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Trade Law Architecture after the Fourth Industrial Revolution

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I INTRODUCTION

Technology stands to fundamentally change almost every aspect of human existence, with international trade and the international trade law system being no exception. There are two primary ways in which this change is taking place. The first is the capacity of technology to fuel the creation of new goods and services that can enter the global marketplace and be traded with greater speed and ease than their more physically embodied counterparts. The second is the possibility for technology to facilitate the regulation of international trade in ways that are more efficient, cost-effective, and inclusive.

While a considerable amount of attention is paid to this first change – how technology will impact the nature of what is traded – relatively little attention is paid to the way in which technology might change the modes and methods by which trade regulation is achieved. To the extent that future trade regulation has been considered, questions generally focus on how trade rules will change to adapt to technology, by modifying existing rules and including new disciplines.[1] So far, there has been no examination of how a future World Trade Organization (WTO) might itself take advantage of technology to restructure how it manages trade and fulfils its mandate. That mandate includes serving as a facilitator of trade agreements and market access negotiations, a forum for resolution of trade disputes, and a watchdog for national trade policies.[2]

Therefore, this chapter will examine current predictions about how the 'Fourth Industrial Revolution' will change the nature of trade, and then consider how trade regulation functions currently undertaken by organisations such as the WTO might be undertaken in future. To this end, in Section II the chapter first considers the emergence of a data-driven trade regime, brought about by emergent technologies,

[1] See M Burri, 'How Should the WTO Respond to the Data-Driven Economy?' (2020), https://perma.cc/U5PK-5ABN.

[2] These roles are defined in the Marrakesh Agreement, 15 April 1994, 1867 U.N.T.S. 154, 33 I.L.M. 1144 (1994). See also WTO, 'Four Roles of the WTO', https://perma.cc/4VJ7-YYN6.

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particularly artificial intelligence (AI), distributed ledger technologies (DLT, blockchain being a prime example), and the Internet of Things (IoT). In Section III, the chapter will consider how a data-driven trade law architecture might change the way in which the current WTO operates, focusing on issues such as dispute settlement, negotiations, notifications, and monitoring. Section IV concludes.

Before proceeding, it is necessary to stress that this chapter is fundamentally a 'thought experiment' – setting aside current technological limitations for consideration of what capacities are predicted to be available in future; setting aside political realities that limit consensus and structural change in favour of considering what could be possible if political will could be guaranteed; and – although it is an extremely important consideration – setting aside the question of the digital divide between well-resourced and less well-resourced states.[3] While absolutely acknowledging that these are important issues worthy of proper consideration – and that considerations of development deserve primacy in the trade system – they are outside the scope of the present chapter. With freedom from these limitations, it is possible to explore the transformative potential technology could have on a world trade law system for the future, allowing the possibility of future work 'circling back' to examine how all states can be supported to share in the potential benefits of both trade and technology.

II CHANGING GLOBAL TRADE AND THE FOURTH INDUSTRIAL REVOLUTION

The nature of trade has changed dramatically since the days of the General Agreement on Tariffs and Trade (GATT), and even since the creation of the WTO, with modern trade being characterised by an ever-increasing services sector and a very substantial increase in global supply chains, where components of goods, and their final assembly, are produced in multiple countries, and multiple cross-border transactions for a single final item are common.[4] The creation of global value chains was very much facilitated by improvements in technology, initially in transport and logistics, but accelerating dramatically with advances in information and communications technology (ICT).[5]

In 2015, Klaus Schwab, founder of the World Economic Forum, coined the phrase 'Fourth Industrial Revolution' to describe the impact of data-driven technologies that will merge the boundaries between the physical and the digital, the artificial and the biological. Schwab sets out the way in which societies and their

[3] R Azevêdo, 'DG Azevêdo: E-Commerce Needs to Be a Force for Inclusion' (WTO, 3 July 2019), https://perma.cc/JP2J-CLVU.

[4] B Hoekman, 'A 21st Century Trade Agenda: Global Supply Chains and Logistics Services', https://perma.cc/EV5R-N3K3.

[5] R Baldwin, *The Great Convergence: Information Technology and the New Globalization* (Cambridge, MA, Belknap Press of Harvard University Press, 2016). See also A Park et al., 'Supply Chain Perspectives and Issues: A Literature Review' (2013), https://perma.cc/ESK7-MJ82.

economies have been transformed by a successive wave of revolutions. These revolutions were, in order, the change from an agrarian to an industrial society, globalisation, the age of information, and then finally the upcoming Fourth Industrial Revolution. Its hallmark, according to Schwab, will be the seamless melding of technology into every facet of society, making it difficult to distinguish along traditional boundaries the beginning and end of 'technology', with progress taking place on a scale and at a pace not previously experienced.[6]

There is broad consensus that AI, blockchain, the IoT, and 3D printing are the emerging innovations most capable of fundamentally changing the nature of international trade.[7] These technologies will create new or reconceptualised products that can be traded, such as autonomous vehicles, intelligent robots, and nanotechnology-containing products, along with a multitude of services that will come to dominate the global market. This 'new wave' of services and goods will raise fundamental questions for the content of the trade rules, for example the nature of the regulatory division between goods and services,[8] the adequacy of existing trade rules to protect new forms of intellectual property,[9] and questions of trade, privacy, and data protection.

As a result, WTO rules will need to be adapted to incorporate and address new types of products and services, to advance agreement on trade-related aspects of e-commerce, to address rights and obligations in relation to flow of data, and to review agreements such as the GATS to make it adequately technologically neutral.[10] Technological change has also caused new issues for dispute settlement, with the WTO noting that '[a]s international trade increasingly involves both digital products and digital methods of transmission and delivery, the WTO dispute settlement system has increasingly found itself tasked with resolving disputes related to aspects of the digital economy'.[11] An example of the difficult questions that can arise without a clear legal framework for new technologies is *EC – Computer Equipment*, which required determination of whether products such as network cards fell within the European Communities' tariff schedule for 'automatic data-processing equipment'.[12]

[6] K Schwab, *The Fourth Industrial Revolution* (London, Penguin Random House, 2017).

[7] Global Shapers Community Geneva, 'Trade 2030 and the Fourth Industrial Revolution (4IR): Bringing the Vision and Thoughts of the Youth to the World' (2018), https://perma.cc/M3FG-VT4J.

[8] S-Y Peng, 'A New Trade Regime for the Servitization of Manufacturing: Rethinking the Goods-Services Dichotomy' (2020) 54(5) *Journal of World Trade* 669–726. See also P Low, 'Rethinking Services in a Changing World', ICTSD/World Trade Forum Policy Options Paper, https://perma.cc/VFW8-BNZF.

[9] See, for example, SA Aaronson, 'Artificial Intelligence Is Trade Policy's New Frontier' (CIGI, 11 January 2018), https://perma.cc/A5UH-NX7K; L Zhang and KK Shang, 'The WTO Disciplines and Trade in Products Powered by Artificial Intelligence: Old Wine and New Wine-Skin?' (2019) 12(1) *Journal of East Asia & International Law* 31.

[10] RW Staiger, 'On the Implications of Digital Technologies for the Multilateral Trading System' in WTO, *World Trade Report 2018* (2018), https://perma.cc/N7TT-4X4F, at 150.

[11] Ibid., at 168. See also Yuka Fukunaga's Chapter 8 in this volume.

[12] Appellate Body Report, *European Communities – Customs Classification of Certain Computer Equipment*, WT/DS62/AB/R, WT/DS67/AB/R, WT/DS68/AB/R, 5 June 1998.

The following subsection A explores how technology will continue to challenge and change the international trade system generally, and more specifically in relation to transformational technologies such as AI. However, as this chapter argues, focusing just on how trade patterns will change, or even how the content of trade rules will change, is only part of the bigger picture. Attention also needs to be given to how trade organisations themselves can and must change to adapt to technology.

A *Technology and Trade: What Is Changing?*

In a paper for the World Economic Forum, Christine Lagarde identified a number of ways in which our data-driven world would cause transformations in the nature of trade. She points, firstly, to a huge increase in the proportion of trade in services, and secondly to a new wave of productivity that may see the use of technology such as 3D printing to bring customised manufacturing back to advanced economies, as well as to the possibilities of technology bringing about a more just and inclusive trade system.[13] Part of the transformation to which Lagarde refers is already evident, particularly in relation to storage of data remotely, a concept that was unthinkable even a short time ago. According to the Open Data Institute, cloud storage of data is now used by some 2 billion people globally,[14] making it one of the most widely traded of cross-border services.

While many technologically based innovations are generating change, there are three in particular that experts predict will have the most fundamental impact upon the international trade system – AI, blockchain, and the IoT. The key attributes of each will be examined in turn, focusing on how international trade law currently considers each technology, and then upon how the technology itself might be used to improve trade law architecture.

1 Artificial Intelligence

At the heart of AI is recognition of data patterns and iterative 'learning' from that data – in other words, it is an engagement with data that goes beyond collating information to include building and interpreting rules for the use of that information – and 'reasoning', where rules and data can be used and applied appropriately to reach conclusions. This can take a range of forms, some of which have been around for many years (for example, IBM's Deep Blue or Apple's Siri), and others which are still many decades away. O'Halloran and Nowaczyk offer a five-fold classification of AI that illustrates its broad range of functions:

[13] C Lagarde, 'Here Are 4 Building Blocks for the New Era of Trade which Will Benefit Everyone' (World Economic Forum, 30 May 2018), https://perma.cc/GLL3-9S35.

[14] L Kay, 'What Are the Links between Data Infrastructure and Trade Competitiveness?' (2019), https://perma.cc/6VXA-LYJ2.

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1. Rules-based systems that set parameters and conditions to enable scenario testing;
2. Machine learning that applies algorithms to decipher patterns and linkages in the data by continuously updating 'learning' through an iterative process;
3. Neural networks that identify interconnected nodes through multi-layered data to derive meaning;
4. Deep learning that leverages pools of high-dimensional data to identify patterns of patterns; and
5. Pattern recognition that uses tools, such as natural language processing, to classify and interpret data.[15]

One of the most sophisticated examples of usable AI today is Google Duplex, an intelligent assistant that is voice activated and can interact with a human caller at the other end of the line, and make phone calls.[16] Autonomous vehicles are being deployed across the developed world, and AI-enabled diagnostic technologies are being presented as superior to expert humans in the identification of potentially successful embryos for IVF transplants.[17]

Current work at the WTO has primarily highlighted the potential for AI to drive trade efficiencies across manufacturing, transport, and supply chain management – in other words, for efficiencies on the private-party side of the trade equation. This would include, for example, the use of autonomous vehicles throughout much of the logistics process, greatly reducing cost. The WTO's research also makes reference to customs efficiencies, which are an important aspect of trade facilitation. Outside observers tend to focus more on issues such as the exponential growth of trade in data, pointing out that the data aggregation and analytic capacity of AI raises issues of trade in data of a scale never before encountered. 'Big data' is by its nature a cross-border transaction, with applications typically synthesising data gathered, transmitted, and re-transmitted across national borders. Aaronson identifies three themes in trade-focused discussion of AI, which are starting to appear in regional trade agreements:

> Today, trade policy makers in Europe and North America are working to link AI to trade with explicit language in bilateral and regional trade agreements. They hope this union will yield three outputs: the free flow of information across borders to facilitate AI; access to large markets to help train AI systems; and the ability to limit cross-border data flows to protect citizens from potential harm consistent with the exceptions delineated under the General Agreement on Trade in Services. These exceptions allow policy makers to breach the rules governing trade in cross-border data to protect public health, public morals, privacy, national security or

[15] S O'Halloran and N Nowaczyk, 'An Artificial Intelligence Approach to Regulating Systemic Risk' (2019) 2 *Frontiers in Artificial Intelligence* 7, at 8.

[16] See 'Google Duplex: A.I. Assistants Calls Local Businesses to Make Appointments' (YouTube, 8 May 2018), www.youtube.com/watch?v=D5VN56jQMWM.

[17] 'Ivy – Artificial Intelligence in IVF', https://perma.cc/K3XZ-5BSJ.

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intellectual property, if such restrictions are necessary and proportionate and do not discriminate among WTO member states.[18]

There is also a focus on the race for AI primacy within the global trade system, noting that different countries have adopted different rules on privacy and use of big data, and that this can operate alongside policies designed to attract research and development (R&D) within their borders.[19]

From a trade architecture perspective, AI offers new and interesting possibilities for better trade regulation, bringing together data insights previously inaccessible because of their complexity, and driven by unprecedented volumes of data on trade flows and transactions across all levels of the supply chain from producer to consumer. This AI capability offers future potential for better dispute avoidance, automatic application of trade rules to cross-border transactions, and possibilities for real-time, dynamic trade measures to protect domestic markets from distorting trade practices. These possibilities are discussed in more detail later.

2 The Internet of Things

The second technology of relevance to trade governance is known as the IoT, a term referring to technology that 'equips everyday objects with identifying, sensing, networking and processing capabilities that allow them to communicate with one another and with other devices via the internet to achieve particular objectives'.[20] The potential uses of the IoT span the entire range of human life and economy – from wearable health devices and automated homes, to smart communities, through to manufacturing, agriculture, and supply chain management. For example, automated sensors on a factory floor can respond to changes in temperature or pressure; machine components can communicate maintenance requirements; and smart devices have transformed agriculture by automatically adjusting pesticide or fertilizer use to actual weather or soil conditions.[21] The data generated from these sensors has a myriad of uses beyond just more efficient production practices, providing information also of relevance for research and policy.

Just as containerization revolutionised maritime trade, so too the IoT has already begun to revolutionise global supply chains and logistics practices, where RFIDs

[18] SA Aaronson, 'Data Minefield? How AI Is Prodding Governments to Rethink Trade in Data' (CIGI, 3 April 2018), https://perma.cc/W7RX-LR3Y.

[19] A Goldfarb and D Trefler, 'AI and International Trade' (2018) National Bureau of Economic Research Working Paper No. 24254; see also P Cihon, 'Standards for AI Governance: International Standards to Enable Global Coordination in AI Research and Development' (2019), https://perma.cc/9XWX-5GLN.

[20] WTO, 'World Trade Report 2018: The Future of World Trade – How Digital Technologies Are Transforming Global Commerce' (2018), https://perma.cc/5CBR-FK7V, at 6.

[21] US Government Accountability Office, 'Internet of Things: Status and Implications of an Increasingly Interconnected World' (2017), https://perma.cc/WFP3-HKXU.

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(radio frequency identification devices) can track shipments through the transit process. One example used in the WTO's Future of World Trade Report is shipping company Maersk's use of remote devices in its refrigerated containers to monitor performance and improve predictive maintenance – which in turn can reduce costly claims against it for damaged cargo.[22] Another potential trade benefit of automatically collected data is improved compliance and reduced risk of fraud, as well as more streamlined customs processing, as production and transport data can be correlated to verify the composition, origin, and attributes of goods. This is particularly the case when 'smart tags' can be combined with blockchain technology.

Seamless electronic borders, currently one of the negotiation points of Brexit, envision the use of mechanisms such as RFID chips attached to all goods crossing the border, embedded weighing points under border roads, and facial recognition and video cameras to scan vehicle numberplates.[23] This data can be transmitted directly to central databases and stored in the blockchain. Other government functions can also take advantage of the blockchain, with it providing almost inscrutable records for the purposes of tax collection, customs valuation, and customs clearance. As sensor technologies evolve and diversify, they have the potential to provide data about sanitary and phytosanitary measures, as well as the technical specifications of goods.

3 Distributed Ledger Technologies Such as Blockchain

Blockchain is the term typically used to describe DLT, although more correctly, blockchain is a form of DLT – in the same way that a Granny Smith is a variety of apple, but not all apples are Granny Smiths. The hallmark of DLT is that they are like databases for information storage, except that, as their name suggests, the storage is distributed rather than centralised. This distributed data can be independently verified through the system, rather than relying upon a trusted intermediary to certify the accuracy of the data. As Werbach explains, there are two primary benefits to this distributed ledger approach – the first that transactions can be verified and trusted without the need to trust any particular individual in the transaction – which is of great benefit in a globalised world where trust is difficult to establish. The second benefit is the reduction of transaction costs, as 'the single distributed ledger replaces many private ledgers that must be reconciled for consistency'.[24] The most widely

[22] See WTO, note 20 above, at 67.

[23] A Nardelli, 'This Leaked Report Reveals the "Technological Solutions" Explored by Liam Fox to Keep the Border in Ireland Open After Brexit' (*Buzzfeed News*, 7 February 2019), www.buzzfeed.com/albertonardelli/leaked-report-irish-border-technology (note that in the context of the Brexit debate, it is generally conceded that the technology would not be viable until approximately 2030); see B Kentish, 'Leaked Memo Warns Hi-Tech Brexit Border Solution "Years Away"' (*Belfast Telegraph*, 18 April 2019), https://perma.cc/M7W9-VEK2.

[24] K Werbach, 'Trust, but Verify: Why the Blockchain Needs the Law' (2018) 33(2) *Berkeley Technology Law Journal* 487, at 491.

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known example of this technology in action is cryptocurrencies such as Bitcoin, although the potential of the technology goes vastly beyond cryptocurrencies.[25]

In the international trade sphere, blockchain could be used to dramatically enhance current efforts in trade facilitation. This approach is already being tested in the financial services sector as a means of streamlining interbank transactions, and in trade through a partnership called Tradelens between IBM and Maersk, designed to reduce the large administrative expenses associated with the handling of containers.[26] Blockchain replaces paper-based processes, and party-to-party messaging is replaced with centralised, electronic storage of information, which will offer not just economic benefits but also the possibility of secure access to information for parties outside the trade transaction, including governments and international organisations.

Current examples of this technology include pilot initiatives to trace the trade of diamonds, through the TRACR project,[27] and the IBM Foodtrust tool to track the authenticity of seafood and other key food products.[28] Similarly, Clipeum is a European bank joint venture that allows clients a 'corporate vault' in which to store transaction information, and a means of granting and revoking access to that information to financial institutions. Governments too, such as the United Arab Emirates (UAE), are aiming to transform the transactions they undertake, with the UAE expecting to have half of its government's transactions blockchain-based by 2021.[29]

DLT, particularly through the use of smart contracts, complements AI to offer transformative potential to international trade. As the World Customs Organization explains,

> Blockchain organizes data into blocks, which are chained together in an append-only mode. It has the capability to move any kind of data swiftly and securely and, at the same time, make a record of that change, movement, or transaction instantly available, in a trusted and immutable manner, to the participants in a Blockchain network. In addition, the use of 'smart contracts', a set of rules that are written down and executed automatically, enables the avoidance of intermediaries, which act as arbiters of money and information.[30]

This is the approach taken by the UAE, which offers a glimpse of the future of trade. It has partnered with industry to create a one-platform system for licensing and

[25] For a contrary view, see E Schuster, 'Cloud Crypto Land' (in press) *Modern Law Review*, https://doi.org/10.1111/1468-2230.12603.

[26] 'Maersk and IBM Introduce TradeLens Blockchain Shipping Solution' (IBM, 9 August 2018), https://perma.cc/S6NE-D9B6.

[27] 'Tracr', www.tracr.com.

[28] 'IBM Food Trust: A New Era for the World's Food Supply', https://perma.cc/9LME-ZAUX.

[29] World Economic Forum, 'Inclusive Deployment of Blockchain: Case Studies and Learnings from the United Arab Emirates' (2020), https://perma.cc/8JKD-JFL3.

[30] 'Blockchain: Unveiling Its Potential for Customs and Trade', https://perma.cc/JUL8-NURR.

registration of traders and the digitisation of shipping and export documentation, including export authorisations and certificates of origin.[31]

The WTO has also studied the ramifications of DLT and blockchain, noting the ability of these technologies to improve transactional efficiencies and reduce administrative costs:

> The intrinsic characteristics of the technology also make it a potentially interesting tool to help implement the WTO Trade Facilitation Agreement (TFA) and to facilitate business-to-government (B2 G) and government-to-government (G2 G) processes at the national level. Blockchain and smart contracts could help administer border procedures and national single windows (a single point of entry through which trade stakeholders can submit documentation and other information to complete customs procedures) in a more efficient, transparent and secure manner, and improve the accuracy of trade data.[32]

While the WTO has invested considerable time in identifying how the object of its regulation will change – namely trade – it has not openly engaged in discussion on how it as an organisation might change or evolve as a result of DLT and blockchain. While the same report notes that a consignment of flowers from one continent to another generates a huge pile of paperwork that will one day be transformed by blockchain, the report does not talk about the WTO adapting its own processes to make trade regulation more efficient. Here too there is potential for the same technology to create seamless, automatised resolution of regulatory issues – including the identification, assessment, and evaluation of trade remedies of safeguards, countervailing duties and antidumping duties.

There is also an opportunity within the WTO to consider the automation and potential convergence of trade data to drive a new approach to rules negotiations, trade policy reviews, accession negotiations, and market access negotiations. Both data and documentation could be automatically generated from smart sensors, with information about customs valuation and product origin generated from data gathered along the supply chain and stored on the blockchain. At this point it becomes possible for government certification processes to take place automatically, with databases granting certifications using automatic decision making. For example, the components of a mobile phone will have been tracked as they enter the country of assembly, with the details of the supply chain being stored in a blockchain. The data trail can be combined with other data sources used to calculate the production cost of the product, a valuation for customs purposes, and used by an importing government to determine applicable tariffs and duties. 'Through [government] participation in the blockchain', Okazaki notes, 'customs would be able to collect the necessary data in an accurate and timely way (all data

[31] World Economic Forum, note 29 above, at 12.

[32] E Ganne, 'Can Blockchain Revolutionize International Trade?' (2018), https://perma.cc/H3JF-RSLL, at IX.

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tied to the commodity like seller, buyer, price, quantity, carrier, finance, insurance, status and location of the commodity)'.[33]

III DATA-DRIVEN TRADE LAW ARCHITECTURE

As this chapter has explained, a data-driven world of trade is emerging, and emerging rapidly. Some impacts of these changes are clear, such as the changing nature of trade itself, intensification of the shift from trade in goods towards trade in services and intellectual property, and erosion of their definitional barriers, the need for data regulation that balances competing interests of rights and obligations, and new, complex questions about human rights and trade.[34] For the WTO, these changes necessitate rethinking substantive trade rules and the creation of new rules, advancing its work programme on e-commerce,[35] and working with other organisations such as the United Nations Commission on International Trade Law to ensure that suitable e-commerce regulations are in place. At the same time, states with a particular national interest in technology are advancing digital trade provisions on their own terms through bilateral and regional agreements.[36]

As indicated earlier, there is potential to use the same technologies that will transform trade and trade rules to transform the functions and operations of the WTO. At a time when many are critical of a lack of progress in multilateral trade fora, with some attributing aspects of the problem to the organisation and its mandate rather than the behaviour of its members, it becomes particularly important to consider what might be done better in an organisation.[37]

One part of the puzzle when exploring how the WTO might embrace the possibilities of transformative technologies is to consider where in the trade ecosystem key activities are taking place, and the challenge is how and on what terms an international organisation can engage. As the examples in this chapter have shown, projects such as Tradelens are driven by large, multinational corporations – in this case, IBM and Maersk – to create an open standard platform that has built a 'trade ecosystem', which in its own words is a 'global network of interconnected shipping corridors [that] will link ports and terminals, authorities, ocean carriers, inland

[33] Y Okazaki, 'Unveiling the Potential of Blockchain for Customs' (2018) WCO Research Paper No. 45, at 3.

[34] See, for example, H Gao, 'Google's China Problem: A Case Study on Trade, Technology and Human Rights under the GATS' (2011) 6 *Asian Journal of WTO and International Health Law and Policy* 347.

[35] World Trade Organisation, 'Electronic Commerce', www.wto.org/english/tratop_e/ecom_e/ecom_e.htm. See also Henry Gao's Chapter 15 in this volume.

[36] For comprehensive analysis of these agreements, see the TAPED Database, created by Mirra Burri and others: www.unilu.ch/en/faculties/faculty-of-law/professorships/managing-director-internationalisation/research/taped.

[37] See, for example, the list presented in J Nakagawa and CB Picker, 'An Introduction to Utopian and Dystopian Post-WTO Regimes and Environments', in MK Lewis et al. (eds), *A Post-WTO International Legal Order: Utopian, Dystopian and Other Scenarios* (Cham, Springer, 2020), at 10.

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transportation, 3pls, shippers, and other actors'.[38] While Tradelens already has government bodies as part of its ecosystem, it does not envisage an obvious role for the WTO. Similarly, Boston Consulting Group produced a comprehensive White Paper examining how 'data field interactions' could be optimised to harmonise the flow of information between participants in the trade process. Their mapping of 'players' included five different types of parties – corporates (importers and exporters); banks; facilitators such as insurers and freight forwarders; disruptors such as tech companies; and 'governing bodies', which they specify as including the importing and exporting customs services. This is a very telling 'lens' through which trade is analysed by the commercial sector – in addition to being transaction driven, international organisations do not feature strongly, let alone convey a clear sense of how the WTO fits in.[39] While they identify the importance of standards and interconnection protocols, there is no clear sense of the regulatory role that the WTO and the international community as a whole plays now and could play in future. This type of analysis shows the importance of enhanced effort by the WTO to be involved in these types of conversations, and to consider its own initiatives to generate global platforms.

Therefore, the remainder of this chapter takes up the challenge of considering how the WTO might reconfigure its management of trade, providing an audit of a range of areas in which change – some radical, some less radical – could allow the WTO to better facilitate future trade. Below are ten ideas to illustrate the range of potential changes that could be possible (again, reminding readers of the 'thought experiment' provisos set out in the introduction to this chapter).

1. Better negotiations – and fewer. The complexity of multilateral market access negotiations is due in part to the number of participants and the difficulty of modelling outcomes from different scenarios. AI is capable of producing sophisticated optimisation models to cross-reference market gains and suggest concessions that could be made by WTO members, modelling trade creation and trade deviation to optimise overall trade benefits.[40] Data could be more easily correlated from different private and public sector sources to enhance its reliability, and better model the distributional effects of proposed changes. As member acceptance of use of algorithms increases, it would be possible for members to agree in advance to be bound by algorithmic determinations of market access, and for these to be automatically generated

[38] A Jorgensen, 'Tradelens' (27 November 2018), https://perma.cc/MSN6-E3VG.

[39] 'Digital Innovation in Trade Finance: Have We Reached a Tipping Point?' (2017), https://perma.cc/CYA4-PUYZ, at 9.

[40] For example, a computable general equilibrium model is generally recognised to be the most effective methodology for modelling concessions in multiparty negotiations, but is also recognised to be expensive and very time consuming, and require large amounts of data, leading to choices of less satisfactory but less difficult models. See M Bacchetta et al., 'A Practical Guide to Trade Policy Analysis' (2012), https://perma.cc/P3HJ-ET4P, at 8–9.

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under the auspices of the WTO with automatic entry into effect. This stands to benefit smaller and more vulnerable states who are negatively impacted by the politicisation of the process.

2. Better data on real-world compliance. The design of the WTO Dispute Settlement System requires a state to take on what is likely to be a grievance of one or more of its private corporate citizens. The political reality is that most failures to comply with WTO rules will not result in dispute unless the breach is substantial and systematic. However, this gives a very distorted picture of real levels of compliance with WTO law across the board – especially on applied tariff rates, quotas, sanitary and phytosanitary measures, and trade remedies. A data-driven trade organisation that is able to harness the 'big data' of international trade derived from business and government sources will gain a much richer picture of adherence to WTO rules, and the transparency will provide incentive for states to ensure more rigorous compliance.
3. Automatic, dynamic, real-time measures. Data will become available more quickly, with a higher level of verifiability and specificity, which has the ability to change how subsidies and safeguard mechanisms are applied and maintained, and provide granular data that can help determine appropriate balances between market protection and market access. This could allow 'real-time' changes to market access when certain conditions are met, and automatic calibration of volumes within agreed ranges, without the direct involvement of member states. Traders and WTO members would have instant, accurate information on subsidies and safeguard mechanisms in operation at any time.
4. More sophisticated technical assistance. Learning has long been a feature of the WTO's outreach activities, but more recently initiatives such as Tradelab have taken advantage of their digital platform to connect developing country governments and non-government organisations with pro-bono advice services offered primarily by trained law students.[41] Technology such as chatbots is already available, and could be used to semi-automate technical advice services to help provide support for developing country officials in locating and interpreting trade law obligations.
5. New outreach activities. The WTO has made an effort to extend its outreach activities to businesses, for example through its joint 'small business champions' programme with the International Chamber of Commerce,[42] the 'ePing' sanitary and phytosanitary and technical barriers to trade alert system,[43] and trader-focused information pages.[44] One of the great promises of technology is its potential to democratise law by narrowing the gap

[41] 'About TradeLab', https://perma.cc/AB4U-Q5RW.
[42] 'Small Business Champions Initiative', https://perma.cc/JL6A-CE6M.
[43] 'ePing', www.epingalert.org/en.
[44] 'The Trade Facilitation Agreement (TFA): What's It About?', https://perma.cc/C67G-MADJ.

between experts and non-experts, facilitating self-help by making knowledge more broadly accessible. This has been a prominent feature of domestic legal systems,[45] but the same logic applies to the international trade law environment as well. This can be made available globally and free, accessible via a mobile phone, and could help developing country exporters identify entry requirements for markets in which they wish to trade. End users could ask questions in natural language, and use question and answer formats to generate documentation to apply for permits and licences. This could reduce or eliminate the need for brokers in trade transactions, ensure better compliance, and generate efficiencies across the supply chain, as well as improving trader engagement with the WTO.

6. Replacement of notification bureaucracy. Notification processes have been a key area of capacity building for the WTO, which notes that the process is burdensome precisely because it is both necessary and important.[46] The notification system is still largely paper driven, with hundreds of notifications required.[47] For example, the Agreement on Import Licensing Procedures obliges members to notify the WTO on the source of import licensing procedures and to lodge copies of those procedures, provide updates, and complete a detailed annual questionnaire. However, there are numerous shortcomings with the current process – the system is slow to document changes, administratively burdensome on states,[48] and does almost nothing to communicate import licensing provisions to those that need to know – traders. WTO notification databases could be designed to dovetail with member governments' blockchain and e-government initiatives, such as those of Dubai, to make this information mostly accessible without the bureaucracy of notification.
7. Better management of contingent measures such as antidumping duties. Retaliatory antidumping is considered to be on the rise[49] and directly undermines the trade system. Disputes such as the zeroing cases further illustrate the challenges of bringing reluctant states into compliance.[50] Centralising

[45] In the domestic context, see L Toohey et al., 'Meeting the Access to Civil Justice Challenge: Digital Inclusion, Algorithmic Justice and Human-Centred Design' (2019) 19 *Macquarie Law Journal* 133.

[46] 'The importance attached by negotiators to this issue explains the very elaborate system of notifications and cross-notifications put in place under the terms of most Agreements. Notifications are a necessary burden, particularly for the administrations and governments of developing countries'. See 'Technical Assistance in Meeting Member's Notification Obligations', https://perma.cc/3HDN-EHKZ.

[47] See, for example, the extensive list in Annex 1 of the Decision on Notification Procedures.

[48] See also 'Technical Cooperation Handbook on Notification Requirements' (2019), https://perma.cc/R84T-PUXM.

[49] RM Feinberg and KM Reynolds, 'The Spread of Antidumping Regimes and the Role of Retaliation in Filings' (2006) 72 *Southern Economic Journal* 877.

[50] The most notable of the zeroing cases included: *United States – Final Dumping Determination on Softwood Lumber from Canada*, WT/DS264/AB/R (31 August 2004); *United States – Laws, Regulations and Methodology for Calculating Dumping Margins (Zeroing)*, WT/DS294/AB/R (18 April 2006); and

control of antidumping duties through the WTO would be feasible through the use of smart contracts and AI. Integrity, transparency, and monitoring could be greatly improved by using a WTO portal for states to initiate antidumping actions. Traders and government would have access to data, but the system would use automated or supported rendering of margin calculations. If data suggested that a product was being dumped in a foreign market, based on trade and sales data, antidumping duties could be automatically attached by use of an algorithm, and antidumping duties remitted to states as part of a fully integrated trade transaction.

8. Rethinking rules. One of the most exciting longer-term possibilities is to create trade measures that can be self-executing in the sense that they do not rely on states to apply or rescind them. For example, the WTO's technology systems would have the capacity to monitor trade flows, prices, and other relevant data, and automatically activate safeguards such as import restrictions based on algorithms, for precisely the duration required to mitigate serious injury. Sunset clauses would operate automatically, and data would be collated from data from the government and private sector.
9. Enhanced support for integrity, human rights, and sustainability. Sustainability data and other credentials can be attached to the blockchain providing information about a product or service, facilitating the communication of this information to consumers, allowing the management of pollution/carbon tax and credit schemes, and helping to minimise tax avoidance and financial fraud. Trade-based money laundering is a greatly increasing category of sophisticated financial crimes that uses physical shipments to launder money, disguising and moving the proceeds of crime on the pretence of legitimate trade in goods. It is considered one of the most difficult to identify, as it relies on techniques such as falsifying the invoiced value of goods, misrepresentation of the nature of goods or services, or misrepresented financial transactions.[51] While consumer demand and government interest may see these schemes evolve from the private sector, the WTO could take the lead or engage in a partnership to roll out a global programme.
10. Small claims arbitration. Online filing and dispute resolution platforms have become an expected part of the justice landscape. It is increasingly commonplace to see the use of AI as part of document management and document review, and supported decision-making tools have been deployed, frequently controversially and poorly, to help judges assess complex phenomena such as the chance of recidivism.[52] The trade law environment contains a particularly

United States – Continued Existence and Application of Zeroing Methodology, WT/DS350/AB/R (4 February 2009).

[51] See S McSkimming, 'Trade-Based Money Laundering: Responding to an Emerging Threat' (2010) 15 (1) *Deakin Law Review* 37.

[52] For discussion of the problematic nature of some algorithms, see Toohey et al., note 45 above.

large number of data-intensive decisions that lend themselves to supported decision-making technology. Certain types of disputes take 'airtime' but involve largely transactional parts of trade that currently take up a lot of time, resources, and political goodwill. With tariffs, antidumping, subsidies, safeguards, rules of origin, and customs valuation largely automated, and with the possibility of significantly streamlining the identification of some breaches of most favoured nation, sanitary and phytosanitary, and technical barriers to trade obligations, we may be able to devote remaining energies to the truly complex issues of the interaction between trade and human concerns such as human rights, public health, and sustainability. As technology advances, a small claims arbitration jurisdiction could be created to offer traders a single portal for resolution of these issues. Notwithstanding the significant challenges of creating algorithms that are transparent and just,[53] arbitration could be undertaken by AI or by human arbitrators supported with smart databases.

IV CONCLUSION

It may seem like fanciful thinking to imagine a world in which all parties and stakeholders in an international transaction – traders, exporting government, importing government, and international organisations – automatically collate, verify, and apply relevant trade laws to a transaction without the need for much human intervention. However, the foundations for such a system already exist and are evolving rapidly. This chapter has sought to come to terms with the dramatic changes to trade presented by technology – to trade itself, to trade transactions, to trade rules, and to a reconceptualised role for an international trade organisation.

It is worth emphasising what was stated at the outset – that the challenges of equity and political engagement are real, and may seem insurmountable. To translate these ideas into reality would require political willpower that surely seems unrealistic at this time. However, given the speed with which private enterprise is creating platforms, change may come sooner than we expect, with governments able to see the advantages of efficiency that integrated systems can bring. In that sense, change is imminent regardless of the preferences of WTO members or the organisation itself.

Technology of the type outlined in this chapter presents a fork in the road for the WTO (or a future trade organisation) by recalibrating its relationship with member states and the types of action perceived by states as part of their sovereignty – such as the calculation of antidumping duties. It also has the potential to recalibrate the

[53] See ME Kaminski, 'Understanding Transparency in Algorithmic Accountability', in W Barfield (ed.), *Cambridge Handbook of the Law of Algorithms* (Cambridge, Cambridge University Press, 2020), at 121–138.

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relationship of individuals with international law by offering more direct mechanisms for engagement and dispute resolution.

At the same time, much work is needed to better understand the range of technological changes that are possible, and to build nuanced and considered responses. This chapter has sought to provide a modest contribution to that effort.