regulations" as not only covering "product characteristics" but also their "related processes and production methods." "Characteristics of a product" include, as per AB in *EC—Asbestos*, "any objectively definable 'features', 'qualities', 'attributes', or other distinguishable mark' of a product." The terms "related processes and production methods," according to the AB in *EC—Seal Products,* need to have a "sufficient nexus to the characteristics of a product." To the extent that the hypothetical algorithm requirements satisfy these criteria, they will fall under the scope of TBT. *See* Appellate Body Report*, European Communities—Measures Affecting Asbestos and Products Containing Asbestos*, ¶ 67, WTO Doc. WT/DS135/AB/R (adopted Apr. 5, 2001); AB Report, *EC—Seal Products*, *supra* note 116, ¶ 5.12*;* AB Report, *European Communities—Measures Prohibiting the Importation and Marketing of Seal Products*, ¶ 5.12, WTO Doc. WT/DS400/AB/R, WT/DS401/AB/R (adopted June 18, 2014).

140. Appellate Body Report, *United States—Measures Affecting the Production and Sale of Clove Cigarettes*, ¶ 120, WTO Doc. WT/DS406/AB/R (adopted Apr. 24, 2012) [hereinafter AB Report, *U.S.—Clove Cigarettes*].

141. *Id.*

142. While the Appellate Body reversed certain aspects of the Panel's analysis, it agreed with the Panel that the "likeness" criteria it examined support its overall conclusion that clove and menthol cigarettes are like products under TBT 2.1. *See id.*

the risks of non-fulfillment of the stated objectives) and a "comparison of the challenged measure and possible alternative measures."[143] Searching for "reasonably available" alternatives, we think, could be a major battleground. As the AB stated in *U.S.—COOL (Article 21.5—Canada and Mexico)*, a reasonably available alternative cannot be "merely theoretical in nature", nor can it impose "an undue burden" on the responding party.[144] Leaving the administrative costs of implementation aside, a liability insurance scheme or strict liability applied to all who wish to place their cars on the Chinese market seems a promising candidate. While this may well compensate for damage to personal property, it can in no way make up for the loss of human lives. Alternatively, can the WTO adjudicators, as some American commentators argue, consider this dilemma a simple math question, using the law and economic analysis to explore the less restrictive measure[145] (e.g., can we accept the claim that it causes lower legal costs, based on tort law, for run-away cars to kill a homeless person rather than a billionaire?). In this case, what are the ramifications of the various institutional designs of WTO Members' tort law systems in the dispute settlement process? Or, can we consider the certification and labelling arrangements like "Certified Elderly-Pedestrian-Friendly" as a possible alternative?[146] Who, then, decides which car meets such moral standards while others do not, or which car manufacturers are more ethical than others? To what extent can these certification schemes make meaningful contributions to the desired objective? Systemically, what if other Members likewise adopt similar measures along similar lines (e.g., can the EU ban Chinese-made automated vehicles designed to make consequential decisions based on its "Social Credit System")?[147] How can the WTO adjudicator address highly contested ethical dilemmas of this kind across the board without creating more ramifications that could further undermine our trust in this already fragile global trading system? All these call for a more holistic, institutional approach that requires constructive dialogue among policymakers and industry stakeholders before these ramifications come to the fore. We will turn to this issue later.

143. Appellate Body Report, *United States—Measures Concerning the Importation, Marketing and Sale of Tuna and Tuna Products*, ¶ 320, 322, WTO Doc. WT/DS381/AB/R (adopted June 13, 2012).

144. *See* Appellate Body Report, *United States—Certain Country of Origin Labelling (COOL) Requirements*, ¶ 5.339, WTO Doc. WT/DS384/AB/R, WT/DS386/AB/R (adopted July 23, 2012) [hereinafter AB Report, *U.S.—COOL*].

145. Bryan Casey, *supra* note 137.

146. Certification and labelling requirements, for instance, have been discussed in AB Report, *EC—Seal Products*, *supra* note 116.

147. For an in-depth discussion on China's Social Credit System and its ramifications, see generally Yu-Jie Chen, Ching-Fu Lin, & Han-Wei Liu, *"Rule of Trust": The Power and Perils of China's Social Credit Megaproject*, 32 COLUM. J. ASIAN L. 1 (2018).

C. Algorithmic Ownership of IPRs and Implications for TRIPs

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs) is the first of its kind that requires Members to take positive steps towards harmonization by creating an "often costly system of IP registration and enforcement that meets minimum standards."[148] TRIPs does not define the term IPR, but specifies several types of IPR covered by it, including copyright and patents.[149] As with other WTO disciplines facing AI's challenges, TRIPs may find it problematic to catch up with evolving technologies, too.[150]

The advent of disruptive technologies casts doubts on some of the basic terms in IPR such as "inventor," "owner," "author" or the duration of the protection. For instance, AI has become a tool for journalism: Washington Post debuted Heliograf, its robo-writing system, to generate coverage of the 2016 Rio Olympics;[151] other players like Forbes, Bloomberg, Reuters, the Associated Press, and the Guardian have also leveraged machines for a range of tasks in their newsrooms.[152] Similar tools have been used elsewhere to generate music, film, artwork, and scientific and technological innovations.[153] The fact that AI has teamed up with a high degree of autonomy to replace humans in the industries that rest upon creativity, curiosity, and critical thinking may well reshape our understanding of "authorship" (in relation to copyright) and "inventorship" (in terms of patent) of non-human-generated outputs.[154] If so, how do we protect these outputs even if human involvement is minimal or non-existent? What, if any, are the WTO Members' responses to this shifting paradigm, and what are their implications for international trade? As an illustration, let us consider interplays between AI and copyright, an emerging battlefield in the IPR community.

Conceptually, as revealed in the existing legal framework of WTO Members, there are two approaches to algorithmically authored works. The first one, exemplified by the U.K.'s Copyright, Designs and Patents Act 1988 (CDPA), features more flexibility and could readily fit into the new setting.[155] CDPA makes special arrangements for computer-generated works.

148. Joost Pauwelyn, *The Dog That Barked But Didn't Bite: 15 Years of Intellectual Property Disputes at the WTO,* 1 J. Int'l Disp. Settlement 389, 422 (2010).

149. Agreement on Trade-Related Aspects of Intellectual Property Rights, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, Apr, 15, 1993, 1869 U.N.T.S. 299; 33 I.L.M. 1197 (1994) [hereinafter TRIPs].

150. For a general overview of challenges, see WTO, *World Trade Report 2018: The Future of World Trade: How Digital Technologies are Transforming Global Commerce* (2018), https://perma.cc/WH8U-65WW.

151. Lucia Moses, *The Washington Post's Robot Reporter Has Published 850 Articles in the Past Year*, Digiday (Sept. 14, 2017), https://perma.cc/NB7H-TE2P.

152. Jaclyn Peiser, *The Rise of the Robot Reporter*, N.Y. Times, Feb. 5, 2019, https://perma.cc/LZA9-HWRF.

153. *See, e.g.,* Evan Ackerman, *Four-Armed Marimba Robot Uses Deep Learning to Compose Its Own Music*, IEEE Spectrum (June 14, 2017), https://perma.cc/5MGH-V36T.

154. *See generally* Colin R. Davies, *An Evolutionary Step in Intellectual Property Rights - Artificial Intelligence and Intellectual Property*, 27 Computer L. & Sec. Rev. 601 (2011).

155. *See id.* at 606–10.

As per CDPA Section 9(3), for a literary, dramatic, musical or artistic work that is computer-generated, the author shall be "the person by whom the arrangements necessary for the creation of the work are undertaken"; and the term "computer-generated" is defined under Section 178 as the work "generated by computers in circumstances such that there is no human author of the work." Therefore, the U.K approach protects algorithmic creations, though it leaves no room for AI itself to be an author. The authorship will instead be attributed to the "the person by whom the arrangements necessary for the creation of the work are undertaken."[156]

While a handful of common law countries like Ireland,[157] South Africa,[158] India,[159] and New Zealand[160] have followed the U.K. approach, there is no equivalent in the U.S. and Australia. The U.S. Copyright Office, for instance, makes clear that the Copyright Law "only protects 'the fruits of intellectual labor' that 'are founded in the creative powers of the mind'" and therefore it "will not register works produced by a machine or mere mechanical process that operates randomly or automatically without any creative input or intervention from a human author."[161] This view is in line with several court decisions, including *Naruto v. Slater*, where the Northern District Court of California rejected a monkey's authorship over selfies it took via an unattended camera.[162] The Australian courts in several cases like *Telstra Corporation Limited v. Phone Directories Company Pty Ltd* also underscored the need for a human author and "some independent intellectual efforts" when reading into relevant sections of the Copyright Act 1968 (Cth).[163]

The British model has failed to gain traction in Continental Europe, as well. In the EU, Article 2 (1) of Computer Directive and Article 4 (1) of the Database Directive, for instance, defines the author as a natural person or group of natural persons who create it, while permitting national laws of Member to otherwise designate the legal person as the right holder.[164]

156. Copyright, Designs and Patents Act 1988 § 9(3) (U.K.).

157. Copyright and Related Rights Act 2000 § 21 (Ire.).

158. Copyright Act 1978 § 1(iv) (S.Afr.).

159. Copyright Act 1957 § 2(d) (India).

160. Copyright Act 1994 § 5(1) (N.Z.).

161. U.S. Copyright Office, Compendium of U.S. Copyright Office Practices § 306 (3rd. ed., 2017). Copyright Act of 1976, 17 U.S.C. §§ 101-102 (1976).

162. Naruto v. Slater, 2016 WL 372231 (N.D. Cal. Jan. 28, 2016), *aff'd* 888 F.3d 418 (9th Cir. 2018). A macaque (Naruto) took a series of photographs of itself with Slater's unattended camera, which were subsequently published. An action was brought by PETA as next friend alleging Naruto should be assigned copyright. The district court dismissed the case, as the Copyright Act did not expressly authorize animals to make copyright claims, so no statutory standing could be established. PETA appealed and the parties agreed to settle with Slater to donate a portion of future revenues of the photographs to wildlife organizations. The Ninth Circuit declined to dismiss the appeal, however, and affirmed the district court's decision in April 2018.

163. Telstra Corporation Limited v. Phone Directories Company Pty Ltd [2010] FCAFC 149 (Austl.); Copyright Act 1968 (Cth) s 32 (Austl.).

164. Directive 2009/24/EC, of the European Parliament and of the Council of 23 April 2009 on the Legal Protection of Computer Programs, 2009 O.J. (L 111/16).

Clearly, this provision indicates, on the one hand, that a natural person is the default author, and on the other, that while it respects different legal traditions by allowing special arrangements, it purposefully uses the language "right holder" rather than "author" to denote legal persons who own the copyright.[165] Similar provisions also appear in many Members' domestic copyright statutes.[166] The Court of Justice of the European Union (CJEU), in expounding the concept of originality under the Information Society Directive in the landmark ruling *Infopaq,* holds that protected copyright subject matter must be original in the sense that "it is [the] author's own intellectual creation."[167]

From a trade law perspective, an immediate difficulty is the creation of a two-tiered system within the WTO.[168] TRIPs Article 3 imposes upon WTO Members national treatment obligations regarding the protection of IPR, defining "protection" to include matters affecting "availability," "acquisition," and "scope," among others.[169] Thus, if a Member adopts the U.K. model by granting copyright of AI-generated creations to its own nationals, it must do the same to nationals of other Members. Yet, there is no guarantee for reciprocal protection, since only a handful of common law countries have CDPA-like statutes. A key to reversing this would lie in the scope of copyrightable subject matter. TRIPs Article 9 does not define it, but instead refers to the relevant provisions of the Berne Convention.[170] As expounded by the Panel in *US—Section 110 (5) Copyright Act*, by way of incorporation, these provisions of the Berne Convention "have become part of the TRIPs Agreement" as applied to all WTO Members, and their negotiation history should serve as a relevant source informing their interpretation in the TRIPs context.[171] Article 2 of the Berne Convention defines "protected works" as including, among others, "literary and artistic work," which comprises "every production in the literary, scientific and artistic domain, whatever

165. Some argue that such special rules are made to accommodate different rules adopted by common law Members. Michael M. Walter, *Authorship of Computer Programs*, *in* European Copyright Law: A Commentary 113 (Michael M. Walter & Silke von Lewinski eds. 2010).

166. For a recount, see, e.g., Rosa Maria Ballardini et al., *AI-Generated Content: Authorship and Inventorship in the Age of Artificial Intelligence, in* Online Distribution of Content in the EU 117, 122-24 (Taina Pihlajarinne et al. eds. 2019); Ryan Abbott, *Artificial Intelligence, Big Data and Intellectual Property: Protecting Computer-Generated Works in the United Kingdom*, *in* Resource Handbook on Intellectual Proprety and Digital Technology (Tanya Aplin eds., forthcoming 2019).

167. Case C-5/08 Infopaq Int'l A/S v. Danske Dagblades Forening, [2009] E.C.R. I-6569, at 36-37.

168. To be sure, however, the TRIPs Agreement is just a minimum standard and it is for WTO Members to determine how to appropriately implement the provisions. While we underscore the possibility of creating a two-tiered regime, we do not advocate for—for now at least—a harmonized system by way of amending the TRIPs or otherwise.

169. TRIPs, *supra* note 149, at art. 3 & n. 3.

170. TRIPs art. 9 states that Members shall comply with Arts. 1 through 21 of the Berne Convention. TRIPs, *supra* note 149, at art. 9.

171. Panel Report, *United States—Section 110(5) of the U.S. Copyright Act*, WT/DS160/R (adopted July 27, 2000) at paras. 6.17–6.18, 6.41, 6.60, 6.63, 6.66 [hereinafter Panel Report, *U.S.—Section 110(5) Copyright Act*].

may be the mode or form of its expression."[172] Although Berne Convention Article 2.1 contains a non-exhaustive list of such works, it does not offer too much insight on authorship and the originality requirement. Nevertheless, several provisions like Articles 5 (2) and 14 *bis* (2) (a) seem to indicate that the determination of the author of a work and originality is a matter of the law of the country where protection is claimed.[173] Further, as revealed in its negotiation history, it was generally agreed among the parties that some level of creativity is required in a work—which means that copyrightable work must be an intellectual creation.[174] Together, both textual and contextual analyses seem to indicate that it is less likely for a Member to reverse this non-reciprocity result.

To add further complexity, even between countries based on the U.K. model, they may well vary in terms of how to interpret the "necessary arrangements" in allocating the authorship. While, for instance, it has been argued under English case law, that it is likely the programmer of AI will be the author of the creation,[175] the role of other players such as users or the engineers in charge of the training process should not be underestimated.[176] Indeed, English case law may inform judicial interpretations of other Commonwealth countries[177] and thus can manage its impacts on cross-border trade. This does not mean, however, that a civil law country that adopts the U.K. model will also accept the English case law.

Some of the ramifications of AI-generated creations may surprise founding Members. The developed world, led by the U.S., for instance, has successfully included copyright protection of computer software in the TRIPs negotiations.[178] With AI looming large in creative activities today, this may undercut the scope of TRIPs Article 10 (1) that protects computer programs as literary works under the Berne Convention.[179] Again, it is unfruitful to look up the texts of the TRIPs or Berne Convention to search for a satisfactory answer. Many of the basic terms under the Berne Convention were undefined because, at the time of drafting, according to Sam Ricketson, "there

172. Berne Convention for the Protection of Literary and Artistic Works, Sept. 9 1886, (amended Sept. 29, 1979), 828 U.N.T.S. 221, art. 2 [hereinafter Berne Convention].

173. *Id.*, arts. 5(2) & 14bis (2)(a). *See also* Daniel Gervais, The TRIPS Agreement: Drafting History and Analysis 247 (4th ed., 2012).

174. *See* Sam Richetson, The Berne Convention for the Protection of Literary and Artistic Works: 1886-1986, at 229–30 (1987). Antony Taubman et al., A Handbook on the WTO TRIPs Agreement 42 (2012).

175. Nova Productions Ltd. v. Mazooma Games Ltd. [2007] EWCA (Civ) 219 (U.K.).

176. For example, AI engineers ensure the successful implementation of AI systems or infrastructures within an organization. They perform roles such as data analysis, deployment of algorithms, and application of AI to perform a specific task. *See* Engineering Management Institute, *The Key Role of AI Engineers* (Oct. 28, 2019), https://perma.cc/R9U9-XPA6.

177. *See, e.g.*, Murray Gleeson, *Global Influences on the Australian Judiciary*, 22 Aust. Bar Rev. 184 (2002).

178. Carlos M. Correa, Trade Related Aspects of Intellectual Property Rights: A Commentary on the TRIPs Agreement 123-24 (2007).

179. TRIPs, *supra* note 149, at art. 10.1.

was a basic agreement between contracting states as to the meaning . . . it [was] thought unnecessary to define it."[180] These emerging implications have led commentators to propose several policy options for domestic policymakers.[181] Some WTO Members like the EU, for instance, have also urged the Commission to map out a "balanced approach to intellectual property rights" and the criteria for "copyrightable works produced by computers or robots."[182] Countries will soon choose the options that best suit their needs, before the WTO or any PTA contemplates new rules. In updating TRIPs, therefore, one may well expect another wave of North-South or even North-North divide because of the underlying national interests. We will address this below.

D. Data and Discontent in the Decision-Making Process

The rise of the data-driven approach to international economic law has accumulated considerable analytical momentum—which promises to transform existing scholarship by allowing researchers to unveil hidden patterns and structures, clarify theoretical and practical misunderstandings, and predict future developments in all sorts of legal instruments—beyond the methodological competence of its traditional counterparts.[183] In the U.S., big data analytics have been leveraged by researchers to predict Supreme Court decisions or to estimate winning rates.[184] Similarly, natural language processing and machine learning have enabled researchers in the U.S. and the U.K. to unveil hidden patterns underlying the judicial decisions rendered by the European Court of Human Rights and make predictions with a remarkable accuracy of 79%.[185] In light of what has been pursued in various domestic contexts, it is likely that artificial intelligence will be increasingly deployed in the international arena to provide accurate predictions of optimal texts for treaty negotiations, strategies for consultation processes, or even outcomes of dispute settlement proceedings.

As the breadth, depth, and diversity of trade agreements have expanded exponentially, countries with inadequate capacities and resources are faced with huge obstacles to meaningfully participating in negotiation, not to

180. Sam Ricketson, *The 1992 Horace S. Manges Lecture- People or Machines: The Berne Convention and the Changing Concept of Authorship,* 16 COLUM.-VLA J. L. & ARTS 1, 8 (1991).

181. *See infra* Part III.

182. *Report of the Committee of Legal Affairs with Recommendations to the Commission on Civil Law Rules on Robotics*, at 28, 2015/2103(INL), (Jan. 1, 2017), https://perma.cc/FVG9-EP36.

183. *See generally* Wolfgang Alschner et al., *The Data-Driven Future of International Economic Law*, 20 J. INT'L. ECON. L. 217 (2017).

184. *See, e.g.*, 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 (2013); Daniel Martin Katz et al., *A General Approach for Predicting the Behavior of the Supreme Court of the United States*, 12 PLoS ONE (2017).

185. *See* Nikolaos Aletras et al., *Predicting Judicial Decisions of the European Court of Human Rights: A Natural Language Processing Perspective*, 2:e93 PEERJ COMPUTER SCIENCE e93 (2016).

mention getting a favorable deal for themselves.[186] Just taking the CPTPP for example, there are 30 chapters and dozens of side instruments and annexes, covering sanitary and phytosanitary measures, e-commerce, IPR, telecommunications, competition policy, investment rules, labor rights, and the environment.[187] The sheer scope as well as the legal and technical complexity of the trade deal significantly raises the cost of trade negotiations and slows countries down in building consensus in due course.[188] Notably, more and more initiatives are being put in place to address such daunting challenges by leveraging AI and data analytics in the arena of international trade. For instance, the United Nations Conference on Trade and Development (UNCTAD) has been working with the International Chamber of Commerce's Brazilian office to develop an AI-based system aimed at assisting developing countries in trade negotiations.[189] According to Bonapas Onguglo at the UNCTAD's trade analysis branch, "[a]rtificial intelligence could help reduce the complexity of information and level the playing field between big and small players in trade negotiations."[190] At the WTO Public Forum in October 2018, this joint project officially launched the first prototype of the AI-powered Cognitive Trade Advisor (CTA) (trained by the data of actual and ongoing negotiations between Canada and Mercosur).[191] The CTA provides a virtual cognitive assistant named "Adam" to answer questions, and helps trade negotiators by classifying and interpreting tons of intricate articles in trade agreements in a snap, leveraging IBM's Watson system to enhance the effectiveness and efficiency of the preparatory work, and providing automated strategy and decision-making analyses based on previous trade agreements signed by counterpart negotiators.[192]

AI's promises in case prediction and decision-making analysis can readily migrate to the sphere of dispute settlement, various stages of which may be subject to a certain level of automation or even autonomy—from notice, consultation, discovery, panel establishment, adjudicative proceedings, and report circulation and adoption, to Appellate Body review, implementation,

186. Matthew Hutson, *How Artificial Intelligence Could Negotiate Better Deals for Humans*, SCIENCE, Sept. 11, 2017, https://perma.cc/7BBR-882H.

187. *See* Austl. Dep't of Foreign Aff. and Trade, *CPTPP Chapter Summaries*, https://perma.cc/69XH-SPHC (last visited Jan. 23, 2020)

188. Preferential trade agreements "have proliferated globally since the 1990s and now form a complex network of agreements," with many "hundreds of pages long and contain[ing] an intricate web of detailed obligations." Due to growing size and complexity, "the PTA universe has become increasingly hard to navigate for scholars, policy-makers, negotiators, and litigators." Wolfgang Alschner, Julia Seiermann & Dmitry Skougarevskiy, *Text-As-Data Analysis of Preferential Trade Agreements: Mapping the PTA Landscape*, UNCTAD Research Paper No. 5, 3 (2017).

189. United Nations Conference on Trade and Development [UNCTAD], *Trade Negotiations: Next Frontier for Artificial Intelligence* (June 18, 2018), https://perma.cc/TC2N-M9GN.

190. *Id.*

191. *ICC Launches Artificial Intelligence Tool for Trade Negotiations*, ICC BRAZIL (Oct. 4, 2018), https://perma.cc/Y7BP-S2CY.

192. *Id.*

and arbitration.[193] While the WTO dispute settlement mechanism has largely been a success and described as the "crown jewel" of the multilateral trading system,[194] the recent U.S. blockage on the appointment of new members of the Appellate Body has critically paralyzed the function of the institution.[195] Intertwined with this development have been other concerns related to piles of pending trade disputes, constant and serious delays in the already lengthy proceedings, and exorbitant costs incurred in various phases.[196] All these issues may together generate a significant political momentum to "speed up" or "modernize" the dispute settlement mechanism in innovative ways, or even to establish alternative models. Faced with strenuous challenges to negotiating an end to the impasse in Appellate Body appointments, it seems to make sense to apply AI techniques to enable a more efficient and effective dispute settlement process. As pointed out by Lucas Bento, Chair of the AI & International Law Subcommittee at the New York City Bar Association, AI can be utilized to enhance legal representation as well as improve adjudicative and institutional services in the arbitration context.[197] In the WTO setting, similarly, WTO Members could agree to use an AI-powered system for some aspects of the dispute settlement to save time and costs, design *ad hoc* procedural rules (*e.g.* an alternative and expeditious arbitration under DSU Article 25), distill key legal issues, predict the likelihood of success of different claims, and manage and streamline disputes.

What might be controversial, however, is when the WTO bureaucracy itself uses AI-driven systems as a tool of dispute settlement based on an efficiency narrative, albeit not practically plausible at this moment.[198] We are not talking about a "robot panelist" or "virtual Appellate Body Member" powered by AI. Rather, we are referring to the institutional use of AI systems by the DSB to partly or fully automate the decision-making process

193. Understanding on Rules and Procedures Governing the Settlement of Disputes, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 2, 1869 U.N.T.S. 401 [hereinafter DSU].

194. Tetyana Payosova, Gary Hufbauer & Jeffrey Schott, *The Dispute Settlement Crisis in the World Trade Organization: Causes and Cures*, Peterson Inst. for Int'l Econ. 1 (Mar. 2018), https://perma.cc/K39E-XLPG.

195. *Id.*

196. Arie Reich, *The Effectiveness of the WTO Dispute Settlement System: A Statistical Analysis* (Eur. Univ. Inst., Working Paper No. 2017/11, 2017), https://perma.cc/BNF3-L3WC.

197. Lucas Bento, *International Arbitration and Artificial Intelligence: Time to Tango?* Kluwer Arb. Blog (Feb. 23, 2018), https://perma.cc/HN7G-8SSJ.

198. Given the current international political economy surrounding the WTO, we do not envisage a significant role (if any) of AI in the DSB. However, the fact that a growing number of countries in both developed and developing worlds have used or are considering to incorporate data-driven techniques into their decision-making process in the public sector cannot be overlooked. While it may be too early to call it a trend, we note that some practitioners—notably, the New York City Bar Association's Chair of AI & International Law Subcommittee—have highlighted AI's potential to further improve arbitration service. While we acknowledge that the rapidly changing landscape of AI development may soon disrupt the existing paradigm, it is true that it is not yet ripe for the DSB to tap into the power of AI at this moment.

traditionally reserved to panelists and Appellate Body Members. If the DSB deploys AI systems in certain aspects of the dispute settlement to automate "objective assessment of the matter" in front of a panel and evaluate "the facts of the case and the applicability of and conformity with the relevant covered agreements" so as to promote a speedy resolution of the dispute,[199] the potential harms regarding accountability deficit, legal and technical blackbox, and amplified human bias as pointed out by the existing legal scholarship cannot be ignored.[200] A recent case in the U.S., *State v. Loomis*,[201] demonstrates well how unrestrained and unchecked outsourcing of judicial functions to complex statistical algorithms and AI tools may undermine due process and the rule of law.[202] Based on two interrelated narratives—that the data-driven approach promises a cost-effective solution to prioritize government resources and that evidence-based tools may help reduce human biases in the criminal justice process[203]—the U.S. has modernized various aspects of government decision-making in law enforcement agencies, corrections officials, and judges by applying data analytics, algorithms, and other AI systems.[204] Controversies have emerged regarding the opaque nature of such initiatives, the unintentional bias against and harm to the underrepresented, and the broader legal, social, and ethical ramifications.[205] Problems as such are relevant if the WTO DSB resorts to efficiency and convenience to justify moves towards a "smarter" dispute settlement mechanism by reinventing infrastructure through big data and algorithms. What types of decisions can governments delegate to machines in the WTO context (*e.g.* value-based judgments or only non-discretionary decisions)? To what extent may automated systems be used to support, or replace human discretion, interpretation, and judgment,[206] exercised by panelists and Ap-

199. DSU, *supra* note 193, at art. 11.

200. *See, e.g.*, Julia Angwin et al., Machine Bias, ProPublica (May 23, 2016), https://perma.cc/F7NZ-A7X3; Frank Pasquale, *Secret Algorithms Threaten the Rule of Law*, MIT Tech Rev. (June 2017), https://perma.cc/8WZ8-LND4; Ellora Israni, *Algorithmic Due Process: Mistaken Accountability and Attribution in* State v. Loomis, Harv. J. L. & Tech. Dig. (Aug. 31, 2017), https://perma.cc/D4CB-UTYV; Katherine Freeman, *Algorithmic Injustice: How the Wisconsin Supreme Court Failed to Protect Due Process Rights in* State v. Loomis, 18 N.C. J. L. & Tech. 75 (2016); Julia Dressel & Hany Farid, *The Accuracy, Fairness, and Limits of Predicting Recidivism*, 4(1) Science Advances 1 (Jan. 17, 2018).

201. State v. Loomis, 881 N.W.2d 749 (Wis. 2016).

202. For a critique, see Han-Wei Liu, Ching-Fu Lin & Yu-Jie Chen, *Beyond* State v. Loomis: *Artificial Intelligence, Government Algorithmization, and Accountability*, 29 Int'l J. L. & Info. Tech. 122 (2019).

203. Robert Brauneis & Ellen P. Goodman, *Algorithmic Transparency for the Smart City*, 20 Yale J. L. & Tech. 103, 116 (2018); Josh Salman & Emily Le Coz, *Race and Politics Influence Judicial Decisions. But Florida's Bench is a World of Contradictions*, Herald Tribune (Dec. 12, 2016), https://perma.cc/LTH2-GT8D (last visited Aug. 15, 2019); David Garland, *Introduction: The Meaning of Mass Imprisonment in* Mass Imprisonment: Social Causes and Consequences 1–3 (David Garland ed. 2001); Roger K. Warren, *Evidence-Based Practices and State Sentencing Policy: Ten Policy Initiatives to Reduce Recidivism* 82 Ind. L. J. 1307, 1308–10 (2007).

204. Liu, Lin & Chen, *supra* note 202, at 124.

205. *Id.* at 132–34.

206. Melissa Perry & Alexander Smith, *iDecide: the Legal Implications of Automated Decision-making* (Speech at Cambridge Centre for Public Law Conference 2014: Process and Substance in Public Law), Sept. 15–17, 2014, https://perma.cc/KQL8-F4VC.

pellate Body Members in practice, without conflicting with the rules set in the DSU? Can discrimination and unequal treatment happen in the context of state-to-state dispute? Given the opacity concerns of machine learning and natural language processing technologies,[207] how can we ensure a proper level of accountability and explainability in algorithmic decision-making employed by the DSB? Is a human-in-the-loop approach required to ensure adequate control of the dispute settlement process? Can a balance be struck between the pursuit of efficient and timely resolution of disputes vis-a-vis the democratic and rule-based legitimacy of the WTO, if AI is applied to automate decision-making in the panel or Appellate Body proceedings?

To summarize Part III, our broader analytical aim here is to identify the emerging and regulatory diversity when governments react to the rapid development and changes of AI. To some extent, such diversity is hardly new if one considers what has happened in other law and technology contexts—such as the earlier regulatory challenges posed by the advent of the Internet and cyberspace—and the scholarly debates as noted by Jack Goldsmith, Tim Wu, and various other scholars over a decade ago.[208] Thus, some of AI's ramifications can be reminiscent of those challenges well known to, and heatedly debated by trade lawyers in relation to digital trade issues.[209] Indeed, both Internet and AI share some continuity links and similarities. They both present mixed opportunities: while they reduce the transaction costs, they may raise an array of concerns, as they mediate economic, social, and political relations. In other contexts, there is an overlap between them—online activities, for instance, generate vast amounts of data which help the development of AI.[210] To the extent that the way in which AI operates to raise similar concerns in the digital environment, existing case-law like *US-Gambling* and *China-Publications* and *Audiovisual Products* may help manage trade frictions in the context of AI.[211]

207. *See generally* Jenna Burrell, *How the Machine "Thinks": Understanding Opacity in Machine Learning Algorithms*, 3 Big Data & Soc'y 1 (Jan.–June 2016); Nick Diakopoulos, *Algorithmic Accountability*, 3(3) Digital Journalism 398, 402 (2015).

208. *See, e.g.*, Jack L. Goldsmith, *Against Cyberanarchy*, 65 U. Chi. L. Rev. 1199 (1998) (challenging the view that the regulations does not apply to cyberspace); Jack Goldsmith & Tim Wu, Who Controls the Internet?: Illustrations of a Borderless World (2008) (using nine examples to illustrate and argue how traditional territorial sovereignties regulate the Internet in different ways); Joel Reidenberg, *Technology and Internet Jurisdiction*, 153 U. Pa. L. Rev. 1951, 1972 (2005) (arguing that states have a normative incentive to regulate the Internet to advance public policy); Michael Geist, *Cyberlaw 2.0*, 44 B.C. L. Rev. 323, 332–35 (2003) (noting the bordered nature of cyberspace).

209. *See, e.g.,* Wunsch-Vincent, *supra* note 76; Mira Burri & Thomas Cottier (eds.), Trade Governance in the Digital Age (2012); Anupam Chander, The Electronic Silk Road (2013).

210. Kristian Kersting, *Machine Learning and Artificial Intelligence: Two Fellow Travelers on the Quest for Intelligent Behavior in Machines*, Frontiers in Big Data (Nov. 19, 2018), https://perma.cc/4MEM-A6Q5.

211. Unfortunately, the past experience shows that resolving these clashes through dispute settlement is not a panacea. It has been over a decade since the *U.S.-Gambling* case, and Antigua "los[es] all hope of U.S. payout" in that dispute. Tom Miles, *Antigua "Losing All Hope" of U.S. Payout in Gambling Dispute*, Reuters (June 22, 2018), https://perma.cc/Q8Z4-AFE6. Likewise, no dispute has even been brought before the WTO adjudicating body to address the trade concerns about China's Internet censorship. Tim

However, as argued above, AI possesses at least three unique features that distinguish itself from other digital technologies in terms of social, economic, and political ramifications as well as available governance strategies. Because of such characteristics, it is evident that AI's challenges as illustrated in our four in-depth case studies can bring the debate among trade policymakers to the next level. All of these issues therefore merit practical and scholarly attention to ensure the benefits of AI systems while preventing negative consequences of weakened legitimacy and public trust.

IV. New Global Legal Pluralism in the Age of AI

There are already proposals in response to some of the ramifications noted in Part III. Some of them are AI specific, while others are generic to capture broader implications of the evolving innovations. How governments react in the AI-empowered era will depend on their economic, social, and political underpinnings. This is particularly so because the design of AI, as shown in the trolley problem, turns on judgment calls of diverse ethnic, cultural, and religious communities in modern nation-states. The variety of domestic regulatory responses features yet another global legal pluralism. It will prove problematic, we think, for trade negotiators and adjudicators to manage the trade frictions stemming from this context while properly reconciling the competing values. To appreciate the emerging challenges, in what follows, we assess some of these proposals on substantive issues and then consider possible legal venues and the role of adjudicators going forward.

A. A Critical Appraisal of Emerging Regulatory Strategies

Let's begin with the classification paradox: an issue that has been troubling governments for years—long before AI emerged on their radar—given the evolving technologies and the deeper and more complex global value chain. The existing GATT and GATS disciplines fail to reflect the business realities amid the changing landscape. Software delivered electronically can be treated as GATS Mode 1 without being subject to duties, while the same item embodied in a physical carrier and traded globally can be taxable. Such inconsistencies can be even more salient in the age of AI, because many inventions are software-intensified and involve various R&D activities across different countries. This paradox has led some to call for "Mode 5," a novel approach to services embedded in a manufacturing process of a good to better reap the real value of "services in boxes."[212] Although Mode 5 is ex-

Wu, *The World Trade Law of Censorship and Internet Filtering*, 7 Chi. J. Int'l L. 263 (2006) (considering whether China's Internet censorship violated its GATS commitments).

212. It is common to see that the share of the value of services in a final product can surpass that of physical components: the growth of Tesla's popularity is, for instance, in large part due to the underlying software and synergies. Marina Foltea, How to Include "Mode 5" Services Commitments in Bilateral Free Trade Agreements and at Multilateral Stage? (2018), https://perma.cc/

pected to bring economic efficiency and draw a clearer boundary between trade in goods and services, this notion is still in the making and lacks a widely accepted definition.[213] Moreover, despite the term Mode 5, it does not necessarily suggest an expansion of the existing GATS rules.[214] Some argue instead that it is better to situate the policy debates on how to refine the current legal framework applicable to trade in goods by expanding certain Mode 5-friendly rules.

Among other Mode 5-friendly provisions, Article 8.1 (b) (iv) of the Customs Valuation Agreement (CVA) and the 1995 Decision on Valuation of Carrier Media Bearing Software for Data Processing Equipment are perhaps most relevant to our discussion. The former allows duty-free treatment for certain types of "intangible assists"—engineering, development, artwork, design work, plans and sketches—insofar as they are sourced in the country of importation.[215] The latter permits WTO Members to choose to either consider only the value of carrier, or include the value of that software in determining the value of imported software.[216] In their current form, these two instruments can hardly capture AI's challenges. For instance, while it is true that buyers could make their machines smarter or personalized through their post-sale interactions,[217] not every buyer may assist the manufacturers by offering the listed services when purchasing AI from overseas. Furthermore, the scope of assistance is narrowly defined, and it can be difficult in practice to distinguish "development" from "research"—the latter being intentionally excluded by the GATT negotiators.[218] Also, the 1995 Decision is limited in scope: it generally applies to software contained in a disc or similar medium.[219] Software embodied in automated vehicles or other AI-enabled devices falls outside this Decision. Although some Members like the EU once sought to engage like-minded trading partners on servification is-

W4XQ-VQXC. *See also* Cernat & Kutlina-Dimitrova, *supra* note 110, at 1115; Petros Mavroidis & Lucian Cernat, *Embody, Disembody, and Gains for Everybody*, E15 Initiative (Jan. 2016), https://perma.cc/5ED2-A9WN.

213. *See e.g.*, Alessandro Antimiani & Lucian Cernat, *Liberalizing Global Trade in Mode 5 Services: How Much Is It Worth?*, 52 J. World Trade 65 (2018) (arguing that global GDP gains from liberalizing Mode 5 at a multilateral level could reach up to €300 billion by 2025). For an overview, see Petros C. Mavroidis, The Regulation of International Trade, Vol. 3: GATS (forthcoming 2020) (on file with the authors).

214. Foltea, *supra* note 212, at 13.

215. Agreement on Implementation of Article VII of the General Agreement on Tariffs and Trade 1994, Annex 1A, art. 8.1(b)(iv), Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, [hereinafter CVA].

216. WTO Committee on Customs Valuation, Decisions Concerning the Interpretation of Valuation of Carrier Media Bearing Software for Data Processing Equipment, G/VAL/5 (Oct. 13, 1995), at 3 [hereinafter 1995 Decision].

217. Blake Morgan, *3 Use Cases of Artificial Intelligence for Customer Experience*, Forbes (Aug. 1, 2018), https://perma.cc/QTA7-DVMP.

218. GATT Committee on Customs Valuation, *The Term "Development" in Article 8.1 (b) (iv) of the Agreement on Implementation of Article VII*, VAL/W/24/Rev.1 (Jan. 10, 1985).

219. In the 1995 Decision, *supra* note 216, carrier medium excludes "integrated circuit, semiconductors and similar devices or articles incorporating such circuits or devices."

sues, and Uruguay proposed to update the 1995 Decision,[220] there has been no breakthrough so far. This should come as no surprise: any proposals that lead to the loss of government revenue can be sensitive.[221] This is even more so for developing countries that rely heavily on customs duties as a major source of income.[222] As things stand, the concept of Mode 5 has a limited, if any, role to manage AI's ramifications.

Leaving the negotiation hurdles behind, even if we can update these Mode-5-friendly rules, it remains challenging for them to fully capture AI if these machines gain legal personhood and acquire professional qualifications in one of the WTO Members. True, most jurisdictions have so far regulated the behavior of AI as if it were a human tool. The ship has sailed, however. Conferring legal personhood on AI has been heatedly debated, running along the continuum between permissivism and restrictivism.[223] It is submitted that, at one end of the spectrum, it is legally feasible to grant legal personhood to AI.[224] Permissivism often rests its claim on "fictionalism" by reference to the history of corporations, ships in maritime law, New Zealand's Whanganui River, church, and so on.[225] At the other end lies restrictivism, which rejects AI's personhood due to its lack of certain properties possessed by biological persons like soul, consciousness, and free will and thus argues it should be taken as a property.[226] This scholarly debate has gained more currency after the European Parliament, as noted above, invited the Commission to "explore, analyse and consider the implications of all possible legal solutions," including the possibility of "applying electronic personality."[227] Searching for the universally agreed upon answer to AI's legal status can be as complicated as trade negotiations themselves, if not more. Factors shaping this answer go way beyond instrumental interests,

220. *See* Motion for a Resolution PE 606.257-2017/2193 (INI), European Parliament Committee on International Trade (Sept. 20, 2017), https://perma.cc/B2KW-7GBJ; WTO Committee on Customs Valuation, *Proposal for Updating the "Decision on the Valuation of Carrier Media Bearing Software for Data Processing Equipment*," G/VAL/W/241. Rev. 1 (May 2, 2014).

221. Foltea, *supra* note 212, at 32.

222. *Id.* (based on interviews with experts, it is argued that "[t]here is thus little likelihood for these [developing] countries to agree on foregoing customs revenue, which has been a salient issue they have raised repeatedly before the WTO Customs Valuation Committee").

223. Bartosz Brozek & Marek Jakubiec, *On the Legal Responsibility of Autonomous Machines*, 25 Artificial Intelligence and L. 293, 294–96 (2017).

224. Shawn Bayern, an American legal academic, for instance, has argued that AI's legal personhood is already possible under U.S. laws on limited liability companies (LLCs). *See* Shawn Bayern, *The Implications of Modern Business-Entity Law for the Regulation of Autonomous Systems*, 7 Eur. J. Risk Reg. 297 (2016).

225. *See*, *e.g.*, Robert van den Hoven van Genderen, *Legal Personhood in the Age of Artificially Intelligent Robots*, *in* Research Handbook on the Law of Artificial Intelligence 213, 228 (Woodrow Barfield & Ugo Pagallo eds., 2018) (noting that non-natural legal persons can be traced back to ancient Egyptian society); Joanna J. Bryson et al., *Of, For, and By the People: The Legal Lacuna of Synthetic Persons*, 25 Artificial Intelligence and Law 273, 278–79 (2017).

226. *See, e.g.*, Lawrence B. Solum, *Legal Personhood for Artificial Intelligences*, 70 N.C. L. Rev. 1231, 1258, 1262, 1276 (1992) (summarizing possible reasons that reject AI's personhood, including "AIs Are Not Humans," "The Missing-Something Argument," and "AIs Ought to Be Property").

227. *Civil Law Rules on Robotics, supra* note 102, ¶ 59.

touching on cultural, philosophical, and metaphysical roots deeply entrenched in each society (e.g., should "soul" be a benchmark, and if so, how do we assess its existence among different religious groups?).[228] It may be true that in the midterm, as Ugo Pagallo argues, one should "skip any hypothesis" of granting AI "full legal personhood."[229] In anticipation of AI's emerging ramifications, however, we suggest that trade policymakers should, on the one hand, keep track of global legal pluralism when WTO Members enter new terrain of human experience, and on the other, plan ahead to consider the possibility of expanding Mode 4 to include "electronic persons", creating a *sui generis* category sitting somewhere between Modes 3 and 4, or otherwise, given the limited reach of the proposed Mode 5.

Reallocating IPR in the age of AI is yet another eminent challenge for trade policymakers. From a policy perspective, the authorship of AI-generated works, as noted above, can be handled in several ways. The author can be the software programmer or the computer user; both of them may be joint authors. The most advanced view is to consider AI itself the author.[230] One may well expect another North-South divide. Developing and least-developed countries without institutional capacity are more likely to be downstream users, rather than programmers. As per a survey of 2018, there are only two emerging economies (i.e., China and South Korea) ranking among the top ten countries in terms of their overall AI performance benchmark.[231] Another source also indicates that high-tech companies from the developed world, the U.S. in particular, have the lion's share in both big data hardware and software markets globally.[232] Presumably, having the software programmer as the default author of AI-generated works may not be in the interests of those countries that lag behind their developed counterparts. Intriguingly, one may well expect a *twofold* North-North divide. First, it can stem from the underlying rationale protecting copyright: it is generally understood that civil law states tend to see it as the natural rights of the author, while the common law world centers on the incentives to create and invest in creativity for the benefit of the society as a whole.[233] Divergent rationales justifying the protected creation in different legal traditions could play a role in reshaping the copyright statutes in managing

228. Solum, *supra* note 226, at 1262–63 (arguing that "public reason cannot rely on particular comprehensive religious or philosophical conceptions of the good").

229. Ugo Pagallo, *Vital, Sophia, and Co.—The Quest for the Legal Personhood of Robots*, 9 INFORMATION 230 (2018).

230. Bruce E. Boyden, *Emergent Works,* 39 COLUM. J.L. & ARTS 377, 383 (2016) (summarizing different policy options of handing AI-generated works).

231. *Artificial Intelligence (AI) Performance Benchmark by Country as of 2018*, STATISTA, 2020, https://perma.cc/TCW8-8GNL.

232. *Artificial Intelligence—Big Data,* STATISTA, https://perma.cc/H4SG-J5ZA (among top market players in big data and analytics software market are Splunk, Oracle, IBM, SAP, Palantir, Cloudera, AWS, SAS, Microsoft, Informatica, and Hortonworks. Except SAP, a Germany-based firm, the rest are American companies).

233. *See generally* Cyrill P. Rigamonti, *Deconstructing Moral Rights*, 47 HARV. INT'L L. J. 353 (2006).

AI's challenges. Searching for a common ground to arrange AI-generated creations at the international level may turn out to be a *deja vu* experience for trade negotiators—as seen in the drafting history of excluding moral rights under Article 6*bis* of the Berne Convention from the TRIPs.[234] Even more intriguing is that, even within the common law world, countries can be divided on this score. As illustrated above, the U.K. CDPA attracts only some, but not all common law jurisdictions to follow suit. All of these exemplify the complexities of the global legal pluralism arising from both instrument and non-instrumental values when policymakers determine new legal frameworks governing AI.

There are proposals on other substantive issues too. Speaking of the moral dilemma of run-away self-driving cars, for instance, Germany's Federal Ministry of Transport and Digital Infrastructure in 2017 took the lead by elucidating key ethical principles featured in its report on "Automated and Connected" cars.[235] It requires, among others, that protecting individuals "take precedence over all other utilitarian considerations," and "technology must be designed in a way that critical situations do not arise in the first place [including a] dilemma. . . in which an automated vehicle has to 'decide' between two evils."[236] When a dilemma becomes unavoidable, it is strictly prohibited to make "any distinction based on personal features (age, gender, physical or mental construction)."[237] It is therefore clear that under the German approach the protection of human life takes the highest priority, and humans are equally important regardless of their personal characteristics in case of danger. While the way forward for other WTO Members remains to be seen, the German approach sheds light on at least two aspects. First and foremost, the pragmatic view argued by some American scholars will be rejected altogether in Germany. Second, while it is not clear how German engineers will address the trolley problem, the said ethical principles can be used to improve the automated vehicles that have already hit the road. For instance, if Uber's system, as has been reported, recognized pedestrians as unknown objects, rather than humans, it may find no place in Germany.[238] While one may argue that we need not worry about the trolley problem given the state of technology, ethical issues have already come to

234. Gervais, *supra* note 173, at 246 (noting that the exclusion of moral rights prompted negative reactions in a number of civil law countries, and it was viewed as a victory of the Anglo-American copyright system over its civil law counterparts).

235. Automated and Connected Driving Report, Fed. Ministry Transport & Digital Infrastructure, Ethics Comm'n 10–13 (2017), https://perma.cc/RQY5-WJZ4 [hereinafter German Ethics Report].

236. *Id.* at 10–11.

237. *Id.* at 11.

238. Nat'l Transp. Safety Board, Preliminary Report Highway: HWY18MH010 (May 24, 2018), https://perma.cc/6M53-REAC.

the fore. Germany's approach indicates the looming trade frictions in this context.[239]

Last, regarding concerns about the use of AI in the decision-making process, the EU's approach is instructive. Recital 71 and Article 22 of the General Data Protection Regulation (GDPR) feature "the right to explanation," which allows the data subject to have the right not to be subject to a decision "based solely on automated processing."[240] Likely, Article 7.12 of China's draft "Information Security Technology—Personal Information Security Specification" provides that if a decision solely based on automatic machines can "significantly affect the subject matter," the information controller should provide ways of appeal to that data subject.[241] While both are concerned about the automated decision-making, they approach this differently. The EU employs the *ex-ante* opt-in mechanism (e.g., consent and safeguards), while the proposed Chinese rule provides *ex-post* remedy which is subject to the "significantly affect" requirement.[242] More recently, the U.S. lawmakers tabled the draft bill of "Algorithmic Accountability Act of 2019"—one that is centered on the concept of risk/impact assessment by forcing companies to evaluate whether the algorithms powering the tools contain bias and whether they pose risk to consumer privacy or security.[243] The fact that three major trading powers—China, EU, and U.S.—have taken similar yet different paths once again illustrate the divergent regulatory philosophies towards AI's mixed opportunities. All of the above discussion on the substantive matters leads us to identify and reflect on the possible routes to manage the challenges of diversity in the age of AI below.

B. *Reconceptualizing AI and Global Trade Governance: Three Recommendations and Two Caveats*

Based upon the critical observations that flow from our analysis in all preceding sections, we further identify three normative dimensions and two

239. *See* Lim, *supra* note 131, at 120 (arguing that Germany's guideline, strictly interpreted, seems to indicate that "unless the use of autonomous vehicles 'promises' to decrease the harm compared with human driving, they should not be permitted on the road").

240. Regulation 2016/679, of the European Parliament and of the Council of 27 April 2016 on the Protection of Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data, and Repealing Directive 95/46/EC (General Data Protection Regulation), rec. 7.1 & art. 22, 2016 O.J. (L 119) 32, 33 [hereinafter GDPR].

241. Guojia biaozhun "xinxi anquan jishu geren xinxi anquan guifan (cao an)" gongkai zhengqiu yijian (信息安全技术:个人信息安全规范) [National Standard "Information Security Technology Personal Information Security Specification (Draft)" for public consultation] [hereinafter *Personal Information Security Specification (Draft)*].

242. By way of example, Article 7.12 of Personal Information Security Specification (Draft) refers to "determining personal credit and loan quotas" as the types of decisions significantly affecting the data subject. *Id*.

243. Algorithmic Accountability, S. 1108, 116th Cong. (2019). This Bill, if passed, will empower the Federal Trade Commission (FTC) to issue rules and regulations regarding the development of certain AI systems, set standards to determine unfairness, discrimination, or data vulnerability in the systems, and offer some oversight over system developers.

caveats for future scholarly endeavor and policymaking. The three normative dimensions are not isolated silos but mutually reinforcing pillars.

First and foremost, more institutional flexibility within the WTO is essential to allow for rigorous and dynamic cross-sectoral dialogue and cooperation on AI-related trade issues. Less focus should be laid on the specificity, stability, and predictability of rules, but on their adaptability, consistency, and optimal design. Considering the unique features of AI challenges and stagnation in forming traditional treaty rules among a widening group of governments with different views towards a disruptive technology, one may well envisage an alternative paradigm shaped by an increasing number of informal rules and standards.[244] These informal rules and standards not only feature new actors and processes but also generate innovative deliverables that outperform treaty-based norms.[245] Underlying this alternative vision is the move away from "thin state consensus" to "thick stakeholder consensus,"[246] which resonates with the dynamic development of AI and prompts the WTO to position itself in a way that is institutionally flexible enough to accommodate emerging challenges. Depending on the demand for political expediency and normative adaptability, different forms and substances of cooperation may be considered. For example, an *AI and Trade Task Force* under the WTO Secretariat, TBT Committee, or otherwise that facilitates cooperation and coordination as well as enables more stakeholders to be informed, get involved, and share best practices may be a sensible choice. Such a task force can also help WTO staff communicate with and learn from other international institutions such as the Organisation for Economic Cooperation and Development (OECD) that have already worked on AI's normative implications.[247] Other institutional designs, including *inter alia* initiatives, network, expert group, informal meeting, or review mechanism, may also be handy. Essentially, institutional flexibility and adaptability provide for a fertile ground for our second and third policy recommendations.

Second, the global trading system should be more deferential to local values and cultural contexts in addressing AI-related issues. One must exercise greater caution and refrain from pushing strong harmonization initiatives. To illustrate, the TBT Agreement operates on the presumption that use of international standards implies the WTO consistency. For anything

244. Such an emerging paradigm shift in global trade governance to informal rules and standards within and outside the WTO is described by Joost Pauwelyn as "rule-based trade 2.0." *See generally* Joost Pauwelyn, *Rule-Based Trade 2.0? The Rise of Informal Rules and International Standards and How They May Outcompete WTO Treaties*, 17 J. INT'L ECON. L. 739 (2014).

245. *Id.* at 740.

246. *Id.*

247. WTO, *About WTO—The WTO and the Organization for Economic Cooperation and Development*, https://perma.cc/4ZPB-783L (last visited Aug. 15, 2019) (as the WTO describes, the WTO Secretariat maintains close working relations with OECD Secretariat staff across various issue areas. The WTO Secretariat staff also attend the OECD Trade Committee meetings and other specific meetings.); *Recommendation of the Council on Artificial Intelligence*, ORG. FOR ECON. DEV. (May 22, 2019), https://perma.cc/4SAS-LSAM.

to qualify as a TBT-sense international standard, as per the Appellate Body, it should at least follow the six principles set forth in the 2000 TBT Committee Decision, including *transparency, openness, impartiality and consensus, relevance and effectiveness, coherence, and development dimension*.[248] Such thresholds reflect the normative elements emphasized by the scholarship of Global Administrative Law (GAL)[249] and are of paramount significance when we seek benchmarks from outside the WTO to resolve trade disputes. In our view, to impose on WTO Members a duty to cooperate should be interpreted and applied strictly in the context of AI in that algorithms and data sets are socially constructed, and WTO Members are immensely diverse in political, ethical, moral, cultural, and religious ways.[250] AI has provoked varying regulatory responses domestically, and such interventions can be politically contentious as they project important distributional consequences and generate clashes between values and agencies under different legal and political frameworks.[251] Even among otherwise like-minded liberal democracies with similar levels of economic development, they may still divide in the tastes on the design and enforcement of a regulatory regime.[252] Divergences are almost inevitable, and the WTO DSB will struggle to work around AI-related disputes within the established jurisprudence. More fundamentally, the core question goes beyond the WTO's jurisprudence and shifts to the institutional role that this organization ought to play in the age of AI vis-à-vis other spheres of governance to foster regulatory cooperation.[253] A looser, more flexible, framework of regulatory cooperation or trans-governmental network is more practicable and preferable than top-down, hard-law type of

248. Decision of the Committee on Principles for the Development of International Standards, *Guides and Recommendations with Relation to Articles 2, 5 and Annex 3 of the Agreement, in Decisions and Recommendations Adopted by the WTO Committee on Technical Barriers to Trade Since 1 January 1995*, at 46–48, G/TBT/1/Rev.10 (June 9, 2011).

249. *See generally* Benedict Kingsbury, *The Concept of 'Law' in Global Administrative Law*, 20 Eur. J. Int'l L. 23–57 (2009).

250. Notably, in a recent dispute, *Argentina-Financial Services*, although one of the key issues involved the regulating State's measures towards "cooperative" and "non-cooperative" countries, citing internationally agreed standards under the aegis of Financial Action Task Force (FATF) and Global Forum, the adjudicators said little about the WTO Members' duty to cooperate. *See* Appellate Body Report, *Argentina – Measures Relating to Trade in Goods and Services,* WTO Doc. WT/DS453/AB/R, para. 6.76-6.80 (adopted May 9, 2016) (while the AB reversed the Panel's "likeness" findings under Articles II:1 and XVII, it would take "no view on whether the services and service suppliers of cooperative countries are 'like' the services and service suppliers of non-cooperative countries, or 'like' Argentine services and service suppliers.").

251. *See* Dani Rodrik, The Globalization Paradox: Why Global Markets, States, and Democracy Can't Coexist 67–68 (2011) (arguing that "trade policy is politically contentious because it has important domestic distributional consequences and because it generate clashes between values and institutions in different nations"; therefore, "unqualified commitment to free trade. . .ceased to be practical, or even desirable, in a world where nations were experimenting with alternative visions of political economy.").

252. *See* Danile W. Drezner, All Politics is Global: Explaining International Regulatory Regimes 95 (2008) (noting that in the context of Internet regulations, even among OECD countries, liberal democracies are not in agreement on content regulations).

253. *See, e.g.*, Nikolai Malyshev & Céline Kauffmann, *International Regulatory Co-operation: The Menu of Approaches*, E-15 Initiative (2015), https://perma.cc/6F9F-X7M9.

harmonization mechanism.[254] The emerging notion of the "global sandbox"—Global Financial Innovation Network (GFIN)—officially launched in January 2019 by like-minded countries is a prime example.[255] The essential elements of global legal pluralism,[256] and informal international lawmaking (IN-LAW)[257] may be of growing relevance and guidance in such a softer framework of international trade cooperation, which leaves ample room for governments and societies to pursue their social, moral, and economic objectives, to experiment with alternative visions of AI governance, and to animate a delicate and dynamic compromise in cross-border settings. Equally important, the recent emergence of regulatory coherence clauses in new-generation FTAs may play a crucial role in urging governments to design rational, consistent, and technologically-informed (albeit diverse) regulations in response to the complexity and uncertainty posed by AI.[258]

The third dimension highlights incrementalism, minilateralism, and experimentalism. We argue that the global trading system led by the WTO and other regional trade agreements (legacy or mega-regional ones) should accommodate and encourage emerging sites of governance in relation to AI-related trade issues. As demonstrated in the above analysis on the challenges posed by AI and the resulting regulatory divergence and uncertainty, nesting in a rigid, multilateral legal framework with formal rules and standards will not stay unencumbered. Given the WTO's distinct characteristics,[259] self-contained mandates, and the lack of technical expertise, it seems unclear how the broader global trade governance regime will interact, normatively and practically, with other regimes of international law and transnational private ordering with regard to AI and trade governance. Softer, market-based, private/hybrid, minilateral, and experimental governance initiatives instead of multilateral, harder, command-and-control, purely public ones will likely develop into a multi-centered governance complex and pose normative impact on the WTO. While it may be difficult for WTO Members to cooperate and converge actively to form common governance strategies,

254. For a detailed account of trans-governmental network, see, e.g., Anne-Marie Slaughter, *Global Government Networks, Global Information Agencies, and Disaggregated Democracy,* 24 MICH. J. INT'L L. 1044 (2003).

255. *Global Financial Innovation Network (GFIN)*, Fin. Conduct Auth. (U.K.) (Jan. 21, 2019), https://perma.cc/RJE9-PHKU.

256. *See, e.g.*, PAUL SCHIFF BERMAN, GLOBAL LEGAL PLURALISM: A JURISPRUDENCE OF LAW BEYOND BORDERS (2012); Gregory Shaffer, *International Law and Global Public Goods in a Legal Pluralist World*, 23 EUR. J. INT'L L. 669 (2012); Fabrizio Cafaggia1 & David D. Caron, *Global Public Goods Amidst A Plurality of Legal Orders: A Symposium*, 23 EUR. J. INT'L L. 643 (2012); Amnon Lehavi, *Unbundling Harmonization: Public Versus Private Law Strategies to Globalize Property*, 15 CHI. J. INT'L L. 452 (2015); Andreas Fischer-Lescanoa & Gunther Teubner, *Regime-Collisions: The Vain Search for Legal Unity in The Fragmentation of Global Law*, 25 MICH. J. INT'L L. 999 (2004).

257. *See generally* INFORMAL INTERNATIONAL LAWMAKING (Joost Pauwelyn et al. eds., 2012).

258. *See generally* Ching-Fu Lin & Han-Wei Liu, *Regulatory Rationalization Clauses in FTAs: A Complete Survey of the US, EU, and China,* 19 MELB. J. INT'L L. 149 (2018); Han-Wei Liu & Ching-Fu Lin, *The Emergence of Global Regulatory Coherence: A Thorny Embrace for China?*, 40 U. PA. J. INT'L L. 133 (2018).

259. Robert Howse et al., *Pluralism in Practice: Moral Legislation and the Law of the WTO After Seal Products*, 48 GEO. WASH. INT'L L. REV. 81, 90–91 (2015).

fragmentation and conflicts are not unsolvable. Rather, there seem to be some governance initiatives outside of the WTO regarding AI and trade issues on national, regional, and transnational levels, which have developed organically and flown incrementally into certain hubs of convergence.[260] Minilateral, experimental, and incremental governance initiatives will not necessarily undermine the WTO multilateral framework but gain normative reference power for the organization to develop and design more technologically informed institutions and rules through inter-system cooperation, best practices formulation, mutual learning, consensus building, and information sharing.[261] By actively encouraging and engaging in the growing experimental governance initiatives, the WTO is better able to secure legitimacy, responsiveness, and accountability in addressing AI-related trade issues.

Having said that, two important caveats should be noted. The first caveat is derived from the fundamental "pacing problem" faced by lawmakers and the society in keeping up with rapid technological development and addressing the challenges posed therein.[262] AI techniques evolve at an exponential speed and are instantly integrated into all sectors of the society along a diverse array of technological trajectories with different development rates and application scenarios. Further, the convergence of multiple technologies can be mutually reinforcing and complicate one another's modes of use, "render[ing] regulatory oversight difficult at a national level, and treaty negotiation perilous at an international one."[263] Hence, the above three policy dimensions are not intended to be written in stone and should not stay rigid and static disregarding time and context. Rather, our recommendations need to be read with a note of responsive governance and live up to the spirit of institutional flexibility and normative adaptability. The other caveat stems from the changing power dynamic and interest groups landscape in the age of AI. International economic law, and more broadly, international law are oftentimes configured and reconfigured by the interactions between states along the North-South continuum. In the era of AI, states with the strongest technological power and the most amount of quality data will likely dominate.[264] A *new* North-South divide may therefore emerge and

260. According to a list compiled by the OECD, such initiatives have been implemented nationally in at least 31 countries, as well as regionally or transnationally by organizations such as the European Commission and G20. *See AI Initiatives Worldwide*, *supra* note 63.

261. For instance, many countries in both civil and common law worlds have modelled themselves on the U.K.'s sandbox approach to deal with Fintech. This is not just a one-way legal transplant, but a dynamic process that often involves bilateral regulatory cooperation through memorandum of understanding (MOU) or otherwise. *See* Dirk A. Zetzsche et al., *Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation*, 23 FORDHAM J. CORP. & FIN. L. 31, 38–43 (2017).

262. *See* Marchant, *supra* note 18, and the discussion in Part I.

263. Matthijs Maas, *International Law Does Not Compute: Artificial Intelligence and the Development, Displacement or Destruction of the Global Legal Order*, 20 MELB. J. INT'L L. 29, 51 (2019).

264. This may explain why certain developing countries have attempted to keep data at home through data localization measures in recent years. *See, e.g.*, Han-Wei Liu, *Data Localization and Digital Trade Barriers: ASEAN in Mega-Regionalism, in* ASEAN LAW IN THE NEW REGIONAL ECONOMIC ORDER: GLOBAL TRENDS AND SHIFTING PARADIGMS 371, 385 (Pasha Hsieh & Bryan Mercurio eds., 2019) (not-

shake up the existing agendas and socio-political underpinnings on which our recommendations are based. The core challenge is to ensure that the institutions and rules are designed to benefit the most rather than the few.

Conclusion

Trade policymakers, lawyers, and scholars have long struggled with challenges posed by disruptive innovations and digital technologies. There is no easy fix to many of these perennial digital trade issues. Some of them have been partly addressed through new-generation PTAs such as CPTPP, while others are temporarily moderated through adjudication. While the political economy has already made it difficult for the WTO to reconfigure itself to accommodate the virtual world, the rise of AI can only make this task even more problematic. Indeed, there is a continuity link between digital technologies and AI, and our past experiences and techniques managing digital trade issues may help trade policymakers harness AI's ramifications. Due to its unique nature, however, AI's implications will certainly go beyond what has been addressed in the earlier legal and policy discourse. This Article has unpacked and examined the complexity of trade issues raised by AI. Such complexity turns on not only redistributive effects between social classes within a country and between countries, but also reflects the deepest root of heterogeneous economic, societal, ethical, and political underpinnings across different states. Soon, we will envisage another wave of global regulatory diversities as well as multi-centric governance networks in this new paradigm. The hard question facing the WTO policymakers then is how to embrace such pluralism while resolving AI-related trade conflicts. In this Article, we advocate for a pluralist agenda, urging the WTO to reconfigure itself as a platform to facilitate softer, informal, and constructive dialogues among different stakeholders in fostering the development of AI and harnessing its associated risks for the benefit of mankind. Institutional flexibility to accommodate or support informal rules, greater respects for local values, and experimentalism to validate various new governance modes are much needed. In the meantime, however, one should bear in mind different WTO Members' capacities to manage the pacing problem and more crucially, the underlying dynamics that reshape the political economy between those haves and the have nots in the age of AI. All of these represent our attempts to maintain legitimacy, accountability, and more fundamentally, relevance of the WTO in addressing AI-related trade issues in the future.

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ing that "Indonesia would love to have 'the likes of Google and Microsoft open up data centres' within its border 'rather than in neighbouring Thailand or Malaysia'").