
Technological Neutrality and Regulation of Digital Trade: How Far Can We Go?

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Abstract

In this age of rapid digital transformations, the principle of technological neutrality can help the international economic community adapt dated rules to changing realities. While the acceptance of this principle would respond to the difficulty of timely norm making and norm updating in international relations, it could also cause legal uncertainty in the case of unforeseen technological developments in the future. Therefore, not every country today is willing to unconditionally acknowledge the applicability of 'old' rules for any emerging trading patterns enabled by, or based on, digital and other technological innovations. The World Trade Organization, the United Nations Commission on International Trade Law and several regional trade agreements have addressed technological neutrality in the context of electronic commerce and digital trade. This article examines this issue, focusing on such areas of trade regulation as services, intellectual property and paperless trading, and concludes that the principle of technological neutrality should be given universal recognition, supplemented by policy flexibilities where necessary.

1 Introduction

The digitalization of production, supply chains and our daily life affects international trade significantly by creating electronic channels for trading and commercializing digital products and services. At the same time, this process has brought about a number of new issues and challenges for regulators to address at both the national and international levels.¹ With the rapid development of information and

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¹ For the latest discussion, see, e.g., S. Shadikhodjaev, *Industrial Policy and the World Trade Organization: Between Legal Constraints and Flexibilities* (2018), at 1–4, 171–173.

communications technology (ICT) and the advent of the Internet, it is often argued that, unless provided otherwise, rules on offline activities should apply to comparable online activities alike.² This is in line with the principle of technological neutrality (or technology neutrality), which prevents rules from favouring or discriminating against a particular technology in pursuing regulatory objectives.³ Depending on the legal context, this principle may call for regulating the effects of technology use rather than the technology itself, and may also require offline and online functional equivalence, ban discrimination between technologies with essentially identical effects or functions or work against hindering the use or development of particular technologies.⁴

The principle of technological neutrality seeks to ensure a rule's longevity and equal application across different technologies.⁵ It enables the market to decide itself what technology is better suited for achieving a particular goal, which in turn promotes competition and the free development of various technologies.⁶ However, technology-neutral rules lack predictability, especially when the drafters could not have anticipated certain technologies. Regarding this feature, one official in an international meeting even wondered if the 1990s-era global rules on transportation services could apply to now-imaginary time travel or rail transport from the earth to the moon if these became scientifically possible one day in the future.⁷

The question of whether or not to accept the principle of technological neutrality has been a controversial part of the World Trade Organization's (WTO) ongoing discussions on electronic commerce (or e-commerce). Since the WTO's establishment in 1995, production, consumption and trading patterns have changed dramatically and currently involve various digital innovations, such as artificial intelligence, the Internet of things, additive manufacturing (3D printing) and blockchain.⁸ The scale of global e-commerce has expanded tremendously.⁹ But the WTO rules have remained

² See, e.g., Reed, 'Online and Offline Equivalence: Aspiration and Achievement', 18 *International Journal of Law and Information Technology* (2010) 248.

³ United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), Explanatory Note to the Framework Agreement on Facilitation of Cross-Border Paperless Trade in Asia and the Pacific (2016), para. 20, available at www.unescap.org/sites/default/files/Revised%20Explanatory%20Note_Post%202nd%20IISG%20Version_0.pdf.

⁴ Koops, 'Should ICT Regulation Be Technology-Neutral?', in B.-J. Koops *et al.* (eds), *Starting Points for ICT Regulation: Deconstructing Prevalent Policy One-Liners* (2006) 77, at 83–87. For the copyright context, see Tussey, 'Technology Matters: The Courts, Media Neutrality, and New Technologies', 12 *Journal of Intellectual Property Law* (2005) 427, at 476–487; Craig, 'Technological Neutrality: Recalibrating Copyright in the Information Age', 17 *Theoretical Inquiries in Law* (2016) 601, at 604–618.

⁵ Greenberg, 'Rethinking Technology Neutrality', 100 *Minnesota Law Review* (2016) 1495, at 1512–1513.

⁶ C. Lo, *Treaty Interpretation under the Vienna Convention on the Law of Treaties: A New Round of Codification* (2017), at 264–265.

⁷ World Trade Organization (WTO), Committee on Specific Commitments – Report of the Meeting Held on 14 October 2015 – Note by the Secretariat, Doc. S/CSC/M/74, 27 November 2015, paras 2.28, 2.31.

⁸ See WTO, *The Future of World Trade: How Digital Technologies Are Transforming Global Commerce*, World Trade Report (2018), at 24–35.

⁹ For example, global e-commerce stood at US \$25 trillion in 2015, up from US \$16 trillion in 2013. United Nations Conference on Trade and Development (UNCTAD), *Information Economy Report 2017: Digitalization, Trade and Development* (2017), at 15.

largely unchanged for more than two decades due to considerable difficulty concluding negotiations, which accentuates the relevance of the technological neutrality issue today more than ever. Non-WTO international forums have also addressed this issue in the digitalization context.¹⁰

This article aims to examine the principle of technological neutrality as applied to 'digital trade' or 'electronic commerce'/'e-commerce' – the terms that are used here either as synonyms (given the absence of a clear-cut distinction and their interchangeable usage in different sources)¹¹ or in the way they are cited in original legal texts. Because of the broadness of the subject matter of trade regulation, the focus will be on the areas of services and intellectual property where digital aspects of technological neutrality have gained considerable attention as well as on paperless trading where some non-WTO standards offer a comparative perspective on technological neutrality.

The remainder of this article is structured as follows. Section 2 looks into the legal status of technological neutrality as a principle of regulation and a factor influencing treaty interpretation. Section 3 examines its applicability to the digitalization of services trade and trade-related aspects of intellectual property rights (TRIPS), followed by Section 4, which discusses technological neutrality together with the closely related concepts of 'media neutrality'¹² and 'functional equivalence' within paperless trading. Section 5 proposes concrete ways for moving towards a universal WTO-wide recognition of the principle of technological neutrality as combined with regulatory flexibilities. Section 6 concludes this analysis.

2 The Legal Status of Technological Neutrality

Whether a particular rule is technologically neutral can be established directly by the legal text itself or by way of its interpretation. This section examines the status of technological neutrality as a regulatory principle and an element of treaty interpretation.

A *Technological Neutrality as a Principle of Regulation*

The earliest attempts to accommodate technological neutrality within the 'ICTized' trading system can be traced back to the 1980s and 1990s. Considering the ever-increasing role of automatic data processing in documenting international trade, the United Nations Commission on International Trade Law (UNCITRAL) recommended

¹⁰ See Sections 2.A and 4 of this article.

¹¹ According to the WTO's working definition, the term 'electronic commerce' means 'the production, distribution, marketing, sale or delivery of goods and services by electronic means'. WTO, Work Programme on Electronic Commerce – Adopted by the General Council on 25 September 1998, Doc. WT/L/274, 30 September 1998, para. 1.3. For unclear distinctions between 'electronic commerce'/'e-commerce' and 'digital trade', see, e.g., WTO, Committee on Specific Commitments – Report of the Meeting Held on 15 March 2017 – Note by the Secretariat, Doc. S/CSC/M/78, 1 May 2017, paras 2.3–2.24.

¹² Throughout this article, the term 'media neutrality' means neutrality of 'media' (or mediums) as a way of expressing or communicating something rather than 'media' as a form of audiovisual services.

in 1985 that governments and relevant international bodies should review their rules to remove unnecessary obstacles to the use of trade-related ‘computer records’, ‘electronic means of authentication’ and operations in ‘computer-readable form’.¹³ The underlying purpose was to integrate electronic technologies into commercial documentation.

In 1997, the United States of America’s (USA) government strategy entitled the Framework for Global Electronic Commerce set out certain principles to guide the drafting of future rules governing international e-commerce, including the principle that ‘rules should be technology-neutral (i.e., the rules should neither require nor assume a particular technology) and forward looking (i.e., the rules should not hinder the use or development of technologies in the future)’.¹⁴ In the same year, the Declaration of the European Ministerial Conference on global information networks stressed that ‘the general legal frameworks should be applied on-line as they are off-line’ and that governments should ‘frame regulations which are technology-neutral, whilst bearing in mind the need to avoid unnecessary regulation’.¹⁵

In 1998, the Asia-Pacific Economic Cooperation emphasized the need for ‘technology-neutral, competitive market-based solutions’ in addressing e-commerce.¹⁶ Since the adoption of the WTO work programme on electronic commerce in 1998, technological neutrality has been one of the ‘cross-cutting issues’ in the multilateral trading system, albeit with the lack of WTO-wide acceptance of it as a regulatory principle.¹⁷ A newly launched WTO plurilateral initiative on electronic commerce negotiations, which currently has over 80 members,¹⁸ discusses, *inter alia*, the role of technological neutrality in regulating digital trade.¹⁹ Recently, the issue of technological neutrality has also been covered by the Organization for Economic Co-operation and Development,²⁰ the now-suspended talks on the Trade in Services Agreement among

¹³ United Nations Commission on International Trade Law (UNCITRAL), Recommendation on the Legal Value of Computer Records (1985), available at www.uncitral.org/pdf/english/texts/electcom/computerrecords-e.pdf.

¹⁴ US White House, The Framework for Global Electronic Commerce (1997), available at <https://clinton-whitehouse4.archives.gov/WH/New/Commerce/index.html>.

¹⁵ European Communities (EC), European Ministerial Conference – Global Information Networks: Realising the Potential – Bonn, 6 to 8 July 1997 (1998), Ministerial Declaration, para. 22.

¹⁶ Asia-Pacific Economic Cooperation (APEC), APEC Blueprint for Action on Electronic Commerce (1998), available at www.apec.org/Meeting-Papers/Leaders-Declarations/1998/1998_aelm/apec_blueprint_for.aspx.

¹⁷ WTO, Dedicated Discussion on Electronic Commerce under the Auspices of the General Council on 15 June 2001 – Summary by the Secretariat of the Issues Raised, Doc. WT/GC/W/436, 6 July 2001; see also Section 3 of this article.

¹⁸ WTO, Joint Statement on Electronic Commerce, Doc. WT/L/1056, 25 January 2019; Ismail, E-Commerce in the World Trade Organization: History and Latest Developments in the Negotiations under the Joint Statement (2020).

¹⁹ See, e.g., WTO, Joint Statement on Electronic Commerce – Establishing an Enabling Environment for Electronic Commerce – Communication from the European Union, Doc. INF/ECOM/10, 25 March 2019, at 3–4; WTO, Joint Statement on Electronic Commerce – Electronic Commerce and Copyright – Communication from Brazil and Argentina – Revision, Doc. INF/ECOM/16/Rev.1, 25 March 2019, at 4.

²⁰ The Organization for Economic Co-operation and Development (OECD) calls for maintaining ‘technology neutrality’ for all Internet services in securing ‘an open and dynamic Internet environment’ and suggests

a subset of WTO members²¹ and data protection laws.²² Out of 75 regional trade agreements (RTAs) containing digital trade provisions, three explicitly accept the principle of technological neutrality as such; 11 forbid treating electronic commerce more restrictively than non-electronic trade; and 10 work against lowering consumer protection in electronic commerce as compared to other forms of commerce.²³ The relevant UNCITRAL rules provide for media and technological neutrality as well as functional equivalence.²⁴

The principle of technological neutrality often puts regulators in a dilemma because it future-proofs a rule, on the one hand, but creates uncertainty as to that rule's applicability to unforeseen technological developments, on the other.²⁵ In the digital trade context, such hesitancy may also be exacerbated by certain complications for governmental control caused by such features of the Internet ecosystem as the 'borderless' nature of cyberspace, the involvement of intermediaries in copying, storing and transmitting information online, the transportation of all communications in digital form and the availability of a proper ICT infrastructure. Unsurprisingly, this principle may be circumscribed to secure some room for technology specificity where relevant.²⁶ In response to such a legal quandary, the literature suggests certain rule-making techniques, such as using the technology-neutral language in a high-ranking regulation and its technology-specific elaboration in a subordinate regulation; inserting open-ended descriptions of technologies; combining abstract and concrete rules

that suppliers be able to deliver services over the Internet 'on a cross-border and technologically neutral basis'. OECD, OECD Council Recommendation on Principles for Internet Policy Making, 13 December 2011, Annex (Communique on Principles for Internet Policy-Making).

²¹ See a draft of the Trade in Services Agreement's Annex on Electronic Commerce. The leaked draft text dated 16 September 2013 was released in May 2016 at WikiLeaks, available at https://wikileaks.org/tisa/document/20151001_Annex-on-Electronic-Commerce/20151001_Annex-on-Electronic-Commerce.pdf.

²² For example, the European Union's (EU) General Data Protection Regulation, Council Regulation (EU) 2016/679, OJ 2016 L 119/1, governing the processing of personal data relating to individuals in the EU, states in Recital 15 that 'the protection of natural persons should be technologically neutral and should not depend on the techniques used'. Such protection applies to the processing of personal data by automated means and to manual processing where relevant.

²³ J.-A. Monteiro and R. Teh, 'Provisions on Electronic Commerce in Regional Trade Agreements', WTO Working Paper no. ERS-D-2017-11 (2017), at 4–5, 34, 41, 47–48. See Section 5 of this article. For trade regionalism, see also Shadikhodjaev, 'The "Regionalism vs Multilateralism" Issue in International Trade Law: Revisiting the *Peru – Agricultural Products Case*', 16 *Chinese Journal of International Law* (2017) 109; Shadikhodjaev, 'Duty Drawback and Regional Trade Agreements: Foes or Friends?', 16 *Journal of International Economic Law (JIEL)* (2013) 587; Shadikhodjaev, 'Keeping Regionalism under "Control" of the Multilateral Trading System: State of Play and Prospects', 19 *Law and Business Review of the Americas* (2013) 327; Shadikhodjaev, 'Checking RTA Compatibility with Global Trade Rules: WTO Litigation Practice and Implications from the Transparency Mechanism for RTAs', 45 *Journal of World Trade (JWT)* (2011) 529; Shadikhodjaev, 'Trade Integration in the CIS Region: A Thorny Path Towards a Customs Union', 12 *JIEL* (2009) 555.

²⁴ See Section 4 of this article.

²⁵ See Reed, 'Taking Sides on Technology Neutrality', 4 *SCRIPT-ed* (2007) 263.

²⁶ See, e.g., Recital 18 of the Council Directive (EC) 2002/21, OJ 2002 L 108/33 (stating that the technological neutrality requirement should not prevent promotion of 'certain specific services where this is justified, for example digital television as a means for increasing spectrum efficiency').

within the same technology regulation; defining a technology-neutral framework for fundamental principles to be followed by technology-specific laws; prescribing periodic reviews of rules; and envisaging sunset clauses in technology laws.²⁷

B *Technological Neutrality as Part of Treaty Interpretation*

Articles 31–33 of the Vienna Convention on the Law of Treaties (VCLT) are dedicated to treaty interpretation.²⁸ Article 31(1) provides that a treaty ‘shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose’. As the WTO Appellate Body puts it, interpretation pursuant to Article 31 is ‘ultimately a holistic exercise that should not be mechanically subdivided into rigid components’.²⁹ The VCLT is silent on whether it is the time of a treaty’s conclusion or its interpretation at which the meaning of a treaty term should be understood. The VCLT’s drafters consciously omitted any explicit reference to such a temporality query.³⁰ Although the legal doctrine and international judicial practice lack consistency in tackling this issue, an evolutionary (or dynamic) way of interpreting treaties seems to have gained wider acceptance in recent times than in the past.³¹ As a ‘factor’ to be considered in treaty interpretation,³² the principle of technological neutrality is essentially embedded in the method of evolutionary interpretation where it stretches a rule’s meaning to the technically altered subject matter or circumstances at a later point.

Technical transformations, linguistic changes in the meaning of a term and other post-treaty developments³³ may necessitate evolutionary interpretation of at least ‘generic’ terms contained in a treaty. While what is ‘generic’ is difficult to precisely determine,³⁴ manifestly specific or non-inclusive terms are arguably not generic. The Appellate Body in *US – Shrimp* found that such a ‘generic term’ as ‘natural resources’ mentioned in Article XX(g) of the General Agreement on Tariffs and Trade (GATT) was ‘by definition, evolutionary’ rather than ‘static’ and thus encompassed both living and non-living resources alike.³⁵ In *China – Publications and Audiovisual Products*, the Appellate Body noted that the terms ‘sound recording’ and ‘distribution’ in China’s schedule of services commitments

²⁷ Koops, *supra* note 4, at 104–107.

²⁸ Vienna Convention on the Law of Treaties (VCLT) 1969, 1155 UNTS 331. For a legal analysis of case-specific VCLT-based treaty interpretation in the WTO, see, e.g., Shadikhodjaev, ‘Customs Duty or Internal Charge? Revisiting the Delineation Issue within Treaty Interpretation in the *China – Auto Parts Case*’, 7 *Asian Journal of WTO & International Health Law and Policy* (2012) 195, at 198–215.

²⁹ WTO, *European Communities – Customs Classification of Frozen Boneless Chicken Cuts – Report of the Appellate Body* (EC – *Chicken Cuts*, Appellate Body report), 27 September 2005, WT/DS269/AB/R, WT/DS286/AB/R, para. 176.

³⁰ I. Van Damme, *Treaty Interpretation by the WTO Appellate Body* (2009), at 55–56.

³¹ For an overview of the doctrine, VCLT drafting negotiations and judicial practice, see Marceau, ‘Evolutionary Interpretation by the WTO Adjudicator’, 21 *JIEL* (2018) 791, at 793–803.

³² Lo, *supra* note 6, at 267.

³³ Marceau, *supra* note 31, at 793.

³⁴ Van Damme, *supra* note 30, at 297, 370.

³⁵ WTO, *United States – Import Prohibition of Certain Shrimp and Shrimp Products – Report of the Appellate Body* (US – *Shrimp*, Appellate Body report), 6 November 1998, WT/DS58/AB/R, paras 130–131. General Agreement on Tariffs and Trade (GATT) 1994, 55 UNTS 194.

were ‘sufficiently generic that what they apply to may change over time’ and that the General Agreement on Trade in Services (GATS), services schedules and all WTO agreements represented ‘multilateral treaties with continuing obligations that WTO Members entered into for an indefinite period of time’.³⁶ In support, the Appellate Body cited³⁷ the *Costa Rica v. Nicaragua* case where the word ‘comercio’ (that is, ‘commerce’) in an 1858 treaty was construed as covering both trade in goods and trade in services, even though the latter was not contemplated when that treaty was concluded.³⁸ There, the International Court of Justice importantly specified the conditions for presuming the parties’ intention to accept the evolving meaning of generic terms:

[W]here the parties have used *generic terms* in a treaty, the parties necessarily *having been aware that the meaning of the terms was likely to evolve over time*, and where the treaty has been entered into for a very long period or is ‘of continuing duration’, the parties must be presumed, as a general rule, to have intended those terms to have an evolving meaning.³⁹

Similarly, the WTO adjudicators interpreted the words ‘commercial’, ‘normal exploitation’ of patents, ‘public morals’ and ‘public order’ appearing in different legal texts in a non-static way. These terms are arguably generic even though they were not explicitly characterized in this way.⁴⁰

By contrast, the panel in *European Communities (EC) – IT Products* avoided the use of the evolutionary interpretation method. There, the key issue was whether the EC’s concessions of not imposing any import duties under the 1996 Ministerial Declaration on Trade in Information Technology Products (also known as ‘Information Technology Agreement’ (ITA)) extended to some products that the EC contended were ‘new’ and thus not eligible for duty-free treatment. The panel noted that the EC’s concession on flat panel display devices was worded in ‘generic terms ... to cover a wide range of products and technologies’, including EC-contested video monitors used both as part of computers and as television screens.⁴¹ But the panel ‘d[id] not consider it necessary

³⁶ WTO, *China – Measures Affecting Trading Rights and Distribution Services for Certain Publications and Audiovisual Entertainment Products – Report of the Appellate Body (China – Publications and Audiovisual Products*, Appellate Body report), 19 January 2010, WT/DS363/AB/R, para. 396. General Agreement on Trade in Services (GATS) 1994, 1869 UNTS 183.

³⁷ *Ibid.*, para. 396, n. 705.

³⁸ *Dispute Regarding Navigational and Related Rights (Costa Rica v. Nicaragua)*, Judgment, 13 July 2009, ICJ Reports (2009) 213.

³⁹ *Ibid.*, at 243, para. 66 (emphasis added).

⁴⁰ WTO, *China – Measures Affecting the Protection and Enforcement of Intellectual Property Rights – Report of the Panel (China – Intellectual Property Rights*, panel report), 20 March 2009, WT/DS362/R, para. 7.657; WTO, *Canada – Patent Protection of Pharmaceutical Products – Report of the Panel (Canada – Pharmaceutical Patents*, panel report), 7 April 2000, WT/DS114/R, para. 7.55; WTO, *United States – Section 110(5) of the US Copyright Act – Report of the Panel (US – Section 110(5) Copyright Act*, panel report), 27 July 2000, WT/DS160/R, para. 6.187; WTO, *United States – Measures Affecting the Cross-Border Supply of Gambling and Betting Services – Report of the Panel (US – Gambling*, panel report), 20 April 2005, WT/DS285/R, para. 6.461; WTO, *European Communities – Measures Prohibiting the Importation and Marketing of Seal Products – Reports of the Appellate Body*, 18 June 2014, WT/DS400/AB/R / WT/DS401/AB/R, para. 5.199.

⁴¹ WTO, *European Communities and Its Member States – Tariff Treatment of Certain Information Technology Products – Reports of the Panel (EC – IT Products*, panel reports), 21 September 2010, WT/DS375/R / WT/DS376/R / WT/DS377/R, paras 7.592–7.593, 7.599. WTO, Ministerial Declaration on Trade in Information Technology Products, Doc. WT/MIN(96)/16, 13 December 1996.

to resort to any form of evolutionary interpretation of the terms’ and confirmed the technological inclusiveness of the concession in question on the grounds that, *inter alia*, the relevant technologies were not unknown during the ITA negotiations.⁴²

With respect to the ‘ordinary meaning’ of treaty terms, WTO jurisprudence lacks uniformity in approaching the temporality of reading members’ schedules. On the one hand, the panel in *EC – Chicken Cuts* adopted static interpretation of the word ‘salted’ (used for characterizing meat) in the EC’s goods schedule by making a statement – not reviewed at the appellate stage – that ‘the “ordinary meaning” [of an interpreted term] is to be assessed at the time of *conclusion* of the treaty in question’.⁴³ Interestingly, the panel reached this conclusion despite its admitted awareness of the Appellate Body’s evolutionary interpretation of ‘natural resources’ in *US – Shrimp*. ‘However’, the panel said somewhat unconvincingly, ‘none of the parties to this dispute have advocated such an “evolutionary” approach for the EC concession in question’.⁴⁴

On the other hand, in the subsequent *China – Publications and Audiovisual Products* case that assessed the scope of ‘sound recording distribution services’, the Appellate Body rejected static interpretation – and approved of the contemporary ordinary meaning – of the GATS scheduled commitments:

[I]nterpreting the terms of GATS specific commitments based on the notion that the ordinary meaning to be attributed to those terms can only be the meaning that they had at the time the Schedule was concluded would mean that very similar or identically worded commitments could be given different meanings, content, and coverage depending on the date of their adoption or the date of a Member’s accession to the treaty. Such interpretation would undermine the predictability, security, and clarity of GATS specific commitments ...⁴⁵

Under such an evolutionary approach, a treaty interpreter would consider a term’s most recent meaning identifiable in the dictionary definitions with which an analysis of the ordinary meaning normally starts,⁴⁶ with the caveat that dictionaries alone cannot be dispositive of the ordinary meaning as it must be ascertained holistically together with the other components under Article 31 of the VCLT.⁴⁷

As it follows from the judicial practice, generic terms used in long-term or continuing treaties, including the WTO agreements, can be presumed to have the

⁴² *EC – IT Products*, panel reports, *supra* note 41, para. 7.600, n. 807.

⁴³ WTO, *European Communities – Customs Classification of Frozen Boneless Chicken Cuts – Reports of the Panel (EC – Chicken Cuts*, panel reports), 27 September 2005, WT/DS269/R (*Brazil*) / WT/DS286/R (*Thailand*), para. 7.99 (emphasis in the original); see also *EC – Chicken Cuts*, Appellate Body report, *supra* note 29, paras 174–176.

⁴⁴ *EC – Chicken Cuts*, panel reports, *supra* note 43, para. 7.99, n. 144. While none of the disputing parties mentioned the evolutionary approach explicitly, the respondent, in fact, did argue that the meaning of the term at issue must be assessed as of the date of the panel establishment as opposed to the date of signing the related WTO instrument in 1994 on which the complainants insisted (paras 7.95–7.98, 7.102–7.103).

⁴⁵ *China – Publications and Audiovisual Products*, Appellate Body report, *supra* note 36, para. 397.

⁴⁶ Marceau, *supra* note 31, at 805.

⁴⁷ *China – Publications and Audiovisual Products*, Appellate Body report, *supra* note 36, para. 348.

evolving meaning unless they were expressly intended to be frozen in time.⁴⁸ By the same token, such generic terms can be said to be technologically neutral where the impact of technology changes is at issue.⁴⁹ With respect to non-generic terms whose static or dynamic status is not obvious and cannot be deduced from the original intent of drafters, technological neutrality may prevail in the course of teleological interpretation that focuses on the object and purpose of the treaty.⁵⁰ For example, if a trade agreement's purpose is to open domestic markets to certain foreign goods and/or services, an interpretative extension of non-generic definitions of covered goods/services to their technical modifications could serve this trade-liberalizing purpose. However, when underlying changes are sufficiently substantive but too drastic, static interpretation may take precedence. In this connection, the panel in *Mexico – Telecoms* cited the 'rapid technological evolution' of telecommunications services to hold that 'some of the telecommunication provisions seem to be technology-specific and may no longer reflect prevailing industry practices'. The panel did not specify those provisions.⁵¹ As the GATS-envisaged telecommunication services like telex or telegraph services are hardly usable today,⁵² the panel's statement would incline one towards giving a static meaning to the trade commitments on such outdated services.

3 Services, Intellectual Property and Digital Trade

Technological neutrality pertains to virtually any digital aspect of market openings under the WTO and RTA regimes as well as under related national systems. In the goods sector, technological neutrality can be linked to tariff treatment⁵³ and non-discrimination,⁵⁴ among other things. Ironically, a trade-liberalizing WTO moratorium on 'customs duties on electronic transmissions'⁵⁵ – restated in several RTAs⁵⁶ – actually deviates from the principle of technological neutrality by favouring an electronic

⁴⁸ It is noteworthy that in interpreting the generic term 'natural resources', the Appellate Body took into account the fact that 'the drafting history does not demonstrate an intent on the part of the framers of the GATT 1947 to exclude "living" natural resources from the scope of application of Article XX(g)'. *US – Shrimp*, Appellate Body report, *supra* note 35, para. 131, n. 114 (emphasis in the original).

⁴⁹ See Peng, 'Renegotiate the WTO "Schedules of Commitments"?: Technological Development and Treaty Interpretation', 45 *Cornell International Law Journal* (2012) 403, at 427 (arguing that the notion of 'generic terms' and the principle of technological neutrality 'conceptually reinforce each other').

⁵⁰ Marceau, *supra* note 31, at 807, 812.

⁵¹ WTO, *Mexico – Measures Affecting Telecommunications Services – Report of the Panel (Mexico – Telecoms, panel report)*, 1 June 2004, WT/DS204/R, para. 7.2 and accompanying n. 799.

⁵² Peng, 'Trade in Telecommunications Services: Doha and Beyond', 41 *JWT* (2007) 293, at 297.

⁵³ See *EC – IT Products*, *supra* note 41 and the related part of this article.

⁵⁴ For example, Article III of the GATT on national treatment may involve products' 'internal sale, offering for sale, purchase, transportation, distribution or use' via different means. Already in 1947, it was stated that 'transportation' in this passage comprised 'all kinds of transportation, from a man's back to jet-propelled rockets', which suggests technological neutrality of that term. GATT Analytical Index, *Guide to GATT Law and Practice* (1995), vol. 1, at 181 (citing Doc. EPCT/A/PV/9, at 43).

⁵⁵ WTO, General Council – Work Programme on Electronic Commerce – General Council Decision – Adopted on 10 December 2019, Doc. WT/L/1079, 11 December 2019.

⁵⁶ Monteiro and Teh, *supra* note 23, at 28–33.

way of trading.⁵⁷ Although the actual scope of this moratorium is not clear enough, it is generally understood to cover digital products delivered electronically, such as e-books, digitally encoded sound recordings or computer programmes and online-transmitted computer-aided design files used by 3D printers for producing physical goods.⁵⁸ The next sub-sections will focus on the fields of services and intellectual property where the issue of technological neutrality has been especially controversial in the e-commerce context.⁵⁹

A Trade in Services

The GATS lays down both general obligations on trade in services and sector-specific commitments on market access and national treatment as inscribed in national schedules. WTO members have differently perceived the silence of the GATS on technological neutrality. On the one hand, a summary of an ‘informal meeting’ of the WTO Council for Trade in Services provides that:

Members agreed that the GATS applied to all services regardless of the means of technology by which they were delivered. ... It was noted that the principle of technological neutrality also applied to scheduled commitments, unless the schedule specified otherwise: it was therefore possible for Members to schedule commitments in a non-technologically neutral manner. It was suggested that consideration should be given to how technological neutrality in electronic commerce would apply to existing commitments and to certain new services.⁶⁰

Likewise, a subsequent WTO progress report on electronic commerce cites ‘the general view that the GATS is technologically neutral in the sense that it does not contain any provisions that distinguish between the different technological means through which a service may be supplied’.⁶¹

On the other hand, the same progress report also mentions some delegations’ view about the complexity of this issue and the need for further examination.⁶² A number of members, including Brazil, India, Thailand, the Philippines, Uruguay, Malaysia,

⁵⁷ A. Mattoo and L. Schuknecht, ‘Trade Policies for Electronic Commerce’, Policy Research Working Paper no. 2380 (2000), at 16–17.

⁵⁸ See S. Wunsch-Vincent, *The WTO, the Internet and Trade in Digital Products: EC–US Perspectives* (2006), at 38–39; WTO, General Council – 26–27 July 2018 – Work Programme on Electronic Commerce – Moratorium on Customs Duties on Electronic Transmissions: Need for a Re-think – Communication from India and South Africa, Doc. WT/GC/W/747, 13 July 2018; Monteiro and Teh, *supra* note 23, at 30–32; UNCTAD, *Rising Product Digitalisation and Losing Trade Competitiveness* (2017), at 15–18.

⁵⁹ It is noteworthy that the Japan–Switzerland Free Trade and Economic Partnership Agreement (FTEPA), 19 February 2009, available at www.seco.admin.ch/seco/en/home/Aussenwirtschaftspolitik_Wirtschaftliche_Zusammenarbeit/Wirtschaftsbeziehungen/Freihandelsabkommen/partner_fha/partner_weltweit/japan.html, ‘recognise[s] the principle of technological neutrality’ in electronic commerce *vis-à-vis* services only, even though the e-commerce chapter explicitly covers both goods and services (Arts 70, 71.2).

⁶⁰ WTO, Council for Trade in Services – Report of the Meeting Held on 14 and 15 December 1998 – Note by the Secretariat, Doc. S/C/M/32, 14 January 1999, at 4.

⁶¹ WTO, Work Programme on Electronic Commerce – Progress Report to the General Council – Adopted by the Council for Trade in Services on 19 July 1999, Doc. S/L/74, 27 July 1999, para. 4.

⁶² *Ibid.*

Saint Lucia and some others, have expressly opposed the idea about the WTO-wide acceptance of the GATS' technological neutrality.⁶³ The main concerns are that technological neutrality undermines the members' legitimate discretion under the GATS for committing only in the sectors of their choice;⁶⁴ that it is unreasonable to stretch the commitments made in the 1990s to 'the completely new and revolutionary businesses models based on digital environment'⁶⁵ and that the technology-neutral extension of those commitments contradicts the GATS principle of progressive liberalization by obviating the need for further commitments.⁶⁶ But, on the last point, the Appellate Body in *China – Publications and Audiovisual Products* made it clear that the principle of progressive liberalization merely contemplated incremental liberalization of services trade through successive rounds of multilateral negotiations and was not meant to constrain the scope of already bound specific commitments.⁶⁷

Unlike in other sectors, the WTO scheduling guidelines for basic telecom services created an explicit general assumption of technological neutrality. Pursuant to the chairman's note, unless it is scheduled otherwise, any listed basic telecom service 'may be provided through any means of technology (e.g. cable, wireless, satellites)', and 'private leased circuit services' involve the ability of suppliers to sell or lease 'any type of network capacity', including 'capacity via cable, satellite and wireless network'.⁶⁸ In practice, this would mean that a member's commitments on, for instance, voice telephone services should extend to such services delivered over the Internet if the related national schedule is silent on the technological means of delivery. The chairman's note in question is 'not intended to have or acquire any binding legal status' but, rather, 'to assist delegations in ensuring the transparency of their commitments and to promote a better understanding of the meaning of commitments'. Nevertheless, the panel in *Mexico – Telecom* considered the note as part of the supplementary means of interpretation.⁶⁹

⁶³ See WTO, General Council – Exploratory Work on Electronic Commerce – Non-Paper from Brazil, Doc. JOB/GC/176, 12 April 2018, para. 4.4; WTO, Committee on Trade and Development – Note on the Meeting of 27 October and 8 November 2000, Doc. WT/COMTD/M/31, 14 December 2000, para. 57; WTO, Council for Trade in Services – Special Session – Report of the Meeting Held on 14 to 17 May 2001 – Note by the Secretariat, Doc. S/CSS/M/9, 22 June 2001, para. 182; WTO, Committee on Trade in Financial Services – Report of the Meeting Held on 6 October 2003 – Note by the Secretariat, Doc. S/FIN/M/42, 12 November 2003, para. 16; WTO, Committee on Trade in Financial Services – Report of the Meeting Held on 16 May 2003 – Note by the Secretariat, Doc. S/FIN/M/40, 30 June 2003, paras 28, 34–35; WTO, Council for Trade in Services – Special Session – Report of the Meeting Held on 9 to 12 July 2001 – Note by the Secretariat, Doc. S/CSS/M/10, 21 September 2001, para. 204.

⁶⁴ WTO, Doc. S/CSS/M/10, *supra* note 63, para. 204.

⁶⁵ WTO, Doc. JOB/GC/176, *supra* note 63, para. 4.4.

⁶⁶ WTO, *China – Measures Affecting Trading Rights and Distribution Services for Certain Publications and Audiovisual Entertainment Products – Report of the Panel (China – Publications and Audiovisual Products, panel report)*, 19 January 2010, WT/DS363/R, para. 4.159.

⁶⁷ *China – Publications and Audiovisual Products*, Appellate Body report, *supra* note 36, para. 394.

⁶⁸ WTO, Group on Basic Telecommunications – Note by the Chairman – Revision, S/GBT/W/2/Rev.1, 16 January 1997, footnote omitted.

⁶⁹ See *Mexico – Telecoms*, panel report, *supra* note 51, paras 7.64–7.65, 7.67.

As for non-telecom services, the panel in *US – Gambling* largely confirmed – albeit without a further review by the Appellate Body – the assumption of technological neutrality even in the absence of written guidelines on this issue. In examining restrictions against the online provision of gambling and betting services from Antigua to the USA, the panel held that the GATS definition of ‘mode 1’ (or cross-border) supply of services did not limit ‘the various technologically possible means of delivery’ and that, unless a national schedule provided otherwise, mode 1 comprised ‘all possible means of supplying services’, including through the Internet. Any other interpretation, the panel said, would nullify trade benefits guaranteed under the GATS. The panel noted that its conclusion was ‘in line with the principle of “technological neutrality”, which seems to be largely shared among WTO Members’, as per the aforementioned WTO progress report on electronic commerce.⁷⁰

By contrast, the panel in *China – Publications and Audiovisual Products* saw no need to invoke the ‘principle of technological neutrality’ because it had already found that China’s commitment on ‘sound recording distribution services’ included the distribution of audio content through electronic means. But the panel did admit that this principle ‘might have come into play’ if it had otherwise had any doubt as to whether the Chinese commitment indeed covered the electronic distribution.⁷¹ Importantly, technological neutrality, avoided by the panel, could have been instrumental here in identifying, or ‘classifying’, a service⁷² rather than defining the scope of mode 1, as was the case in *US – Gambling*.

1 *Whether Classification of Services Is Technologically Neutral*

A number of so-called ‘digital services’, such as Internet access services, voice-over-Internet protocol, video-on-demand services, online distribution of audiovisual content, smart grids services and others, have no explicit references in the WTO’s services sectoral classification list (also known as ‘W/120’)⁷³ – the 1991 catalogue of service (sub-)sectors typically with corresponding Central Product Classification (CPC) code numbers. WTO discussions in the past pointed to ‘the inadequacy of W/120 in capturing market realities’ and to classification challenges in sectors influenced by information technology with respect to ‘bundled or integrated or converged services, overlaps between sector/sub-sectors, distinction between new services and new means of delivery as well as the scope of existing entries in W/120’.⁷⁴ As a convergence of

⁷⁰ *US – Gambling*, panel report, *supra* note 40, paras 6.281, 6.285 (citing WTO, Doc. S/L/74, *supra* note 61, para. 4), para. 6.286.

⁷¹ *China – Publications and Audiovisual Products*, panel report, *supra* note 66, para. 7.1258.

⁷² In particular, this principle would have helped classify the electronic distribution at issue as ‘sound recording distribution services’ as opposed to ‘network music services’ that China contended to be an uncommitted ‘new type of service’. *Ibid.*, paras 7.1144, 7.1166, 7.1249.

⁷³ These are examples taken from the Illustrative List of Services without Explicit References in W/120, provided by the WTO and contained in UN Department of Economic and Social Affairs, New Issues Requiring Guidance in the Central Product Classification (CPC), Meeting of the Expert Group on International Statistical Classifications, New York, 19–22 May 2015, UN Doc. ESA/STAT/AC.289/20, 12 May 2015.

⁷⁴ WTO, Committee on Specific Commitments – Compilation of the Discussions on Classification Issues – Informal Note by the Secretariat, Doc. JOB/SERV/180, 14 March 2014, para. 3, as cited in South Centre, Towards the WTO’s MC11: How to Move Forward on E-Commerce Discussions?, Doc. SC/AN/TDP/2017/6 (2017), at 14.

'enabling' (computer, telecom) and 'content' (audiovisual, financial and so on) services cuts across several W/120 categories, this may give rise to classification difficulties.⁷⁵

If accepted, the principle of technological neutrality could play an important role in adapting the current W/120 list to the ever-changing services involved in trade. Specifically, if digital services are merely modernized variants of the W/120-listed services, this principle would link them to the existing classification categories accordingly. Furthermore, the panel in *China – Electronic Payment Services* held that where component services, as combined together, resulted in 'a new and distinct service' that was supplied and consumed as such, such an 'integrated service' should be classified under a relevant single service sub-sector.⁷⁶ Technological neutrality may apply here with respect to the means of delivering the integrated service and probably the means of bundling the input services if this becomes an issue.

But even if accepted in principle, technological neutrality can be constrained in some cases. First, this can be done at the scheduling stage as was acknowledged in the 'informal meeting' of the Council for Trade in Services above. For example, '[r]adio broadcasting, cable television, satellite transmissions of DTH and DBS services and of audio digital services' cannot be classified as telecommunications services under Mexico's GATS schedule that makes an explicit exclusion to this end.⁷⁷

Second, technological neutrality cannot extend the existing classification to genuinely 'new' services. While, arguably, these are not W/120-coverable new integrated services above and 'old' services delivered via new means, the extent of 'new' services is still controversial.⁷⁸ The only text-based WTO definition of a 'new' service exists in the financial sector and applies solely to interested members that assumed an associated market access obligation, but even this definition does not appear to cover completely unknown services.⁷⁹ In theory, the residual category of 'other' in relevant

⁷⁵ See Peng, *supra* note 52, at 298–300.

⁷⁶ WTO, *China – Certain Measures Affecting Electronic Payment Services – Report of the Panel*, 31 August 2012, WT/DS413/R, paras 7.188, 7.198. The integrated service in this dispute was classifiable under the existing sub-sector in China's schedule. If a sub-sector to which an integrated service can be linked does not exist yet, the integrated service may qualify as a genuinely 'new' service, which itself is a controversial issue (see the discussion below).

⁷⁷ WTO, *Trade in Services – Mexico – Schedule of Specific Commitments – Supplement 2*, Doc. GATS/SC/56/Suppl.2, 11 April 1997.

⁷⁸ See R. Zhang, 'Covered or Not Covered: That Is the Question – Services Classification and Its Implications for Specific Commitments under the GATS', WTO Working Paper no. ERSD-2015-11 (2015), at 14–17; WTO, *Committee on Specific Commitments – Report of the Meeting Held on 18 September 2014 – Note by the Secretariat*, Doc. S/CSC/M/71, 15 October 2014, paras 1.1–1.18.

⁷⁹ Under the WTO Understanding on Commitments in Financial Services (sections B:7 and D:3), a committing member must permit a foreign supplier established in its territory to offer any 'new financial service' – that is, 'a service of a financial nature, including services related to existing and new products or the manner in which a product is delivered, that is not supplied by any financial service supplier in the territory of a particular Member but which is supplied in the territory of another Member'. In other words, a financial service is 'new' if it is not available in the committing member yet, but is already supplied in another member. This Understanding is applicable only to those members that have incorporated it in their schedule of commitments. See R. Wolfrum, P.-T. Stoll and C. Feinäugle (eds), *WTO – Trade in Services* (2008), at 650–652, 657.

W/120 service (sub-)sectors could potentially accommodate many new services not existent in 1991, but this remains uncertain in practice due to the absence of specific guidelines.⁸⁰ Only some of the ‘other’ services in W/120 have CPC codes, in which case related CPC explanation (if available) may be helpful. But in such W/120-listed sectors as audiovisual services or tourism and travel-related services where the category of ‘other’ does not have CPC codes, it is unclear whether ‘other’ can capture, for example, electronic distribution of audiovisual content or online accommodation booking services respectively.⁸¹ Outside the WTO, some RTAs directly exclude ‘new services’ from the scope of commitments.⁸²

2 Whether Likeness of Services Is Technologically Neutral

In *US – Gambling*, Antigua implicitly suggested technological neutrality of the likeness test by contending that Antiguan and US gambling services were ‘like’ regardless of whether they were Internet-based versus land-based services, remote versus non-remote services and virtual casino versus real casino services.⁸³ In support, Antigua, *inter alia*, cited the WTO Secretariat’s note that stated that likeness under the GATS provisions on most-favoured-nation (MFN) treatment and national treatment depended on ‘attributes of the [service] product or supplier *per se* rather than on the means by which the [service] product is delivered’.⁸⁴ But the panel avoided this issue for the judicial economy reason.⁸⁵

The Appellate Body in *Argentina – Financial Services* held that the likeness of services and service suppliers under Articles II (MFN) and XVII (national treatment) of the GATS could be determined with the use of the well-established likeness criteria for goods – products’ characteristics and end uses, consumers’ tastes or preferences and tariff classification – as properly adapted to services trade.⁸⁶ Applying this approach to the *US – Gambling* case, one could argue that online and offline gambling services are in fact ‘unlike’ because they pose varying social hazards that would show ‘online versus offline’ differences at least under the criteria of services’ characteristics and/or consumers’ perception.⁸⁷ Indeed, the panel in that case disagreed with Antigua’s argument, which was put forward under the WTO general exceptions, that the concerns

⁸⁰ See Zhang, *supra* note 78, at 17–19; WTO, Doc. S/CSC/M/71, *supra* note 78, paras 1.3, 1.4, 1.9, 1.11.

⁸¹ Zhang, *supra* note 78, at 18–19.

⁸² See *ibid.*, at 16–17; Section 5 of this article.

⁸³ *US – Gambling*, panel report, *supra* note 40, paras 3.148, 3.165–3.168, 3.183, 3.198–3.209.

⁸⁴ *Ibid.*, para. 3.150, n. 268 (citing WTO, Council for Trade in Services – The Work Programme on Electronic Commerce – Note by the Secretariat, Doc. S/C/W/68, 16 November 1998, paras 10, 33).

⁸⁵ *US – Gambling*, panel report, *supra* note 40, para. 6.426.

⁸⁶ WTO, *Argentina – Measures Relating to Trade in Goods and Services – Report of the Appellate Body (Argentina – Financial Services)*, Appellate Body report, 9 May 2016, WT/DS453/AB/R, paras 6.31–6.32.

⁸⁷ In *EC – Asbestos*, the Appellate Body found that the health risks associated with the product at issue could be evaluated in the context both of criteria of physical properties and of consumers’ tastes/habits in checking the likeness under Article III of the GATT on national treatment. WTO, *European Communities – Measures Affecting Asbestos and Asbestos-Containing Products – Report of the Appellate Body (EC – Asbestos)*, Appellate Body report, 5 April 2001, WT/DS135/AB/R, para. 113.

associated with gambling-related risks – namely, money laundering, fraud, health problems and underage gambling – were the same for both remote (for example, online) and non-remote (for example, offline casino) gambling. The panel paid particular attention to certain concerns specific to remote gambling, such as the volume, speed and international reach of remote gambling transactions; the virtual anonymity of such transactions; low barriers to entering remote gambling; and the isolated and anonymous environment of such gambling.⁸⁸

On this basis, the panel concluded – and the Appellate Body concurred⁸⁹ – that less-restrictive US measures countering the same societal risks in the context of non-remote gambling could not ‘be compared and examined as WTO-consistent alternatives’ to address the specific concerns relating to remote gambling.⁹⁰ Although such differences were examined under the general exceptions, they may equally be considered under the non-discrimination rules, as follows from an earlier appellate ruling.⁹¹ Therefore, while the principle of technological neutrality would not lead to classifying electronic and non-electronic comparable services differently merely on the grounds of a difference in delivery techniques, it may not necessarily make them ‘like’ services. By analogy with the tariff classification of goods, the fact of comparable services being placed in the same CPC category is just one criterion indicating their likeness.⁹² But the overall assessment of this and the other criteria may eventually show the unlikeness of these services if a given market’s situation so suggests.

B Intellectual Property Rights

The WTO’s TRIPS Agreement does not address, directly, digital age challenges regarding the liability of Internet service providers for transmitting and storing copyright-infringing content, the treatment of Internet domain names containing protected trademarks, the extent of national jurisdiction over online piracy and so on.⁹³ The World Intellectual Property Organization’s (WIPO) Copyright Treaty and WIPO’s Performances and Phonograms Treaty, which were adopted in 1996 but not incorporated into the TRIPS Agreement, are more specific in regulating some of these issues and preventing an unauthorized use of protected materials on digital networks, while generally adhering to the pre-existing international regimes on intellectual property, including the TRIPS Agreement.⁹⁴

⁸⁸ *US – Gambling*, panel report, *supra* note 40, paras 6.498–6.520.

⁸⁹ WTO, *United States – Measures Affecting the Cross-Border Supply of Gambling and Betting Services – Report of the Appellate Body*, 20 April 2005, WT/DS285/AB/R, paras 323, 326, 346–347.

⁹⁰ *US – Gambling*, panel report, *supra* note 40, paras 6.493, 6.498, 6.521.

⁹¹ *EC – Asbestos*, Appellate Body report, *supra* note 87, para. 115.

⁹² *Argentina – Financial Services*, Appellate Body report, *supra* note 86, para. 6.32.

⁹³ See WTO, Council for Trade-Related Aspects of Intellectual Property Rights (TRIPS) – The Work Programme on Electronic Commerce – Background Note by the Secretariat, Doc. IP/C/W/128, 10 February 1999, paras 39–42, 60, 68–73. Agreement on Trade-Related Aspects of Intellectual Property Rights 1994, 1869 UNTS 299.

⁹⁴ See World Intellectual Property Organization (WIPO), *WIPO Internet Treaties*, available at www.wipo.int/copyright/en/activities/internet_treaties.html; WIPO Copyright Treaty, 20 December 1996, available at www.wipo.int/treaties/en/ip/wct/; WIPO Performances and Phonograms Treaty (WPPT), 20 December 1996, available at www.wipo.int/treaties/en/ip/wppt/; Shadikhodjaev, *supra* note 1, at 261–262.

According to the WTO Secretariat's background information, the TRIPS Agreement is written in 'the technologically neutral language', so its provisions are generally relevant to the protection and enforcement of intellectual property rights in the digital environment.⁹⁵ The European Union (EU), Japan, Switzerland, Australia and the USA take a similar position.⁹⁶ Australia even suggests adopting an 'agreed statement' about the 'generally technology-neutral nature of TRIPS provisions'.⁹⁷ However, sceptical members like Korea counter that the TRIPS Agreement was negotiated before the digital aspects of intellectual property rules had become a real global issue.⁹⁸ Some commentators even advocate technology-specific approaches to protecting intellectual property rights.⁹⁹

To begin with the text of the TRIPS Agreement, certain provisions – mostly on patents – mention the word 'technology'. An explicit expression of technological neutrality can be found in Article 27.1, which requires patentability of inventions 'in all fields of technology' as well as the availability of patents and the enjoyment of patent rights 'without discrimination as to ... the field of technology'. Such a rule preventing technology discrimination also applies to Article 30 exceptions to patent rights.¹⁰⁰ Moreover, Article 66.2 obliges developed country members to incentivize 'technology transfer' to least-developed countries, without specifying any type of technology. By contrast, Article 31(c) of the TRIPS Agreement lays down specific requirements for the use of 'semi-conductor technology' without authorization of the patent holder. Furthermore, under Article 65.4, a developing country member could temporarily delay the implementation of the TRIPS provisions on product patents in 'areas of technology' that were not patentable in its territory on the general date of application of the TRIPS Agreement for that member. Thus, it could provisionally leave some technologies aside.

For some provisions that do not refer to technology *per se*, WTO case law has interpreted such silence as being indicative of their technological neutrality. In particular, Article 13 of the TRIPS Agreement allows copyright limitations or exceptions if they are confined to 'certain special cases which do not conflict with a normal exploitation of the work and do not unreasonably prejudice the legitimate interests of the right

⁹⁵ WTO, Doc. IP/C/W/128, *supra* note 93, paras 6, 14; see also WTO, *supra* note 8, at 167.

⁹⁶ See WTO, Council for TRIPS – Minutes of Meeting – Held in the Centre William Rappard on 21 and 22 April 1999, Doc. IP/C/M/23, 2 June 1999, paras 72, 74; WTO, Council for TRIPS – Minutes of Meeting – Held in the Centre William Rappard on 7–8 July 1999, Doc. IP/C/M/24, 17 August 1999, paras 66, 68–70; WTO, Council for TRIPS – Work Programme on Electronic Commerce – Communication from Japan, Doc. IP/C/W/145, 13 July 1999; WTO, Council for TRIPS – Work Programme on Electronic Commerce – Communication from Switzerland, Doc. IP/C/W/286, 22 June 2001.

⁹⁷ WTO, Council for TRIPS – Electronic Commerce Work Programme – Submission from Australia, Doc. IP/C/W/233, 7 December 2000, para. 11; see also WTO, IP/C/M/24, *supra* note 96, paras 68–69.

⁹⁸ WTO, Council for TRIPS – Minutes of Meeting – Held in the Centre William Rappard on 19 and 20 September 2001, Doc. IP/C/M/33, 2 November 2001, para. 142.

⁹⁹ It is argued that copyright law should allow discrimination between different categories or 'domains' of technologies grouped by common characteristics and that patent law should be technology specific to better accommodate varying needs and specific features of particular technologies. See Greenberg, *supra* note 5, at 1548–1559; Thomas, *Tailoring the Patent System for Specific Industries* (2014).

¹⁰⁰ See *Canada – Pharmaceutical Patents*, panel report, *supra* note 40, paras 7.91–7.93.

holder'. In *US – Section 110(5) Copyright Act*, the panel concluded that Article 13 justified the US rules that exempted local restaurants and retail outlets using 'homestyle' broadcasting equipment from paying royalties to songwriters and music publishers.¹⁰¹ But the panel warned that the development of new technologies of music distribution, including the online transmission of music, could affect a future assessment of the US exemption under Article 13.¹⁰² This finding suggests the continued applicability of Article 13 in any technologically changing environment for using copyrighted works.

Article 61 of the TRIPS Agreement provides for members' obligation to establish criminal procedures and penalties at least for 'wilful trademark counterfeiting or copyright piracy on a commercial scale'. The panel in *China – Intellectual Property Rights* held that these terms and, in particular, the word 'commercial' were 'technology-neutral' and applicable to various forms of commerce and means of infringement. Thus, the volume of distribution through digital technologies and the Internet was pertinent, the panel said, to the assessment of a 'commercial scale' under Article 61.¹⁰³ In *Saudi Arabia – Protection of IPRs*, Qatar complained that Saudi Arabia's intellectual property regime failed to provide an adequate protection to a Qatar-based company broadcasting in Saudi Arabia in relation to, *inter alia*, streaming pirated content online, including on social media platforms like Facebook, Instagram and Twitter.¹⁰⁴ The panel found that Saudi Arabia violated Article 61 of the TRIPS Agreement by not taking criminal actions against a perpetrator operating under its jurisdiction, while also holding that its violations of Article 42 and Article 41.1 concerning civil enforcement procedures met the conditions of the security exception in Article 73.¹⁰⁵ As none of the parties casted doubt on the *per se* applicability of the TRIPS provisions in question to online infringements, the panel ruled without considering this aspect and thus implicitly assuming technological neutrality of such provisions in the digital context.

It follows that the silence in the TRIPS Agreement on e-commerce issues may imply its applicability in the digital environment in principle. Such implied technological neutrality is recognized by some TRIPS-based regimes as well. For instance, Israel reported to the WTO that its domestic laws on copyright, trademarks and geographical indications did not contain any Internet-related provisions, but they were nevertheless 'technology neutral' in battling against illegal online activities – for example, sale of infringing software over the Internet or the use of trademark-like domain names – akin to comparable activities occurring 'in more conventional mediums'.¹⁰⁶ Furthermore, some national courts have elaborated on various features of technological neutrality of domestic intellectual property laws as applied in the digital environment.¹⁰⁷

¹⁰¹ *US – Section 110(5) Copyright Act*, panel report, *supra* note 40, paras 6.159, 6.219, 6.272, 7.1.

¹⁰² *Ibid.*, para. 6.153.

¹⁰³ *China – Intellectual Property Rights*, panel report, *supra* note 40, para. 7.657.

¹⁰⁴ WTO, *Saudi Arabia – Measures Concerning the Protection of Intellectual Property Rights – Report of the Panel*, circulated 16 June 2020 (currently under appeal), WT/DS567/R, paras 2.30–2.48.

¹⁰⁵ *Ibid.*, para. 8.1.

¹⁰⁶ WTO, Council for TRIPS – Review of Legislation – Responses from Israel to Questions Posed by Australia, the European Communities and Their Member States, Japan and the United States, Doc. IP/C/W/192, 18 July 2000, at 2, 5–6.

¹⁰⁷ For example, Canada's courts have developed a means-oriented approach (formal non-discrimination), an effects-oriented approach (functional equivalence) and a purpose-oriented approach (preservation of the

At the same time, the ‘digital silence’ of the TRIPS Agreement also seems to give WTO members certain discretion for enacting e-commerce-specific rules where appropriate. In a simplest version, such e-commerce rules may textually stretch the offline system’s reach to the Internet-based environment without creating ‘e-customized’ elements. In particular, the RTAs like the Comprehensive and Progressive Agreement for Trans-Pacific Partnership and the US–Mexico–Canada Agreement state that the covered civil, administrative, criminal and other enforcement procedures must be available ‘to the same extent’ against trademark and copyright infringements ‘in the digital environment’.¹⁰⁸ Alternatively, these could be rules with substantially new contents. In 2012, Canada, for example, adopted a legislative act that essentially exempts Internet service providers from liability for copyright infringements occurring in cyberspace,¹⁰⁹ drawing a borderline between violators of copyright and providers of technological means of communication. While pertaining to the digital (or technologically specific) environment, this legislative exemption still manifests technological neutrality by preventing interference with – hence, remaining ‘neutral’ towards – technologies that have no close bearing on copyright liability.¹¹⁰ It could be argued that digital rules under either alternative above are acceptable as long as they do not undermine the key principles and minimum standards of protection guaranteed by the TRIPS Agreement.

4 Facilitation of Paperless Trading

This article uses the term ‘paperless trading’ to encompass both electronic trade administration by governments and electronic exchange of information within the business community.¹¹¹ With respect to trade administration, the WTO Agreement on Trade Facilitation encourages members to:

balance of rights and interests) to technological neutrality in copyright cases. See Craig, ‘Technological Neutrality: (Pre)Serving the Purposes of Copyright Law’, in M. Geist (ed.), *The Copyright Pentology: How the Supreme Court of Canada Shook the Foundations of Canadian Copyright* (2013) 271, at 281–291.

¹⁰⁸ Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), 8 March 2018, Art. 18.71.2, available at www.dfat.gov.au/trade/agreements/Pages/trade-agreements. US–Mexico–Canada Agreement (USMCA), 30 November 2018, Art. 20.78.2, available at <https://ustr.gov/trade-agreements/free-trade-agreements/united-states-mexico-canada-agreement/agreement-between>.

¹⁰⁹ Siu, ‘Technological Neutrality: Toward Copyright Convergence in the Digital Age’, 71 *University of Toronto Faculty of Law Review* (2013) 76, at 78, 80–81.

¹¹⁰ Hutchison, ‘Technological Neutrality Explained & Applied to *CBC v. SODRAC*’, 13 *Canadian Journal of Law and Technology* (2015) 101, at 113–115; Hutchison, ‘The 2012 Supreme Court Copyright Decisions & Technological Neutrality’ (2012), at 17–19, available at <https://ssrn.com/abstract=2157646>. For technological neutrality and technologically specific exemptions, see Hagen, ‘Technological Neutrality in Canadian Copyright Law’, in Geist, *supra* note 107, at 307–333.

¹¹¹ It follows the conceptual approach used in World Economic Forum, *Paperless Trading: How Does It Impact the Trade System?* (2017), at 4, available at www3.weforum.org/docs/WEF_36073_Paperless_Trading_How_Does_It_Impact_the_Trade_System.pdf.

- provide for electronic formats of documents in the pre-arrival processing stage (Article 7.1) and electronic payment of customs charges (Article 7.2);
- accept electronic copies of import, export or transit documentation (Article 10.2);
- establish a single window system using information technology (Article 10.4);
- allow electronic filing and processing in border procedures (Article 10.7); and
- use electronic means in international customs cooperation (Articles 12.4, 12.6 and 12.10).¹¹²

As for intra-business electronic communications, certain private law norms are being introduced into the international economic law domain. In particular, recent RTAs typically require the adoption of domestic laws – and/or lay down specific rules – on electronic transactions, electronic authentication and electronic signatures on the basis of pertinent legal standards developed by UNCITRAL.¹¹³ Many of such business e-documentation issues, including those addressed by UNCITRAL, are currently discussed in ongoing WTO negotiations on electronic commerce¹¹⁴ and investment facilitation¹¹⁵ and thus have every potential to become part of the WTO rulebook.

Over more than two decades, UNCITRAL issued four legal instruments on electronic documentation (hereinafter the UNCITRAL texts): three model laws as templates for national enactments – the 1996 Model Law on Electronic Commerce, the 2001 Model Law on Electronic Signatures and the 2017 Model Law on Electronic Transferable Records – and the 2005 United Nations (UN) Convention on the Use of Electronic Communications in International Contracts reinstating the substance of many provisions in the model laws.¹¹⁶ The UNCITRAL texts facilitate the use of

¹¹² Agreement on Trade Facilitation, annexed to WTO, General Council – Protocol Amending the Marrakesh Agreement Establishing the World Trade Organization – Decision of 27 November 2014, Doc. WT/L/940, 28 November 2014.

¹¹³ See Monteiro and Teh, *supra* note 23, at 38–39, 42–45; CPTPP, *supra* note 108, Arts 14.5, 14.6; USMCA, *supra* note 108, Arts 19.5, 19.6.

¹¹⁴ See, e.g., WTO, General Council – Joint Statement on Electronic Commerce Initiative – Communication from the Russian Federation, Doc. JOB/GC/181, 16 April 2018; WTO, General Council – Joint Statement on Electronic Commerce – Communication from New Zealand, Doc. JOB/GC/175, 11 April 2018; WTO, General Council – Joint Statement on Electronic Commerce Initiative – List of the Key Elements and Ideas on Electronic Commerce – Communication from Japan, Doc. JOB/GC/180, 13 April 2018; WTO, General Council – Joint Statement on Electronic Commerce – Establishing an Enabling Environment for Electronic Commerce – Communication from the European Union, Doc. JOB/GC/188, 16 May 2018; WTO, Doc. JOB/GC/176, *supra* note 63.

¹¹⁵ See, e.g., WTO, General Council – Structured Discussions on Investment Facilitation – Communication from Brazil, Doc. JOB/GC/169, 1 February 2018; see also WTO, Ministerial Conference – Eleventh Session – Buenos Aires, 10–13 December 2017 – Joint Ministerial Statement on Investment Facilitation for Development, Doc. WT/MIN(17)/59, 13 December 2017.

¹¹⁶ UN Convention on the Use of Electronic Communications in International Contracts, 23 November 2005, available at https://uncitral.un.org/en/texts/ecommerce/conventions/electronic_communications; UNCITRAL Model Law on Electronic Commerce, 12 June 1996, available at https://uncitral.un.org/en/texts/ecommerce/modellaw/electronic_commerce; UNCITRAL Model Law on Electronic Signatures, 5 July 2001, available at https://uncitral.un.org/en/texts/ecommerce/modellaw/electronic_signatures; UNCITRAL Model Law on Electronic Transferable Records, 13 July 2017, available at https://uncitral.un.org/en/texts/ecommerce/modellaw/electronic_transferable_records.

electronic equivalents of paper documents in commercial activities and, in doing so, rely on the intertwined and mutually complementary concepts of ‘media neutrality’, ‘technological neutrality’ and ‘functional equivalence’. These concepts are scattered across various provisions mostly implicitly. The preamble of the UN Convention on the Use of Electronic Communications in International Contracts is direct in mentioning ‘technological neutrality’ and ‘functional equivalence’ as ‘the principles’ to be taken into account.

Some other comparable international instruments also envisage the concepts above. For example, Article 5 of the Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific – adopted by the UN Economic and Social Commission for Asia and the Pacific in 2016 – explicitly lists ‘technological neutrality’ and ‘functional equivalence’ among its ‘general principles’ and seems to incorporate ‘media neutrality’ into another general principle of ‘non-discrimination of the use of electronic communications’ (meaning ‘no disparity of treatment between electronic communications and paper documents’).¹¹⁷ Unlike in the UNCITRAL texts, these principles apply not only to business-to-business, but also business-to-government and government-to-government electronic transactions.¹¹⁸

A *Media Neutrality and Technological Neutrality*

In general, it is often difficult to distinguish between the principles of media neutrality and technological neutrality as both of them ensure ‘immunity’ of law to technological transformations. Yet the UNCITRAL texts do not equate one with the other. In particular, media neutrality precludes discrimination between information contained on a paper medium and information communicated or stored electronically, while technological neutrality secures non-discrimination among various techniques used to communicate or store information electronically.¹¹⁹ In other words, media neutrality treats physically and non-physically carried information alike, thereby putting the paperless (or electronic) environment on equal footing with the conventional paper-based environment.¹²⁰ By contrast, technological neutrality equalizes different data-related technologies within the electronic environment.

The principle of media neutrality is indirectly written into UNCITRAL’s provision that states that the legal effect, validity or enforceability of information cannot be denied ‘solely on the grounds that it is in the form of a data message’.¹²¹ Likewise, the *per se* use of data messages should not lead to denials of their admissibility and evidential weight in legal

¹¹⁷ UNESCAP, *supra* note 3, paras 20–22; Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific, 19 May 2016, available at www.unescap.org/resources/framework-agreement-facilitation-cross-border-paperless-trade-asia-and-pacific.

¹¹⁸ Xue, ‘The Newest UN Treaty to Facilitate Cross-Border Paperless Trade in Asia and the Pacific: An Insight Preview’, 51 *JWT* (2017) 959, at 966.

¹¹⁹ United Nations, UNCITRAL Model Law on Electronic Signatures with Guide to Enactment 2001 (2002), at 9, para. 5.

¹²⁰ C.M. Laborde, *Electronic Signatures in International Contracts* (2010), at 119.

¹²¹ UNCITRAL Model Law on Electronic Commerce, *supra* note 116, Art. 5.

proceedings as well as denials of contracts, declarations of will or other statements between parties.¹²² Such an anti-prejudice stance towards electronic forms is also adopted by some RTAs.¹²³ The principle of technological neutrality affected the way of scoping the subject matter of the Model Law on Electronic Commerce – namely ‘any kind of information in the form of a data message’ used in commercial activities.¹²⁴ In particular, the term ‘data message’ here is defined as ‘information generated, sent, received or stored by *electronic, optical or similar means* including, *but not limited to*, electronic data interchange (EDI) [that is, computer-to-computer electronic transfer of information], electronic mail, telegram, telex or teletype’.¹²⁵ This definition covers all messages in ‘essentially paperless form’.¹²⁶

Under UNCITRAL’s conception, technological neutrality may be circumscribed if need be. This is the case, for instance, of electronic signatures – ‘data in electronic form in, affixed to or logically associated with, a data message, which may be used to identify the signatory in relation to the data message and to indicate the signatory’s approval of the information contained in the data message’.¹²⁷ This definition covers all forms of electronic signature and associated techniques like scanned signatures, typed names, codes or passwords, biometrics as well as digital signatures that use a specific encryption system within a public key infrastructure.¹²⁸ On the one hand, the UN General Assembly’s resolution on the Model Law on Electronic Signatures underlines a ‘technologically neutral’ manner of legally recognizing electronic signatures and of assessing ‘the practical reliability and the commercial adequacy’ of related techniques,¹²⁹ with that model law itself mandating equal treatment of signature techniques in principle.¹³⁰ On the other hand, that model law still leaves some room for legislators to prescribe the use of a particular signature technique in identified situations and for transacting parties to prefer or exclude, by agreement, certain electronic signature techniques.¹³¹ This deviating option is also envisaged under some RTAs.¹³²

¹²² *Ibid.*, Arts 9, 11, 12.

¹²³ See, e.g., Japan–Australia Economic Partnership Agreement, 8 July 2014, Art. 13.5, available at www.dfat.gov.au/trade/agreements/in-force/jaepa/full-text/Pages/full-text-of-jaepa; Australia–Chile Free Trade Agreement, 30 July 2008, Art. 16.5, available at www.dfat.gov.au/trade/agreements/in-force/aclfta/Pages/australia-chile-fta.

¹²⁴ UNCITRAL Model Law on Electronic Commerce, *supra* note 116, Art. 1.

¹²⁵ *Ibid.*, Art. 2 (emphasis added).

¹²⁶ United Nations, UNCITRAL Model Law on Electronic Commerce with Guide to Enactment 1996 with Additional Article 5 *bis* as Adopted in 1998 (1999), at 26, para. 31.

¹²⁷ UNCITRAL Model Law on Electronic Signatures, *supra* note 116, Art. 2.

¹²⁸ United Nations, Promoting Confidence in Electronic Commerce: Legal Issues on International Use of Electronic Authentication and Signature Methods (2009) (hereinafter United Nations, Promoting Confidence in Electronic Commerce), at 15–16, paras 21, 24; United Nations, *supra* note 119, at 38, para. 82.

¹²⁹ Preamble of the UN General Assembly Resolution 56/80 [On the Report of the Sixth Committee (A/56/588)], Model Law on Electronic Signatures of the United Nations Commission on International Trade Law, UN Doc. A/RES/56/80, 24 January 2002, International Legal Materials, Vol. 41, No. 2 (March 2002), at 303–309.

¹³⁰ UNCITRAL Model Law on Electronic Signatures, *supra* note 116, Art. 3; United Nations, *supra* note 119, at 48, para. 107.

¹³¹ United Nations, *supra* note 119, at 48, para. 107.

¹³² See, e.g., Korea–US Free Trade Agreement, 30 June 2007, Art. 15.4.1–15.4.2, available at <https://ustr.gov/trade-agreements/free-trade-agreements/korus-fta/final-text>; Korea–China Free Trade Agreement, 1 June 2015, Art. 13.4.2, available at <http://fta.mofcom.gov.cn/topic/enkorea.shtml>.

Therefore, while most countries enacting the model law in question have followed its generally technologically neutral approach by neither prescribing nor favouring the use of any specific technology,¹³³ some countries seeking a higher degree of security have been more technology specific in requiring, for example, the use of only digital signatures.¹³⁴ Others have adopted a mixed approach by admitting any form of electronic signature in principle but granting some greater legal effect to advanced forms of electronic signature in defined circumstances.¹³⁵

B *Functional Equivalence*

Notwithstanding the general anti-prejudice stance towards electronic documents, it is recognized that their ‘unphysical’ features like screen-dependent readability may not necessarily let them perform all functions of paper documents.¹³⁶ Thus, the relevant rules set down criteria for some basic functions that, if met, will render electronic communications equivalent to paper documents and grant them the same level of legal recognition.¹³⁷ The Model Law on Electronic Commerce adopted such a ‘functional equivalent’ approach in accommodating computer-based techniques within the contract law concepts of ‘writing’, ‘signature’ and ‘original’.¹³⁸ Similarly, some of these and other items are included in the Model Law on Electronic Transferable Records under a separate chapter entitled ‘Provisions on Functional Equivalence’.

The notion of functional equivalence may provide a tool for the principles of media and technological neutrality to materialize. For example, Article 7(1) of the Model Law on Electronic Commerce singles out such key functions of a handwritten signature as identifying the signatory and indicating the signatory’s approval of the signed information. Under Article 7(1), any technology that can carry out these offline functions in electronic form is regarded as complying with a legal signature requirement in relation to a data message.¹³⁹ Thus, this provision incorporates both media and technological neutrality by functionally equating electronic signatures with handwritten signatures and accepting any digital technology performing those functions for signing a data message.

Interestingly, the WTO panel in *EC – IT Products* explored the functional equivalent approach (in the sense understood from the UNCITRAL texts) in examining the scope of certain ITA products, including ‘[s]et top boxes which have a communication function: a microprocessor-based device incorporating a modem for gaining access to the Internet, and having a function of interactive information exchange’. The panel noted that because this narrative description in the ITA stressed ‘functionality’ – and,

¹³³ United Nations, Promoting Confidence in Electronic Commerce, *supra* note 128, at 38–39, para. 87.

¹³⁴ *Ibid.*, at 39–40, paras 90–92; UNCTAD, Information Economy Report 2015: Unlocking the Potential of E-commerce for Developing Countries (2015), at 67.

¹³⁵ United Nations, Promoting Confidence in Electronic Commerce, *supra* note 128, at 41–43, paras 93–96.

¹³⁶ United Nations, *supra* note 126, at 20–21, paras 15–18.

¹³⁷ *Ibid.*; UNESCAP, *supra* note 3, para. 21.

¹³⁸ UNCITRAL Model Law on Electronic Commerce, *supra* note 116, Arts 6–8; United Nations, *supra* note 126, at 21, paras 17–18.

¹³⁹ United Nations, Promoting Confidence in Electronic Commerce, *supra* note 128, at 37, para. 85.

specifically, a communication function – rather than the product’s technical characteristics or the use of a particular technology,¹⁴⁰ the term ‘modem’ in the description should not be construed ‘in an overly narrow or technical sense’. The panel concluded that ITA duty-free treatment was available not only to the set top boxes with old-style modems but also to the set top boxes incorporating newer technologies performing the functions of connecting to the Internet and providing interactive information exchange.¹⁴¹

5 The Outlook

In electronic commerce, technological neutrality may cover ‘analogue versus digital’ trading issues as well as technology comparisons within the online world. With the future-proofing motive, this principle could extend the existing rules to a changing trade environment. However, a precise way of doing so would depend on the concrete legal context and factual circumstances. Given the breadth of WTO law, it is not surprising to discern, for example, non-discrimination between offline and online delivery techniques in *US – Gambling*¹⁴² but functional equivalence for technologically upgraded goods in *EC – IT Products*. Therefore, where accepted, technological neutrality may still apply differently across the WTO legal order and have varying implications in the form of the evolving technical scope of, *inter alia*, trade liberalization (in, for example, services), the protection of private rights (in, for example, intellectual property) and the facilitation of paperless documentation.

The idea about technological neutrality of trade rules seems to gain wider acceptance in the field of intellectual property than in the services sector. Although the TRIPS Agreement lacks necessary details – and thereby causes some uncertainty – on the mechanics of protecting and enforcing intellectual property rights within the Internet ecosystem, WTO members enjoy certain discretion for filling this gap without violating the existing standards. Arguably, this allows some flexibility in accommodating technological neutrality in this particular area. By contrast, acceptance of the technological neutrality of the GATS could entail extension of market access to unanticipated digital services against a committing member’s original intentions. Therefore, at this point, it is highly unlikely that all WTO members will recognize – either through a new text or authoritative multilateral interpretation¹⁴³ – technological neutrality *vis-à-vis* the existing commitments under the GATS. To mitigate the quandary over this issue in the WTO, Brazil’s recent proposal on e-commerce suggests ‘a separation between new and old commitments’, albeit with no further details.¹⁴⁴ This article will

¹⁴⁰ *EC – IT Products*, panel reports, *supra* note 41, para. 7.913.

¹⁴¹ *Ibid.*, paras 7.886, 7.888, 7.916.

¹⁴² The extension of the US commitments to online gambling services in *US – Gambling* seems to fall within Craig’s concept of ‘means-oriented’ technological neutrality that suggests ‘formal’ non-discrimination between technologies and allows the law to apply in different media. See Craig, *supra* note 4, at 606–608.

¹⁴³ Kelsey, ‘How a TPP-Style E-commerce Outcome in the WTO Would Endanger the Development Dimension of the GATS Acquis (and Potentially the WTO)’, 21 *JIEL* (2018) 273, at 294.

¹⁴⁴ WTO, Doc. JOB/GC/176, *supra* note 63, para. 4.4, as reinstated in WTO, Exploratory Work on Electronic Commerce – Non-Paper from Brazil, Doc. INF/ECOM/3, 25 March 2019, para. 4.4.

use this bifurcation for discussing how technological neutrality could be handled in this sphere in the future.

With respect to existing (or old) commitments for which members' disagreement on technological neutrality of the GATS persists, the WTO judicial procedures can continuously be used for clarifying controversial treaty terms on a case-by-case basis. As discussed above, WTO adjudicators have generally (but still not unanimously) been sympathetic to the evolutionary interpretation approach. However, given continuing US criticism of allegedly inappropriate 'precedence setting' in WTO dispute settlement, and the current dysfunctionality of the Appellate Body as a result,¹⁴⁵ the past jurisprudence's impact on future cases remains to be seen yet. In any event, as long as the members remain obviously split on technological neutrality, adjudicators will likely be reluctant to directly base their findings on this principle as such.¹⁴⁶

With respect to future (or new) commitments, the members may still rely on the judicial track for clarification. In addition, they could agree to regularly modernize – and, hence, bring more clarity to the technological reach of – the services classification in their schedules while keeping the commitments intact.¹⁴⁷ At present, the GATS scheduling guidelines and even some newly acceded members' schedules expressly state that the CPC numbers in national schedules correspond to the references in the 1991 UN provisional CPC – that is, the 30-year-old classification system!¹⁴⁸ Unlike the provisional CPC, the latest UN CPC version 2.1, adopted in 2015, lists many digital services like 'web search portal content', 'website hosting services' and so on.¹⁴⁹ Surprisingly, such GATS scheduling practice is in stark contrast with the WTO goods schedules that are regularly updated, with no alteration of the substance of tariff bindings, to reflect any Harmonized System (HS) amendments by the World Customs Organization.¹⁵⁰ The WTO's ministerial declaration on the ITA expansion even has a built-in mechanism of periodic reviews of the product coverage 'in the light of technological developments ...

¹⁴⁵ See US Trade Representative, Report on the Appellate Body of the World Trade Organization (2020), at 55–64; WTO, Dispute Settlement Body – Minutes of Meeting – Held in the Centre William Rappard on 28 February and 5 March 2020, Doc. WT/DSB/M/441, 14 May 2020, paras 8.1–8.27.

¹⁴⁶ Cf. Gagliani, 'Cybersecurity, Technological Neutrality, and International Trade Law', 23 *JIEL* (2020) 723, at 743 (suggesting that the WTO adjudicators' elaboration on technological neutrality should be confined to the trade provisions that have clearly incorporated technological neutrality; for the other provisions, it is for members to elaborate).

¹⁴⁷ Indeed, the 'inadequacy' of the W/120-based services classification in today's realities has been indicated in WTO meetings. WTO, Committee on Specific Commitments – Report of the Meeting Held on 24 June 2019 – Note by the Secretariat, Doc. S/CSC/M/80, 31 July 2019, at 4, para. 2.1.

¹⁴⁸ WTO, Trade in Services – Guidelines for the Scheduling of Specific Commitments under the GATS – Adopted by the Council for Trade in Services on 23 March 2001, Doc. S/L/92, 28 March 2001, at 8, para. 23 and the accompanying footnote; WTO, Trade in Services – Russian Federation – Schedule of Specific Commitments, Doc. GATS/SC/149, 5 November 2012, at 2; WTO, Trade in Services – The Republic of Kazakhstan – Schedule of Specific Commitments, Doc. GATS/SC/154, 15 February 2016, at 2.

¹⁴⁹ United Nations, Central Product Classification (CPC) Version 2.1 (2015), available at <https://unstats.un.org/unsd/classifications/unsdclassifications/cpcv21.pdf>; WTO, Doc. S/CSC/M/74, *supra* note 7, paras 2.4–2.5.

¹⁵⁰ See WTO, General Council – Procedure for the Introduction of Harmonized System 2017 Changes to Schedules of Concessions Using the Consolidated Tariff Schedules (CTS) Database – Decision of 7 December 2016, Doc. WT/L/995, 9 December 2016; D. Yu, 'The Harmonized System – Amendments and Their Impact on WTO Members' Schedules', WTO Staff Working Paper no. ERS-D-2008-02 (2008).

or changes to the HS nomenclature'.¹⁵¹ Therefore, the WTO schedules have a strange *status quo* in which the classification of services is frozen in the early 1990s, while the classification of goods is readily upgraded despite the much higher number of goods than services. Modernizing the provisional CPC for the old commitments could probably be too late at this point,¹⁵² but the timely updating of a newer CPC version used in future service commitments seems a more realistic option. To this end, members could use the already-established WTO procedures¹⁵³ for rectifying the GATS schedules without changing the scope or substance of the existing commitments.¹⁵⁴ Given the success of the WTO Secretariat's assistance with the HS-updating technical work on goods schedules,¹⁵⁵ members could revamp such GATS procedures to allow the Secretariat to directly draft schedule rectifications, subject to a subsequent examination by the respective member and a multilateral review.¹⁵⁶

For new commitments, members could also take further steps towards explicitly acknowledging technological neutrality, which would make the schedules even more up to date when periodic upgrading of services classification, suggested above, does not suffice to catch up with the technological progress. However, because of the different perceptions of potential risks and sensitivity of sectors among members, there should be some room for individual regulatory carve-outs. Thus, all members could agree to technological neutrality in principle, subject to member-specific exemptions, if any.¹⁵⁷ For example, three RTAs have already adopted the proposed approach for e-commerce. More specifically, Japan's bilateral trade agreements with Australia and Mongolia 'recognise the principle of technological neutrality in electronic commerce'.¹⁵⁸ The Japan–Switzerland Free Trade and Economic Partnership Agreement (FTEPA) additionally defines this principle as meaning that 'any provisions related to trade in services do not distinguish between the different technological means through which a service may be supplied' and requires the parties to ensure that their 'measures governing electronic commerce do not discriminate the supply of services transmitted electronically against the supply of like services by other means'.¹⁵⁹

¹⁵¹ WTO, Ministerial Conference – Tenth Session – Nairobi, 15–18 December 2015 – Ministerial Declaration on the Expansion of Trade in Information Technology Products – Nairobi, Doc. WT/MIN(15)/25, 16 December 2015, at 4, para. 11.

¹⁵² See, e.g., WTO, Committee on Specific Commitments – Report of the Meeting Held on 17 March 2016 – Note by the Secretariat, Doc. S/CSC/M/75, 14 April 2016, at 3–4, paras 2.3–2.8.

¹⁵³ WTO, Procedures for the Certification of Rectifications or Improvements to Schedules of Specific Commitments – Adopted by the Council for Trade in Services on 14 April 2000, Doc. S/L/84, 18 April 2000.

¹⁵⁴ The literature and WTO sources, checked by this author, do not appear to give any instance of using the procedures of technical rectifications for CPC updating.

¹⁵⁵ Yu, *supra* note 150, at 9–10.

¹⁵⁶ This is how the Secretariat-prepared Harmonized System modifications regarding goods schedules currently take place. WTO, Doc. WT/L/995, *supra* note 150.

¹⁵⁷ Alternatively, members could agree to technological neutrality in the commitments of their choice only.

¹⁵⁸ Japan–Australia Economic Partnership Agreement, *supra* note 123, Art. 13.1.3; Japan–Mongolia Economic Partnership Agreement, 10 February 2015, Art. 9.1.3, available at www.mofa.go.jp/policy/economy/fta/mongolia.html.

¹⁵⁹ Japan–Switzerland FTEPA, *supra* note 59, Arts 71.2, 74.

For each party, this FTEPA provides for different carve-outs (or ‘reservations’) on trade in services applicable to electronic commerce.¹⁶⁰ In particular, Japan reserves its right to regulate in relation to any mode of supply in which services were not technically feasible at the time of entry into force of the agreement as well as *vis-à-vis* ‘new services other than those recognised’, with the ‘recognised’ services being those that were positively and explicitly classified in Japan’s Standard Industrial Classification or CPC at that time.¹⁶¹ By contrast, Switzerland’s reservations concern new services in only listed sectors (telecommunications, audiovisuals, computer, advertising and so on), with ‘new services’ being defined in a similar way to the WTO’s concept of a ‘new financial service’, mentioned earlier in this analysis.¹⁶² The fact that even a bilateral agreement articulates different carve-outs for each of the two parties once again makes a case for individualization of related exceptions in the WTO. By expanding the scope of available policy flexibilities,¹⁶³ this option with WTO-approved self-defined carve-outs would arguably make members more comfortable with the principle of technological neutrality.

Finally, potential WTO rules on intra-business electronic documentation will likely follow the example of recent RTAs in relying on, or borrowing from, the UNCITRAL texts and the embedded concepts of rules’ neutrality. But, even outside this area, UNCITRAL’s conceptual distinctions could help broaden the WTO’s perception of technological neutrality. In particular, while the WTO e-commerce work on services has covered the UNCITRAL-like concepts of media and technological neutrality, functional equivalence has gained less attention. In the goods sector, the original and expanded ITA provides functional descriptions for some covered products,¹⁶⁴ with *EC – IT Products* representing a rare example in WTO case law where, as considered above, the concept of functional equivalence was influential. The UNCITRAL texts and the ITA give food for thought for exploring the functional equivalent approach in services trade as well. Specifically, members could add functional descriptions of services to their schedules to ensure greater technological neutrality in the digital context and beyond.¹⁶⁵

¹⁶⁰ *Ibid.*, Arts 57, 71.3.

¹⁶¹ *Ibid.*, Appendix 1 of Annex III to Chapter 6 (‘Trade in Services’).

¹⁶² *Ibid.*, Appendix 2 of Annex III to Chapter 6; see also *supra* note 79.

¹⁶³ These include, for example, general and security exceptions under the existing trade rules. Gagliani, *supra* note 146, at 742–743, however, warns that invocation of such exceptions (commonly available to all members) for technology-specific trade restrictions would not be ‘a viable solution in the long term’ for addressing technological neutrality in the cybersecurity context.

¹⁶⁴ See the attached list of products in WTO, Ministerial Conference, Singapore – Ministerial Declaration on Trade in Information Technology Products – Singapore, 13 December 1996, Doc. WT/MIN(96)/16, 13 December 1996; WTO, Doc. WT/MIN(15)/25, *supra* note 151.

¹⁶⁵ For an earlier discussion on this approach in the telecommunications sector, see WTO, Council for Trade in Services – Special Session – Committee on Specific Commitments – Communication from the European Communities – Classification in the Telecom Sector under the WTO–GATS Framework, Doc. TN/S/W/27, S/CSC/W/44, 10 February 2005; WTO, Council for Trade in Services – Committee on Specific Commitments – Special Session – Communication from the United States – Classification in the Telecommunications Sector under the WTO–GATS Framework, Doc. TN/S/W/35, S/CSC/W/45, 22 February 2005; Peng, *supra* note 52, at 301–305.

6 Conclusion

Digital trade or e-commerce covering various electronically enabled commercial transactions, digital products and services, trade-related electronic documentation and data flows will evolve over time with new forms and shapes. But the WTO legislative regime is hardly able to catch up with these important developments as fast as desirable. Consensus-building difficulties in negotiations pose unavoidable challenges for introducing new tailor-made rules within the multilateral trading system. In response to this reality, technological neutrality should play a bigger role under the WTO system. However, members have not been united about recognizing it as an established principle for regulating digital trade, which can be explained with concerns about unpredictability of rules' application in general and uncertain implications for each regulatory area in particular. For enabling a compromise between the proponents and the opponents, this article has advocated an official WTO-wide recognition of technological neutrality as a principle of regulation, subject to appropriate self-defined limitations where necessary. Some RTAs already provide for certain carve-outs for services, exemplifying the ways in which members could seek flexibilities in drafting new WTO rules affecting electronic commerce.¹⁶⁶

Acceptance of technological neutrality at the WTO level is especially imperative for the services sector, seems less challenging for the intellectual property regime and could also pertain to potential WTO provisions on intra-business paperless trading. Because of the peculiarities of, and varying segments inside, each regulatory sphere, such universal recognition would not necessarily entail a uniform application across the board. Depending on the legal context, purposes of regulation and factual circumstances, technological neutrality could mean, *inter alia*, non-discrimination, functional equivalence or non-prevention of technologies or their effects with respect to 'offline versus online' comparisons and/or regulatory distinctions within the digital environment. With the possibility of international rule-making and judicial practice to develop over time, it remains to be seen whether technological neutrality will keep its diversity or show a prevailing pattern in the era of digitalization.

¹⁶⁶ It is hoped that, in such combination with self-determined policy space where relevant, technological neutrality would not become, as sceptics (Greenberg, *supra* note 5, at 1562) would say, 'socially undesirable' for leading to rules 'that are over-inclusive and speak poorly to unforeseen technologies'.