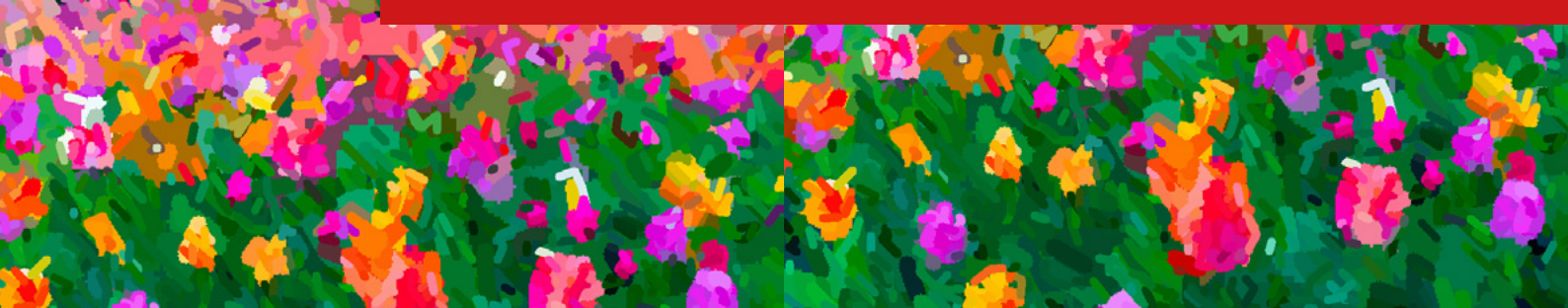
University of Amsterdam

IViR (Institute for Information Law)

Prospective Policy Study on Artificial Intelligence and EU Trade Policy



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Summary

The cover of this study features works rendered by artificial intelligence trained to paint in the style of Dutch masters. Artificial intelligence is poised to be 21st century's most transformative general purpose technology that mankind ever availed itself of. Artificial intelligence is a catch-all for technologies that can carry out complex processes fairly independently by learning from data.

In the form of popular digital services and products, applied artificial intelligence is seeping into our daily lives, for example, as personal digital assistants or as autopiloting of self-driving cars. This is just the beginning of a development over the course of which artificial intelligence will generate transformative products and services that will alter world trade patterns.

Artificial intelligence holds enormous promise for our information civilization if we get the governance of artificial intelligence right. For the EU – and the Netherlands in particular – ensuring responsible artificial intelligence is a top priority. With the exception of privacy and personal data protection, the tenets of responsible artificial intelligence are not (yet) codified in EU law. The EU is now drafting new rules to provide for ethical and human-centric artificial intelligence.

What makes artificial intelligence even more fascinating is that the technology can be deployed fairly location-independent. Data and machine learning code can be moved across today's digital ecosystem and the predictive outcomes of an artificial intelligence system can be applied at a distance. The fluidity of artificial intelligence inevitably holds repercussions for the societies it interacts with which can affects individuals' fundamental rights and societal values.

Cross-border trade in digital services which incorporate applied artificial intelligence into their software architecture is ever increasing. That brings artificial intelligence within the purview of international trade law, such as the General Agreement on Trade in Services (GATS) and ongoing negotiations at the World Trade Organization (WTO) on trade related aspects of electronic commerce.

The Dutch Ministry of Foreign Affairs commissioned this study to generate knowledge about the interface between international trade law and European norms and values in the use of artificial intelligence. The study embarked on research of artificial intelligence with a comprehensive look at areas where EU external trade and EU governance of artificial intelligence intersect.

The study makes a number of significant findings:

First, international trade law presumably covers cross-border trade in digital services powered by artificial intelligence. A WTO member's measure that restricts cross-border digital trade could thus be assessed for its conformity with GATS disciplines. Within the confines of the GATS, a member may adopt measures that are not GATS inconsistent or it may seek to justify GATS inconsistent measures under one of the exceptions. The study tests the performance of the following measures in a hypothetical challenge under the GATS:

1. Data and/or technology localization;
2. Restrictions of cross-border flows of personal data;
3. Digital security;
4. Technological sovereignty;
5. Mandatory technology transfer requirements; and
6. Other behind-the-border regulations.

Second, the findings of the study indicate that the EU's trade policy should better anticipate the challenges of the transnational deployment of artificial intelligence and should be aligned with EU rule-making on artificial intelligence. Aside from the General Data Protection Regulation (GDPR), the EU and member states have not yet exercised their right to regulate responsible artificial intelligence and should guard sufficient space to maneuver under international trade law.

At the beginning of 2019, seventy-six WTO Members announced the launch of WTO negotiations on trade-related aspects of electronic commerce. Without mentioning artificial intelligence, the e-commerce negotiations aim for the multilateralization of new WTO disciplines and commitments relating to e-commerce.

New trade rules on e-commerce will also provide for the cross-border supply of artificial intelligence.

The study calls for an open and inclusive deliberation on the interactions between the EU's e-commerce proposal and EU governance of artificial intelligence. Trade law should not move ahead in setting the rules for cross-border trade in artificial intelligence before the EU adopts its own rules on artificial intelligence. Future law and policy must reckon with the fluidity of artificial intelligence systems. Hence, policymakers must implement strategies that interlace European norms and values with cross-border trade of artificial intelligence.

The EU's e-commerce proposal notably backs new commitments that protect software source code and restrict a countries' data and technology localization measures, among other measures. This well-intentioned aim raises an attendant question: should cross-border digital trade in artificial intelligence be made contingent on a healthy measure of transparency of artificial intelligence systems? EU trade policy should not rule out domestic measures that in the public interest mandate source code transparency, accountability and auditability of artificial intelligence systems.

Moreover, this study contends that the free data flow commitments inscribed in the EU's e-commerce proposal have the unintended result of foreclosing policy space for state-of-the-art data governance. The free flow of data, which enables cross-border trade in artificial intelligence (upstream), does not necessarily come with reciprocal benefits for countries at the receiving end (downstream). The current discourse lopsidedly emphasizes the free data flows without considering how knowledge and surplus value generated from European data may contribute to public value and societal interests.

Lastly, the WTO e-commerce negotiations must give due consideration to the situation of developing nations. Developing nations should aim to become producers of artificial intelligence, rather than suppliers of data, or mere consumers of artificial intelligence from abroad. As has been the case during GATS negotiations, e-commerce should give special treatment to least-developed countries in the WTO e-commerce negotiations.

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List of abbreviations

AI Artificial Intelligence

ECHR European Convention on Human Rights

EU European Union

GATS (WTO) General Agreement on Trade in Services

GDPR (EU) General Data Protection Regulation

MFN (WTO) Most Favored Nation

OECD Organisation for Economic Co-operation and Development

PPM (WTO) Process and production method

TEU Treaty on European Union

TFEU Treaty on the Functioning of the European Union

UNCTAD United Nations Conference on Trade and Development

US United States

WTO World Trade Organization

Introduction

The paintings on the cover of the present study were rendered by an artificial intelligence system, trained as a skillful apprentice to the great Dutch masters.[1] These works serve to demonstrate how machine learning and artificial intelligence, far from being hypothetical or far off in the future, are already seamlessly embedded in the digital fabric of our lives.

Heralded as the next disruptive technology, artificial intelligence has the potential to revolutionize every aspect of the economy and society at large. Artificial intelligence systems not only command near unlimited capacity but they can also be deployed location-independent and diffuse across borders. The fluidity of artificial intelligence systems is bound to affect the societies they interact with.

The EU is currently developing new rules for ethical and responsible artificial intelligence that would ensure "trust based on European values." There is at present very little understanding of the role of artificial intelligence inside international trade and "the extent to which the current international trade regulations safeguard European norms and values in the use of artificial intelligence."[2]

The Prospective Policy Study on 'Artificial Intelligence and EU Trade Policy' was commissioned by the Dutch Ministry of Foreign Affairs. The study has been carried out by the Institute for Information Law (IViR) at the University of Amsterdam. The research has been conducted in full compliance with the 2018 Netherlands Code of Conduct for Research Integrity.

The study aims to generate knowledge in two policy fields that intersect when it comes to governing artificial intelligence. One the one hand, the EU is in the process of formulating its policy on ethical and trustworthy artificial intelligence that aims to ensure a high level of protection of EU values. On the other hand, the EU is in charge of external trade policy and is negotiating future commitments on trade-related aspects of e-commerce at the World Trade Organizations (WTO).

The study interrogates whether EU's external trade policy meets the challenges in the face of transnational deployment of artificial intelligence. The study will answer the following questions:

- How are digital services incorporating artificial intelligence appraised in the purview of international trade law?
- To what extent are artificial intelligence systems and agents already covered by existing trade-law disciplines and sector-specific commitments?
- Are safeguards inside trade law adequate in face of the challenges from artificial intelligence and which trade rules can be adapted to provide sufficient guarantees?
- How far does new trade law, such as commitments on free data flows and source code protection, prematurely limit the EU's right to regulate artificial intelligence?

The scope of the study covers WTO law concerning cross-border trade in services and the WTO e-commerce negotiations in relation to artificial intelligence. The study takes the perspective of the EU and its member states while also covering developing countries' particular situation in relation to trade-related aspects of artificial intelligence. International trade law pertaining to government procurement, international investments rules and intellectual property protection have not been considered as part of this study.

The study is structured as follows: After the introduction, **Section 1** will set the scene for this study with an overview of artificial intelligence, its deployment and resulting cross-national competition as well as artificial intelligence's transboundary effects.

1. Jia, B.; Brandt, J.; Mech, R.; Kim, B.; Manocha, D., "LPaintB: Learning to Paint from Self-Supervision," (2019) arXiv:1906.06841.
2. Dutch Digital Agenda for Foreign Trade and Development Cooperation (2019).

Section 2 will summarize the current landscape of law and policies governing artificial intelligence in the EU and the Netherlands.

Section 3 will explore to what extent artificial intelligence is governed by international trade law and examine a suite of measures that are deemed to hamper cross-border trade in artificial intelligence.

Section 4 will assess the EU's e-commerce proposal tabled in the ongoing WTO negotiations in light of the EU's policy stance on ethical and trustworthy artificial intelligence.

Section 5 will give consideration to the position and situation of developing countries in the ongoing WTO e-commerce negotiations.

The **Conclusions** will pull together the different strands of arguments made in the sections and make recommendation for better recognition of governance issues of artificial intelligence inside EU external trade policy.

Section 1. A primer on artificial intelligence

Writing in the abstract about artificial intelligence is a difficult task, as it is a general purpose technology[3] that is foundational to a wide range of other innovative developments, across many different economic sectors and to society at large. According to Alan Turing, the founding father of computational science, artificial intelligence is about realizing cognitive capabilities in computing that make machines "think".[4] Artificial intelligence is going to be the defining development of the 21st century since it is poised to be the most transformative general purpose technology mankind ever availed itself of.[5]

The first section will set the scene for this prospective policy study by introducing the technological paradigms that underpin artificial intelligence, the present state of artificial intelligence and resulting cross-national competition and collaboration as well as artificial intelligence's transboundary effects.

Artificial intelligence

Artificial intelligence is an umbrella term that encompasses a cluster of self-learning technologies, such as machine learning, re-enforced learning, and deep learning, with the prospect to develop creative problem-solving capabilities similar to and exceeding the human mind in the future. For today's policy discourse one should bear in mind the distinction between specialized artificial intelligence and general artificial intelligence.

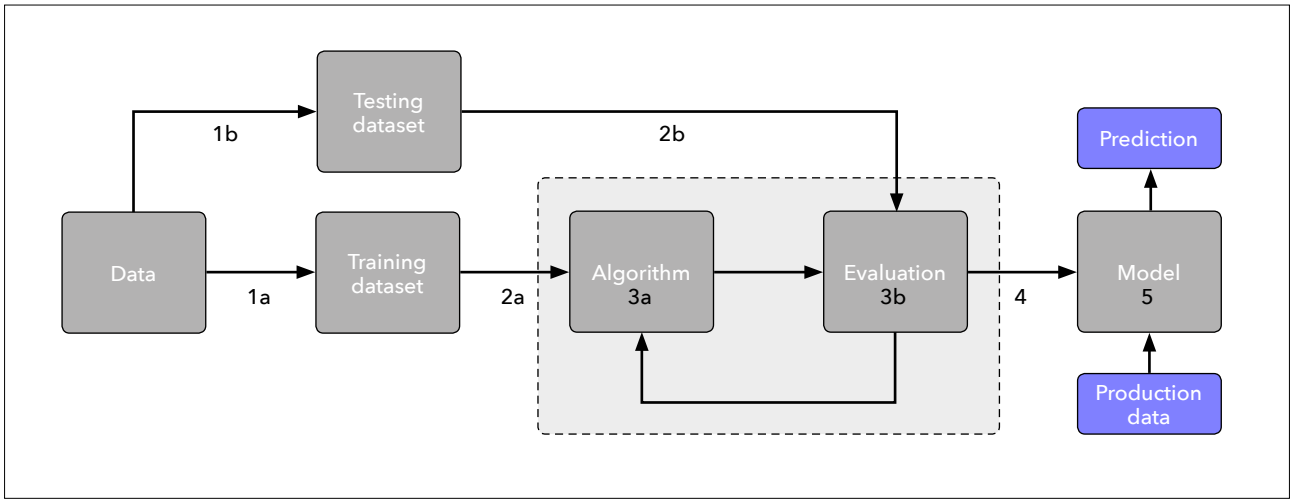

Figure 1. Own reproduction from Ayush Pant, 'Workflow of a Machine Learning project', Toward Data Science, 11 January 2019. In a typical machine learning workflow, an original pool of data is split into a training dataset and a testing dataset (1a and b), which is set aside like a kind of control group. The training dataset is then processed through a machine learning algorithm (2a), which generates first parameters based on statistical methods. These parameters result in a preliminary model (3a). The model, in a next step, is applied to the testing dataset (2b). At this point the machine learning algorithm gathers no new information from the testing dataset. This process is iterated to the point that the model performs its predictions well on the testing data (3b and c). Thus the testing dataset is used to ensure that the model has not simply learned the training dataset but that it applies to unknown datasets as a well (4). The final model can now be used for new predictions on a fresh set of data (5). Next to that new datasets can be fed to the machine learning algorithm it the same manner described above to continue improving the predictive value of the model. Hence, a form of learning accrues in models after each cycle of the machine learning process.

3. Think for example of electricity and information technology, see Boyan Jovanovic and Peter L Rousseau, 'General Purpose Technologies' in Philippe Aghion and Steven N Durlauf (eds), Handbook of Economic Growth (Elsevier Ltd 2005).
4. Alan M Turing, 'Computing Machinery and Intelligence' (1950) 49 Mind 433.
5. Iain M Cockburn, Rebecca Henderson and Scott Stern, 'The Impact of Artificial Intelligence on Innovation: An Exploratory Analysis' in Ajay K Agrawal, Joshua Gans and Avi Goldfarb (eds), The Economics of Artificial Intelligence: An Agenda (University of Chicago Press 2019); Allan Dafoe, 'AI Governance: A Research Agenda' (2018).

»AI will outperform humans in many activities in the next ten years, such as translating languages (by 2024), writing high-school essays (by 2026), driving a truck (by 2027), working in retail (by 2031), writing a bestselling book (by 2049), and working as a surgeon (by 2053).«

Katja Grace and others (2018)

Specialized artificial intelligence generates adaptive learning by processing large, granular datasets, drawn from physical and social behavior, through algorithms. Advancements in computer algorithms and data analytics are the foundations of this new capability. According to the Royal Society, "[m]achine learning is the technology that allows systems to learn directly from examples, data, and experience."[6] Figure 1 depicts a standard machine learning workflow. Specialized machine learning systems thus depend on two inputs: the computer algorithm and a wealth of data.[7]

Generalized artificial intelligence, by contrast, requires capabilities that go beyond today's data analytics approach in machine learning: notably cognition, reasoning, creativity, planning and eventually action. Achieving generalized artificial intelligence is thought to require additional technological breakthroughs and is hence a possible future development.[8] For this reason, this study refers to machine learning to connote applied specialized artificial intelligence.

Implementation and deployment

There is an important difference between discovery and innovation in artificial intelligence on the one hand, and, on the other hand, implementation and deployment of machine learning systems. Today's readily available machine learning technologies belong to the realm of specialized artificial intelligence since they can perform specific tasks fairly accurately and independently. Real-world examples oftentimes involve extensive pattern recognition from very large datasets, such as online navigation, facial recognition, and chat bots. According to market research, machine learning systems diffuse rapidly in real-world business models.

Machine learning uptake follows four deployment models:

1. Machine learning is built into the software architecture of a stand-alone service or deployed by an organization requiring in-house know-how.
2. Companies can convene competitions or challenges to involve developers in solving data science challenges via specialized platforms, such as the Kaggle and GitHub.
3. Machine learning is offered on a contract-basis as a service where digital technology companies provide the machine learning environment to clients and process clients' requests, e.g. Alphabet's Deep Mind, IBM's Watson and Amazon Web Services.
4. Specialized industrial platforms integrate machine learning into their software architecture, such as internet of things platforms and stock exchanges.

»What we have gotten from deep learning instead is machines with abilities—truly impressive abilities—but no intelligence.«

Dana Mackenzie and Judea Pearl (2018)

There are a variety of proprietary and open source solutions to machine learning technology. While leading companies offer their products as a service, they also release many of their tools as open source software, acknowledging that training data is more important than machine learning code. Developers can access

6. The Royal Society, Machine Learning: The Power and Promise of Computers That Learn by Example (2017).
7. Ibid.
8. Gary Marcus, 'Deep Learning: A Critical Appraisal' (2018).

open source libraries containing machine learning and neural network code, e.g. GitHub and TensorFlow. There are also pre-trained models, for example in computer vision and natural language recognition, that enable experimentation without building and training a machine learning system.

The role of access to training datasets for applied machine learning is more nuanced than it appears at first glance. Clearly, companies with the best data can make better predictions.[9] This holds especially true in the context of machine learning applications which require extensive training data, such as facial recognition. But there is enough room for specialized machine-learning algorithms at organizational or sectoral levels.[10]

»And this is where China comes in—while the US is the world's leader in AI discoveries, China is actually the leader in AI implementation.«

Kai-Fu Lee (2018)

Competition and collaboration

Aside from knowledge and training data, research and development in artificial intelligence requires significant investments. Existing variations, such as relative access to venture capital, influence how well countries perform in a cross-national comparison of investments in artificial intelligence.

Today, artificial intelligence is attracting record sums of private and public investments. A 2018 report by the Organisation for Economic Co-operation and Development (OECD) finds that the United States (US) accounts for the majority of artificial intelligence start-up equity investments worldwide, followed by China which now appears to be the second player globally in terms of the value of artificial intelligence equity investments received.[11] Equity investments in artificial intelligence start-ups in the European Union increased to eight percent in 2017.[12] Cross-border AI investments link the US to China and vice versa which creates a certain interdependence concerning artificial intelligence stakes.[13]

The current state-of-the-art machine learning systems are developed by major American and Chinese companies.[14] In spite of its strong research traditions and its leading industrial manufacturing, Europe is lagging behind not only in research but also when it comes to implementing artificial intelligence. To some extent this appears to be a continuation of the comparatively weak role European companies play in digital services overall.[15] Public sector investments in the EU and the Netherlands back a range of initiatives,[16] which by comparison to US and Chinese corporate investments must, however, be considered modest.

Apart from investments, patent applications, accepted papers at academic conferences and competitions are commonly used proxies to compare cross-national competitiveness in artificial intelligence. Figure 2 depicts the number of patent filings in the field of artificial intelligence to patent offices in different jurisdictions. Most patent applications have been made in the United States and in China, which grew by an average of 25 percent since 2009.[17] The EU is comparatively less dynamic in terms of patent applications to the European Patent Office (EPO). With the exception of Germany, the figure does not contain data on all EU member states.

Leading events, conferences, competitions and online resources on artificial intelligence, however, create an

9. Avi Goldfarb and Daniel Trefler, 'AI and International Trade' (2018).
10. James Kossuth and Robert Seamans, 'The Competitive Landscape of AI Startups' (2018) Harvard Business Law Review 1.
11. OECD, 'Private Equity Investment in Artificial Intelligence' (2018).
12. Ibid.
13. Jeffrey Ding, 'Deciphering China 's AI Dream' (2018) 28.
14. Goldfarb and Trefler (n 9).
15. Cedric Villani et al, 'For a Meaningful Artificial Intelligence: Towards a French and European Strategy' (2018).
16. European Commission, 'Artificial Intelligence for Europe (COM(2018) 237 Final)' (2018).
17. WIPO, 'Technology Trends 2019: Artificial Intelligence' (2019).

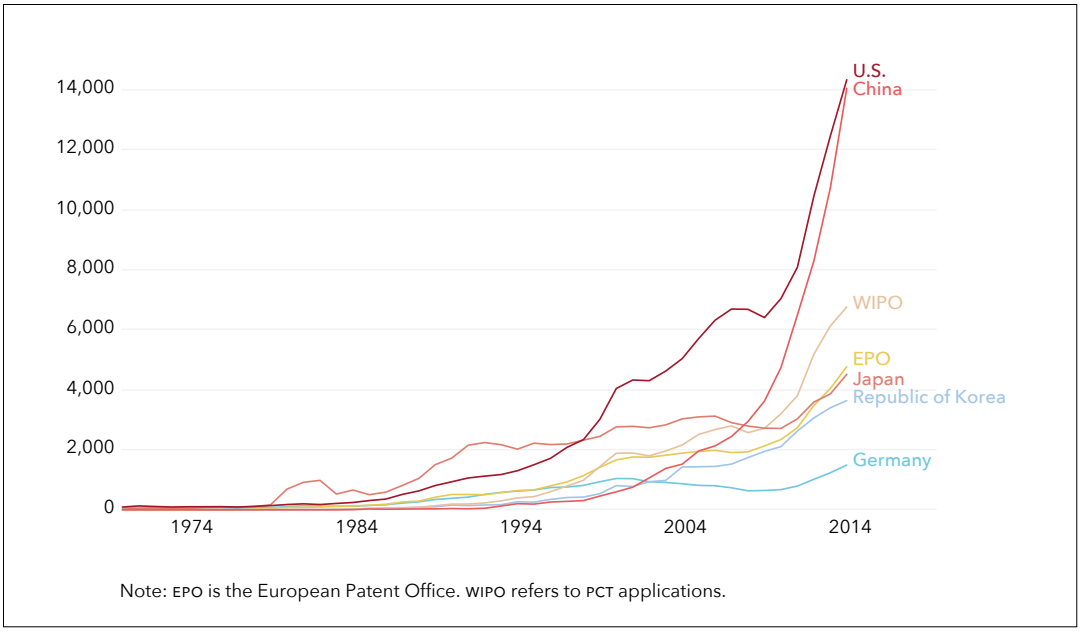

Figure 2. Number of patent applications for different offices by earliest priority date.
Source: WIPO Technology Trends 2019: Artificial Intelligence

international knowledge exchange and network. This has led to unprecedented transnational competition and collaboration, producing a lively ecosystem, where solutions, ideas, training data, services, and code travel across scientific domains, firms, and jurisdictions with little apparent friction.[18] Today's system of investments, key talents, research and development displays as much multilateral interdependence and synergies as it does cross-national competition.

Transboundary effects of artificial intelligence

Being essentially composed of data and code, algorithmic systems can freely be moved across today's global digital ecosystems. Developers, vendors, customers and users of an algorithmic system can be spread around the world. In addition, programming code, training datasets and predictive outcomes are increasingly held in geographically dispersed locations. The following patterns in transnational algorithmic flows have emerged:

1. Data or datasets are transferred to the machine learning system.
2. A machine learning algorithm can also be transferred to where the data resides.
3. The predictive outcomes of a machine learning system can be applied at a distance.

Hence, transnational algorithmic systems create extra layers of cross-national interdependence that can cause transboundary effects for end-users' rights and societal values.

18. See e.g. Madhumita Murgia, 'Who's Using Your Face? The Ugly Truth about Facial Recognition' Financial Times, 19 April 2019.

Section 2. Law and policy on artificial intelligence in the EU and the Netherlands

Artificial intelligence and machine learning have become a major economic policy issue in Europe. The EU and its member states are currently fine-tuning their respective strategies to promote "artificial intelligence made in Europe."[19] At this moment the use of personal data –a key input for machine learning applications– is regulated according to the General Data Protection Regulation (GDPR)[20]; however, the predictive output of algorithmic agents and their effects on individuals and society are not yet.

This Section provides a concise overview of the law and policies governing artificial intelligence in the EU and the Netherlands. In the following, the focus will be on the GDPR and the EU's push for ethical and trustworthy artificial intelligence.

EU policy on artificial intelligence

From the outset, EU policy makers put forward "a European approach to artificial intelligence" which rests on three pillars:

1. foster research, development and uptake of such technologies,
2. support member states to prepare for the socioeconomic changes brought by artificial intelligence and
3. ensure an appropriate ethical and legal framework.[21]

The policy recognizes that it is in the EU's strategic interest to foster investments, capacity and uptake of artificial intelligence that live up to Europe's economic position in the world. "Without such efforts," the Communication continues, "the EU risks losing out on the opportunities offered by AI, facing a brain-drain and being a consumer of solutions developed elsewhere."[22]

> *»The main ingredients are there for the EU to become a leader in the AI revolution, in its own way and based on its values.«*
>
> European Commission (2018)

The policy identifies access to data as key for a competitive AI landscape.[23] The corresponding policy to unleash a European data economy[24] covers measures on the free flow of respectively personal data and non-personal data in the digital single market, the re-use of public sector information as well as open access of scientific information, among others. With the aim to facilitate data sharing for re-use in the public and in the private sectors, the EU recently set up the Support Centre for Data Sharing and issued a list of key contractual principles to aid agreements over data sharing.[25]

In addition to harnessing its internal market clout, the EU aims to join-up member states' strategies in order to forge a better impact of European initiatives. All 28 member states and Norway, being a member of the European Economic Area, have signed a declaration of cooperation on artificial intelligence.[26] This cooperation aims to leverage a comprehensive and integrated approach to artificial intelligence and to support pan-European research networks.[27] The ambitious plans for promoting talent, research and networking efforts are mapped out elsewhere.[28]

19. European Commission, 'Member States and Commission to work together to boost artificial intelligence "made in Europe"' (press release of 7 December 2018).
20. Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), 2016 Official Journal of the European Union L 119/1.
21. European Commission, 'Artificial Intelligence for Europe (COM(2018) 237 Final)'.
22. Ibid.
23. Ibid.
24. European Commission, 'Towards a Common European Data Space (COM(2018) 232 Final)'.
25. Ibid.
26. See 'Declaration of Cooperation on Artificial Intelligence'.
27. European Commission, 'Coordinated Plan on Artificial Intelligence (COM(2018) 795 Final)'.
28. Charlotte Stix, 'A Survey of the European Union's Artificial

General Data Protection Regulation

A preeminent piece of legislation is the EU's GDPR which provides for "effective and complete protection" that aims for a "high level of protection" of individuals' fundamental rights and freedoms.[29] The GDPR entered into force in 2018 and, being an EU regulation, its rules apply directly in the member states. The EU envisions that its high data protection standards build consumer trust and translate into an advantage in the global digital economy.

The GDPR's territorial scope of application has been revised to ensure that "natural persons are not deprived of the protection to which they are entitled" in the context of online services.[30] The GDPR applies directly to third country entities when they collect personal data of individuals who are in the EU, when such data relates to to the offering of goods and services, irrespective of any monetary counter-performance.[31]

The GDPR tightly regulates the lawful collection and use of personal data; cross-border transfers of personal data to third countries are subject to special formalities that ensure "the protection travels with the data."[32] The rules on transfers of personal data to third countries essentially function as an anti-circumvention mechanism to prevent personal data from being processed outside the EU at much lower standards.[33]

The GDPR has special rules on automated individual decision-making, which can apply to the predictive outcomes of artificial intelligence applications.[34] Accordingly, individuals have the right that decisions, which produce a legal or significant other effect, not be based solely on automated processing. Profiling, ie. the automated processing of personal data to evaluate, analyze or predict certain aspects of an individual's life, must not be used to produce legal or other significant decisions.[35] However, the GDPR's rules on automated decision-making and profiling are not a substitute for standards on ethical, fair, non-discriminatory and trustworthy artificial intelligence.

Ethical and trustworthy artificial intelligence

There is presently no EU regulation specifically on artificial intelligence but work is ongoing to ensure an appropriate ethical and legal framework. The European Commission, for example, convened the High-Level Expert Group on Artificial Intelligence which recently released its Ethics Guidelines for Trustworthy Artificial Intelligence.[36] These guidelines are now in a piloting phase that evaluates how its requirements can be operationalized.[37] To this end the EU can work with relevant EU-funded research projects and public-private partnerships, including in the member states, on implementing the guidelines' requirements. Notably, the guidelines are non-binding and thus they do not create new legal obligations.

The guidelines state that trustworthy artificial intelligence requires

1. human agency and oversight,
2. technical robustness and safety,
3. privacy and data governance,
4. transparency,
5. diversity, non-discrimination and fairness,
6. environmental and societal well-being and
7. accountability.

Common to each of these objectives is the desire to foster public engagement, of communicating and receiving stakeholder input, and instituting meaningful societal checks and balances on the development of artificial intelligence. According to the guidelines, ethical artificial intelligence accords respect for human autonomy, prevention of harm, fairness and explicability.

Intelligence Ecosystem' (2019).

29. See CJEU, case C-362/14 (Maximillian Schrems v Data Protection Commissioner), judgment of 6 October 2015, ECLI:EU:C:2015:650, para. 39.
30. GDPR, recital 23.
31. GDPR, article 3(2).
32. European Commission, 'Exchanging and Protecting Personal Data in a Globalised World (COM(2017)7 Final)'.
33. See CJEU, (Maximillian Schrems v Data Protection Commissioner) (n 29), para. 73.
34. GDPR, article 22.
35. GDPR, article 22 in connection with article 4(4).
36. High-Level Expert Group on AI, 'Ethics Guidelines for Trustworthy AI' (2019).
37. European Commission, 'Building Trust in Human-Centric Artificial Intelligence (COM(2019) 168 Final)'.

»It will be the job of the next Commission to deliver something so that we have regulation similar to the General Data Protection Regulation that makes it clear that artificial intelligence serves humanity.«

Angela Merkel (2019)

From an international trade perspective, what is striking about the guidelines is that they are theorized within the context of a digital single market, without reference to how cross-border trade bears on the EU's normative approach to artificial intelligence. The EU announced that it opens up cooperation to all non-EU countries that share the same values and that it explores how third country stakeholders can participate in the pilot phase. In addition, international fora will be sought "to bring the Union's approach to the global stage and build a consensus on a human-centric AI."[38]

Expected future rule-making will draw on the existing guidelines and follow the model of the GDPR. The incoming European Commission is said to propose new rules for ethical and trustworthy artificial intelligence and certain high risk applications, such as for example facial recognition.[39] EU institutions herald the GDPR as a role model for the future regulation of ethical and trustworthy artificial intelligence. Industry stakeholders, by contrast, consider the GDPR's high level of protection too onerous for data-intensive innovation and are wary of new regulation of artificial intelligence.[40]

Quite similar to the expectations for the GDPR, EU policy makers anticipate that the EU's ethical approach to AI "strengthens citizens' trust in the digital development and aims at building a competitive advantage for European AI companies."[41] Some commentators are skeptical about the EU's competitiveness and whether ethical rules on artificial intelligence can become a competitive edge at all.[42]

However, future EU rules on ethical and trustworthy artificial intelligence would have to anticipate transboundary effects of artificial intelligence systems and cross-national differences in fundamental rights protection and ethical standards. Consider an artificial intelligence system that operates from outside the EU with predictive outcomes that affect individuals in the EU; for example, a life insurance that calculates premiums based on photographs. How will future EU rules ensure that such system will not undercut EU ethical standards? As with the GDPR, to avoid circumventions, future EU rules will likely have to apply to artificial intelligence systems if they affect individuals in the EU; no matter where the provider is established.

»It's absurd to believe that you can become world leader in ethical AI before becoming world leader in AI first.«

Ulrike Franke (2019)

The Netherland's strategy on artificial intelligence

In the Netherlands, the government policy on artificial intelligence forms part of the 2018 Dutch Digitalization Strategy.[43] Artificial intelligence was the overarching theme of the 2019 Netherlands Digital Day and its development and uptake is now a government priority.[44] The Dutch government's "AI strategic action plan" has three tracks:

1. to seize societal and economic opportunities,

38. Ibid.
39. Laura Kayaly, 'Next European Commission Takes Aim at AI' Politico (2019).
40. See e.g. Janosch Delcker, 'Google top lawyer pushes back against one-size-fits-all rules for AI' Politico (2019).
41. European Commission, 'Building Trust in Human-Centric Artificial Intelligence (COM(2019) 168 Final)' (n 37).
42. Janosch Delcker, 'Europe's silver bullet in global AI battle: Ethics' Politico (2019).
43. Ministry of Economic Affairs and Climate Policy, 'Dutch Digitalisation Strategy: Getting the Netherlands ready for the digital future,' (2018).
44. Ministry of Economic Affairs and Climate Policy, 'Nederlandse Digitaliseringsstrategie 2.0' (2019).

2. to create a conducive AI climate for economy and society, and
3. to strengthen the foundations for public values, human rights, trust and safety.[45]

Next to measures to strengthen the national base for knowledge, research and innovation, the Dutch government pays considerable attention to artificial intelligence's effects on society and fundamental rights in the Netherlands, Europe and abroad.[46] This independent study, for instance is a product of the Dutch Digital Agenda for Foreign Trade and Development Cooperation.[47] It is an important initiative to generate knowledge on and engage in defining safeguards for ethical and trustworthy artificial intelligence within the context of the international trading system.

Outside the scope of this study but not less relevant are many noteworthy initiatives by private companies, professional associations and civil society organizations to formulate ethical standards for artificial intelligence fit for the Netherlands.[48]

45. Ministry of Economic Affairs and Climate Policy, 'Strategisch Actieplan voor Artificiële Intelligentie' (2019).
46. See e.g. Roos De Jong, Linda Kool and Rinie Van Est, 'This Is How We Put AI into Practice Based on European Values' (2019).
47. Dutch Digital Agenda for Foreign Trade and Development Cooperation (2019).
48. See e.g. the Dutch Alliance on Artificial Intelligence (ALLAI) and the launch of the Dutch AI Coalition.

Section 3. Artificial intelligence inside international trade law

Artificial intelligence is bound to impact international trade and consequently the international trading system.[49] The third Section will explore to what extent artificial intelligence is governed by international trade law. The analysis focuses on selected measures that can affect cross-border digital trade in artificial intelligence. Starting from the General Agreement on Trade in Services (GATS), it will ask what the gaps are in international trade law that would affect cross-border artificial intelligence deployment. To what extent does international trade law limit countries' autonomy to adopt regulation on ethical artificial intelligence?

»AI will generate transformative products and services that alter world trade patterns.«

Goldfarb and Trefler (2018)

General Agreement on Trade in Services

The GATS is the first multilateral treaty on the liberalization of international trade in services that forms part of the World Trade Organization (WTO).[50] The WTO occupies a very prominent role inside international trade law because it came equipped with its own effective enforcement mechanism. Recently, the Dispute Settlement System is in a crisis which threatens to destabilize the multilateral trading system.[51]

While the primary aim of the GATS is the expansion of international trade in services through the elimination of trade barriers, this aim is not unlimited. The preamble to the GATS acknowledges WTO members' regulatory autonomy to pursue their national policy objectives. Domestic regulation affecting trade in services must nevertheless be consistent with the GATS and applied non-discriminatorily.[52]

GATS general obligations and commitments (read in conjunction with WTO members' individual schedule of commitments) are founded on general principles of non-discriminatory treatment, market access and transparency. The deregulation of services is not the objective of the GATS,[53] however, the margin of maneuverability that is left to a WTO member also depends on its individual commitments in the disciplines of market access and national treatment.

Cross-border services powered by artificial intelligence can involve mode 1, cross-border supply, and mode 2, consumption abroad; a junction that can become very relevant in relation to a WTO member's specific commitments entered in its schedule. In order to better grasp how the GATS interacts with WTO members' current and future domestic policies in the field of artificial intelligence, the GATS will be hypothetically applied to cross-border digital services that (already) operate with applied artificial intelligence.

Scope of the GATS

The GATS applies to all service sectors, with the exception of government services. The scope of the GATS is extensive and highly inclusive as it applies to all measures affecting trade in services. All measures affecting the supply of services, from the moment of production, to their final delivery, fall under the GATS obligations.[54] A measure that affects trade in both goods and services is governed by the GATS.[55]

49. See WTO, World Trade Report 2018: The future of world trade.
50. The GATS forms part of the 1994 Marrakesh Agreement on Establishing the World Trade Organisation (WTO Agreement) as Annex 1B.
51. The Economist, It's the end of the World Trade Organisation as we know it, edition of 28 November 2019.
52. Pursuant to GATS Articles VI(1) and XIV.
53. Peter van den Bossche and Werner Zdouc, The Law and Policy of the World Trade Organization (3rd edition, Cambridge University Press 2014) 514.
54. I.e. any measure by a member, "whether in the form of a law, regulation, rule, procedure, decision, administrative action or any other form," GATS Article XXVIII(a).
55. See, e.g. Anupam Chander. The Internet of Things: Both Goods and

The determination of whether an activity constitutes a service is to be made on a case-by-case basis. Increasingly, digital products combine characteristics of both goods and services. For instance, a connected car is clearly a good but also a service in so far that an autopilot navigates the car. In this case, the trade rules for services apply to the features of a product performing a digital service.

Digital services inside the WTO services classifications system

What can be difficult, however, is to categorize digital services squarely within one of the traditional service classifications. The service classifications are predominantly used to determine the specific commitments a party entered into in the country's schedule of specific commitments. Most members drew up their GATS 1994 schedules following the WTO Services Sectoral Classifications List (W/120), which links to the UN Provisional Central Product Classification (UNCPC) 1991.[56] These service classifications, originally conceived for a static and offline world, are today used to determine a member's commitments in relation to digital services.

At first blush, the GATS appears equipped to handle the evolution from analogue to digital, and offline to online services. WTO adjudicating bodies have consistently found digital commercial activity to be governed by the GATS.[57] This technologically neutral reading of the GATS, which gives wide coverage to digital services, will likely be the subject of contestation among WTO members. Digital services can be readily subsumed under numerous classifications and can even be interpreted as modes of supply. As a consequence, members may lay claim to contradictory levels of GATS commitments when examining a particular service powered by artificial intelligence.

At the time of the Uruguay Round of negotiations, WTO members have entered into far reaching commitments in relation to "Computer and Related Services." Back then the impact of digitalization and cross-border digital trade was still nascent, which by today's standards must be considered disruptive for a number of digital services and platforms. Injecting artificial intelligence into digital services will likely compound the existing problems with service classifications under the GATS considering that the balance struck in 1994 when the WTO treaties were ratified is already upset.

Nature of artificial intelligence based services

Whilst not all artificial intelligence qualifies as a tradable service, digital services which operationalize artificial intelligence are increasingly marketed and sold across national boundaries. Framing applied artificial intelligence as a process and production method (PPM) instead of a new service category would actually support the indiscriminate application of the GATS.

> *»… judicial transplants cannot replace political consensus on the substance, particularly in a complex and highly technical domain, such as digital trade.«*
>
> Mira Burri (2017)

As long as digital services have a generic entry in the aforementioned service classification list they are presumably covered by the GATS. Likewise, digital services operating with applied artificial intelligence are presumptively covered. For instance, machine learning is already used for real-time bidding in online advertisement[58] which is classifiable as "Advertisement Service" pursuant to the WTO Services Sectoral Classification List. Digital services without a clear-cut analogue legacy are more likely subsumed under the "Computer and Related Services" category. An online search engine, for example, is presumably classified as a "Data Processing Services," which is a sub-category of the "Computer and Related Services" category.[59]

Services. (2019) World Trade Review 18(S1), S9-S22.

56. WTO, Services Sectoral Classification List. Note by the Secretariat, MTN.GNS/W/120, 10 July 1991.
57. See WTO Panel Report, China – Publications and Audiovisual Products, WT/DS363/R, para. 7.1641-7.1653.
58. See Google Ads Help, "About Smart Bidding."
59. See Rolf H Weber and Mira Burri, Classification of Services in the Digital Economy (Schulthess 2012).

Thus, the expected transformative impact on global value chains and service sectors[60] to be wrought by the introduction of artificial intelligence cannot have been envisioned by the current GATS. This will very likely raise the stakes for WTO members to argue over the service classifications and the commitments they entered into for specific service sectors in relation to market access and national treatment obligations under the GATS. The question remains to what extent the classical trade law disciplines can create a level-playing field for digital services deploying artificial intelligence.

Overview of GATS disciplines

The GATS provides for general obligations, i.e. Most-Favoured Nation (MFN) treatment and domestic regulation, which apply automatically to all members and services sectors, and commitments concerning market access and national treatment. The commitments only have binding effect if a member has so indicated this in its schedule of specific commitments. MFN and national treatment are the two non-discrimination disciplines of the GATS.

Most Favoured Nation Treatment

The core general obligation is Most-Favoured-Nation (MFN) treatment, found in GATS Article II, which is automatically and unconditionally binding across all services unless a WTO member sought an exemption upon negotiation of the GATS. Under GATS Article II, each WTO member shall treat services and service suppliers of a WTO member 'no less favourable' than 'like' services and service suppliers of any other member.

National Treatment

While MFN requires WTO members to refrain from discriminating among each other, the national treatment principle ensures that services and service suppliers from outside a member are treated equally to domestic services and service suppliers. The language in Article XVII.1 carries the same legal test as Article II, as it prohibits WTO members from giving treatment 'less favourable' to 'like' foreign services of any other member than the treatment given to domestic services or service suppliers.

Domestic regulation

Domestic regulation discipline concerns procedural due process and fairness in those sectors for which a GATS member has undertaken specific commitments. GATS Article VI provides that "each member shall ensure that all measures of general application affecting trade in services are administered in a reasonable, objective and impartial manner." It ensures, among among other things, that licensing and qualification requirements are based on objective criteria.

Market Access

Under the market access discipline in GATS Article XVI, each member bound by a commitment in its Schedule should not to impose one of the six market access barriers listed in Article XVI:2 (a) to (f). At the Uruguay Round, a number of WTO members negotiated to continue applying various combinations of the six barriers to market access. These negotiated limitations on market access appear in the members' GATS Services Schedule.

In the next step the GATS disciplines will be applied to specific measures that, following current trade diplomacy, can affect cross-border trade of services that involve artificial intelligence.

»The world's most valuable resource is no longer oil, but data.«

The Economist (2019)

GATS disciplines as applied to cross-border digital services powered by artificial intelligence

It is important to recall that at its most basic an artificial intelligence application is the product of training data and machine learning code/ algorithms (upstream) which generates predictions based on input data (downstream). Machine learning code can either be open source, e.g. Google's open source machine learning platform TensorFlow,[61] or treated as a business secret, e.g. the search algorithm by the same company.[62]

60. Avi Goldfarb and Daniel Trefler, 'How Artificial Intelligence Impacts Labour and Management', World Trade Report: The future of world trade (WTO 2018).

61. See at https://opensource.google/projects/tensorflow.

62. Rob Copeland, "Google Lifts Veil, a Little, Into Secretive Search Algorithm Changes", The Wall Street Journal, 25 October, 2019.

Whilst the GATS protects cross-border trade in services, it is up to the service suppliers to determine how data flows and processing operations are integrated into their ordinary course of business. Suppliers of digital services powered by applied artificial intelligence rely heavily on the processing of different kinds of data and the free flow thereof. Measures by WTO members which require a closer examination in order to assess their conformity with the GATS are:

1. Data and/or technology localization;
2. Restrictions of cross-border flows of personal data;
3. Digital security;
4. Technological sovereignty;
5. Mandatory technology transfer requirements; and
6. Other behind-the-border regulations.

None of these measures has been the subject of adjudication under the WTO Dispute Settlement System. The subsequent hypothetical analysis of each of these measures in turn will be informed by WTO law, jurisprudence and literature. Note, that a GATS inconsistent measure could potentially be justified in the context of the relevant exceptions.

Data and/or technology localization

Data and technology localization are measures by which a country requires "local[izing] data storage or conditioning cross-border data transfer on local data storage, or prohibiting or restricting the transfer"[63] out of its territory of business and personal data. Such measures are discussed as possible violations of GATS market access and/ or national treatment rules provided a WTO member has scheduled commitments on the cross-border supply of relevant services in relation to either discipline.[64]

A WTO member's data and technology localization measures may constitute barriers to market access under GATS Article XVI. It can be argued that a member's data or technology localization measure limits the cross-border trade in digital services which are contingent on cross-border data transfers.[65]

Moreover, forced data and technology localization could be inconsistent with GATS national treatment rules.[66] Measures on data and technology localization for digital services, which requires foreign suppliers to "duplicate expensive infrastructure, security and services support in local markets,"[67] accords less favourable treatment to foreign suppliers. Even if data localization measures treat national and foreign suppliers identically, such measures "modify the conditions of competition in favour of national suppliers," [68] which can translate into a 'less favourable' treatment of foreign suppliers under GATS Article XVII:3.

Restrictions of cross-border flows of personal data

Other measures that are discussed as barriers to the cross-border supply of digital services include a country's rules restricting cross-border transfers of personal data. Such restriction of cross-border transfers of personal data could be deemed inconsistent with GATS national treatment even if the measure does not discriminate on its face but has the effect of modifying the conditions of competition in favour of domestic services.[69]

Certain country-specific measures restricting cross- border transfers of personal data can trigger other trade law disciplines, e.g. GATS market access commitments if they effectively localize personal data processing. A measure that accords less favorable treatment to services of a third country as compared to a 'like' service of another third country, depending on the regulatory convergence with a third country's data privacy laws, could be in violation of the GATS MFN treatment obligation.

Digital security

With digital connectivity grows the risks of cyberattacks and -espionage which have prompted many countries to adopt measures aimed at enhancing digital

63. Daniel Crosby, 'Analysis of Data Localization Measures Under WTO Services Trade Rules and Commitments' (2016).
64. E.g. Andrew D Mitchell and Jarrod Hepburn, 'Don't Fence Me In: Reforming Trade and Investment Law to Better Facilitate Cross-Border Data Transfer' (2017) Yale Journal of Law and Technology; Mira Burri, 'Current and Emerging Trends in Disruptive Technologies : Implications for the Present and Future of EU's Trade Policy' (European Parliament 2017).
65. Crosby (n 63).
66. Ibid.
67. Ibid.
68. Ibid.
69. Kristina Irion, Svetlana Yakovleva and Marija Bartl, 'Trade and Privacy: Complicated Bedfellows? How to Achieve Data Protection-Proof Free Trade Agreements' (2016).

security.[70] The range of measures span interventions at the level of hardware and software of critical information infrastructure and key technologies, some of which can amount to restrictions of market access for foreign service providers. Emblematic is the US government's blacklisting of the Chinese company Huawei for (national) security concerns and its global call for countries' allegiances.[71]

A WTO member's measure that targets specific foreign service suppliers' technologies and services would be outright discriminating, thereby violating several GATT and GATS disciplines, but presumably capable of being justified under the GATS security exception (see below). Trade pundits argue that governments' extensive reliance on the national security exception "could lead to a large increase in trade restrictions."[72]

Technological sovereignty

The quest for technological sovereignty is behind recent measures by a number of countries that have as their objective to guarantee locally controlled digital infrastructures, data pools, and recently artificial intelligence applications.[73] Such measures can range from subsidizing local technology champions, harnessing government procurement rules and industrial policy to nurture technological sovereignty.

For WTO members which have inscribed full commitments in their GATS schedules on market access and national treatment, the margin of maneuver for an industrial policy that favors domestic suppliers is consequently limited.[74] A measure that would accord less favorable treatment to a foreign supplier of digital services, either formally or actually, than that afforded to domestic suppliers, could be in violation of a WTO member's GATS national treatment commitment.

Mandatory technology transfer requirements

Mandatory technology transfer requirements are a type of measure that requires a firm operating in the territory of a WTO party to reveal, inter alia, technologies, source code and algorithms. Some countries make market access conditional upon technology transfer, introduce licensing and authorization schemes to that effect or require compulsory joint ventures with local companies.[75] While intellectual property rights and trade secrets are protected under the WTO TRIPS Agreement,[76] GATS market access and domestic regulation disciplines can help tackle a WTO member's measure on mandatory technology transfers.

Prospective regulation of ethical, trustworthy and human centric artificial intelligence may however require some measure of transparency or even disclosure over machine learning code and algorithms either in the course of an authorization procedure for critical applications or for the purpose of exercising regulatory oversight. Distinguishing between measures that are protectionist and those that advance legitimate government interests is a matter of justifying a trade-restrictive measure in the context of the general exceptions (see below).

Other behind-the-border regulations

Domestic regulations, often implemented in pursuit of general interest objectives, are currently more broadly discussed as 'behind-the-border barriers to trade'. Due to a lack of regulatory convergence, suppliers of digital services incur the costs of complying with different WTO members' regulations, as is the case with diverging consumer protection laws.[77] As long as behind-the-border measures are not inconsistent with one of the GATS disciplines, compliance costs as such would not amount to a violation of the GATS, which does not have the deregulation of services as its objective.

In connection with the diffusion of applied artificial intelligence and machine learning applications, a number of countries are preparing new rules for ethical, trustworthy and human centric artificial intelligence. A WTO member may adopt measures that are not

70. Joshua P Meltzer and Cameron F Kerry, 'Cybersecurity and Digital Trade: Getting It Right' (2019).
71. Steve Lohr, 'US Moves to Ban Huawei From Government Contracts', The New York Times, 7 August 2019.
72. Meltzer and Kerry (n 70).
73. Marc Scott, 'What's driving Europe's new aggressive stance on tech', Politico, 27 October 2019.
74. Burri (n 64) 16.
75. See Andrea Andrenelli, Julien Gourdon and Evdokia Moïsé, 'International Technology Transfer Policies' (2019) 222 OECD Trade Policy Papers.
76. Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), Apr. 15, 1994, Annex 1C to the Marrakesh Agreement Establishing the World Trade Organization.
77. Ioannis Lianos and others, 'The Global Governance of Online Consumer Protection and E-Commerce Building Trust' (2019).

inconsistent with the obligations and commitments assumed under the GATS or, in case of a trade-restrictive measure, members may seek to justify GATS inconsistent measures under one of the general exceptions (see below).

Justifications for GATS-inconsistent measures

Where a measure is found to violate one or several of the GATS disciplines, the agreement provides for a range of justifications and exceptions. Relevant in the context of measures that restrict the cross-border supply of digital services are:

1. GATS Article V which provides for deeper regional economic integration,
2. GATS Article XIV *bis* which protects members' security interests, and
3. GATS Article XIV which holds general exceptions for public interest measures.

> *»The internet is going to be regulated by trade agreements – or better said, trade agreements are already regulating the internet.«*
>
> Carolina Rossini (2019)

Deeper regional economic integration

GATS Article 5 expressly permits its members to enter into another agreement liberalizing trade in services between or among the parties to such an agreement if the conditions of the exception are met. The exception of the EU/EEA internal market for instance has been justified as regional economic integration in the meaning of GATS Article V.

In reaction to the stalemate in the multilateral trading system, international governance of digital trade has gradually shifted to bilateral and regional trade agreements.[78] Examples for mega-regional trade agreements which incorporate chapters on 'electronic commerce' or 'digital trade' are the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (TPP-11) signed in March 2018 and the United States-Mexico-Canada Agreement (USMCA) signed in November 2018.

Security exceptions

The security exceptions contained in GATS Article XIV *bis* can justify a GATS-inconsistent measure if it is necessary to protect a WTO member's essential security interests. Until recently, the GATS security exceptions, which have been modelled after GATT Article XXI, have scarcely been used. However, this has changed dramatically over the past few years during which countries increasingly invoke national security interests in defence of a variety of trade-restrictive measures. A recent proliferation of WTO disputes involving national security inside GATT lays the interpretive foundation for jurisprudence under GATS Article XIV *bis*, also as it concerns cross-border trade in artificial intelligence-powered services.

Early 2019, a WTO panel in *Russia-Measures Concerning Traffic in Transit* ruled that the GATS security exceptions are subject to review by a WTO dispute settlement panel to determine whether objective grounds exist for invocation of XXI(b).[79] The panel clarified that any member that invokes GATT Article XXI(b) bears the burden of proof that there is a *good faith* basis to designate a concern as 'essential security interest.'[80] The invoking member's good faith obligation extends not only to the security interest defined, but also to the nexus between the security interest and the measure taken.[81]

By virtue of the intangible nature of 'information', Article XIV *bis* (a) lends itself to a broad application because a WTO member can refuse to "furnish any information, the disclosure of which it considers contrary to its essential security interests." Subparagraph (a) which is not limited to times of conflict or military necessity may be read to mean data generally as long

78. Javier Lopez-Gonzalez and Janos Ferencz, 'Digital Trade and Market Openness (TAD/TC/WP(2018)3/FINAL)'.
79. WTO Panel Report, Russia-Measures Concerning Traffic in Transit, WT/DS512/R, para 7.101-7.102.
80. Ibid., para 6.132-7.134.
81. Ibid., para 7.138.

as a WTO member's data-restrictive measure has a good faith connection to an 'essential security interest'. Thus, under Article XIV *bis,* countries may seek to justify *any* restrictive measure governing datasets, including, but not limited to data localization, data access restrictions, foreign investment and ownership restrictions, or hardware import controls.[82]

General exceptions for public interest measures

The general exceptions under GATS Article XIV act as an affirmative defense that permits a WTO member to adopt a measure in the public interest, even if such a measure is inconsistent with GATS obligations. It is the country that has imposed the inconsistent measure that bears the burden of proving the measure is an admissible exception. Article XIV(c) provides for derogations from commitments if the measure is 'necessary' to protect important public interests, notably the prevention of deceptive and fraudulent practices, the protection of the privacy of individuals and safety.

In order to rely on the general exceptions, the contested measure has to meet the material requirements of GATS Article XIV(c), as well as the provision of the so-called *chapeau*. First, a respondent member must prove that the measure is 'necessary'. The less trade-restrictive a measure is, and the greater its contribution to the public interest, the more likely the measure is to meet the necessity test. If a claimant member can demonstrate that a less trade-restrictive alternative was reasonably available, then the measure will fail the necessity test. Second, under the chapeau of GATS Article XIV(c) the measure in question may not constitute "arbitrary or unjustifiable discrimination between countries where like conditions prevail [nor may it impose] a disguised restriction on trade in services."

Reliance on the general exceptions is arguably more successful in policy areas where GATS members' public interest policies already substantially converge and, conversely, less successful where a members' public interest policy significantly diverge in the adopted normative approach. Take for example the EU's fundamental rights approach to the protection of personal data and attendant restrictions to cross-border transfers thereof. If trade law adjudicators conclude that a less trade-restrictive alternative capable of securing compliance was reasonably available, then the EU measure restricting cross-border transfers of personal data would fail the necessity test.[83]

In a similar vein, prospective policy initiatives on ethical, trustworthy and human centric artificial intelligence may not achieve functional-equivalent regulatory convergence from the outset. Even with important international harmonization efforts ongoing, such as the 2019 OECD Principles on Artificial Intelligence,[84] members will likely exercise their regulatory autonomy differently. What if the EU restricts the deployment of facial recognition technologies[85] mandating as an additional safeguard that EU citizens' biometric data be processed in EU territory? How can measures in pursuit of technological sovereignty be justified if they restrict, either formally or actually, the cross-border supply of digital services?[86]

Sector-specific commitments in telecommunications and financial services

Besides the GATS disciplines, WTO members have made additional sector-specific commitments in telecommunications and financial services. These sector-specific commitments already address the free movement of information in relation to telecommunications and financial services.

The Annex on Telecommunications

The debate over free flows of data overlooks the high degree of liberalization already afforded under the Annex on Telecommunications of the GATS. Trade diplomacy's preoccupation with cross-border data flows may in fact be a misnomer as its advocates are principally concerned with market access for digital services themselves rather than the conveyance of digital signals.

82. See e.g. Norman Zhang, 'Trade Commitments and Data Flows: The National Security Wildcard: Reconciling Passenger Name Record Transfer Agreements and European GATS Obligations' (2019) 18 World Trade Review S49.

83. See for more details Irion, Yakovleva and Bartl (n 69).

84. OECD, Recommendation of the Council on Artificial Intelligence (OECD/LEGAL/0449), adopted on 22 May 2019.

85. Mehreen Khan, 'EU plans sweeping regulation of facial recognition,' Politico, 22 August 2019.

86. Marc Scott, 'What's driving Europe's new aggressive stance on tech', Politico, 27 October 2019.

In 1994, by the end of the Uruguay Round, WTO members produced an original schedule of service commitments that fully liberalized cross-border supply of both basic and value-added telecommunications. In 1997, members deepened their set of existing commitments in the area of basic telecommunications with the adoption of the Fourth Protocol on Basic Telecommunications Services. Many WTO members, including the EU and the US, made full cross-border market access and national treatment commitments in the area of digital transmission of sound, data and images in their 1997 supplement schedules. In addition, they provided for full liberalization of packet switched data transmission services, a category pertaining to the core protocols of today's Internet transmission technology.[87]

The GATS Annex on Telecommunications in its Article 5(c) provides:

> Each member shall ensure that service suppliers of any other member may use public telecommunications transport networks and services for the movement of information within and across borders, including for intra-corporate communications of such service suppliers, and for access to information contained in data bases or otherwise stored in machine-readable form in the territory of any member.

At close reading of the Annex, it is principally aimed at cross-border data flows for service suppliers from non-telecommunications sectors, including "for intra-corporate communications of such service suppliers". Following this provision, WTO members may not restrict "the movement of information within and across borders" (i.e., cross-border data flows) in relation to any services for which they have entered specific commitments.[88] It has been argued that in practice the Annex benefited mostly non-telecommunications services, which incorporate the electronic transmission and retrieval of information that require access to and use of communications services.[89]

87. I.e. Transmission Control Protocol (TCP) and the Internet Protocol (IP).
88. Crosby (n 63).
89. Weber and Burri (n 59) 62.

The Annex on Financial Services

The Understanding on Commitments in Financial Services (the 'Understanding') comprise the Fifth Protocol of the GATS, a *lex specialis* framework governing trade in financial services. In 1999, the EU, among others, undertook additional financial service commitments and a list of MFN exemptions beyond the initial commitments of 1994. This multilateral liberalization, in conjunction with financial deregulation at the end of the 20th century, led to unprecedented financial globalization in the EU and around the world.

The Annex on Financial Services defines financial services broadly as any service of a financial nature offered by a financial service supplier of a member. Paragraph 5(a)(v-xvi) of the Annex provides a non-exhaustive list of financial services covered in the commitments.[90] Both WTO jurisprudence and the definitions set out in the Annex show electronic payments to be a financial service covered by the GATS. For instance, the panel in *China-Electronic Payment Services* found that China was bound by GATS Financial Services commitments in its measures concerning electronic payment services.[91]

Section B, paragraph VIII of the Understanding requires that:

> No member shall take measures that prevent transfers of information or the processing of financial information, including transfers of data by electronic means, […] where such transfers of information, processing of financial information or transfers of equipment are necessary for the conduct of the ordinary business of a financial service supplier.

This provision appears to proscribe localisation and other trade-restrictive measures affecting both data and algorithms in financial services.

The obligation to provide for the free flow of financial data in Section B paragraph 8 of the Understanding is

90. These include, acceptance of deposits, lending of all types, consumer credit, mortgage credit, commercial finance; all payment and money transmission services, including credit, charge and debit cards, travelers cheques and bankers drafts; derivative products including, futures and options; and provision and transfer of financial information, as well as financial data processing and related software by suppliers of other financial services.
91. WTO Panel Report, China-Electronic Payment Services, WT/DS413/10.

tempered by a counterbalancing clause permitting a member to take measures to protect personal data, personal privacy, and confidentiality of individual financial interests so long as such a measure is not used to circumvent GATS obligations.

Contracting parties in 1998 could not possibly have envisioned digital financial services eclipsing traditional commercial presence. The overall shift from traditional banking to online financial services has come to be known as 'Fintech', such as for example PayPal, AliPay and WeChat, or trade in digital currencies based on blockchain technology, such as BitCoins and Etherium. Their business operations' heavy reliance on data flows integrates flows that are necessary for financial transactions and the supply of financial services with data mining, profiling, personalization and algorithmic predictions. Whether all business operations of Fintech services are covered by WTO members financial service commitments is not clear at this point, however, WTO jurisprudence may favor an inclusive approach to financial services.

This lack of foresight led to greater limitations on commercial presence in the EU than on cross-border delivery. Moreover, Fintech's business operations' heavy reliance on data flows integrates flows that are necessary for financial transactions and the supply of financial services with data mining, profiling, personalization and algorithmic predictions. Whether all business operations of Fintech services are covered by WTO members financial service commitments is not clear at this; however, WTO jurisprudence may favor an inclusive approach to financial services.

Paragraph 2(a) of the Financial Services Annex enables a member to take safeguard measures in financial services, under the aegis of "prudential reasons." Such measures include the protection of e.g. investors and depositors, or to ensure the integrity and stability of the financial system." WTO jurisprudence supports a broad interpretation of the coverage provided by the prudential reasons carve-out. In *Appellate Body Report, Argentina – Financial Services,* the Appellate Body established the comprehensive scope of the prudential reasons carve-out when it clarified that the carve-out justifies WTO inconsistencies in both market access and national treatment.[92]

The WTO Work Program on Electronic Commerce

The growth of electronic commerce, electronic delivery of services and cross-border data flows took off after the Uruguay Round of negotiations closed with the adoption of the 1994 GATS. At the Geneva Ministerial Conference in May 1998, WTO members adopted a Ministerial Declaration on Global Electronic Commerce.[93] The Declaration provides the mandate for the formulation of a work program on all trade-related aspects of e-commerce and instituted a moratorium on payment of custom duties on electronic transmissions.

The Work Program on e-Commerce which has been discontinued several times did not yield tangible outcomes beyond periodically prolonging the moratorium on custom duties on electronic transmissions. The reigning consensus within the work program is that electronic commerce falls within the scope of existing WTO treaties.[94] However, there is much division over the classification of 'digital contents' and whether electronic delivery of a cross-border service falls under mode 1 (cross-border) or mode 2 (consumption abroad).[95] Nor has the work program resolved the issue of whether the 'likeness' requirement for the MFN obligation and national treatment commitments in the GATS is technology-neutral or independent of the means of delivery.[96]

Following a setback in 2016 when multilateral negotiations for the Trade in Services Agreement (TISA) col-

92. WTO Panel Report, Argentina – Measures Relating to Trade in Goods and Services, WT/DS453/AB/R, para. 6.255.
93. The Geneva Ministerial Declaration on global electronic commerce, 20 May 1998, WT/MIN(98)/DEC/2.
94. WTO Council for Trade in Services WTO, Progress Report on the Work Programme on Electronic Commerce, 19 July 1999, S/L/74, para. 4.
95. Burri, 'Regulation of Data Flows through Trade Agreements' (2017) 48 Georgetown Journal of International Law 407, 415.
96. Ibid.

lapsed, e-commerce is back on the WTO agenda. On January 25, 2019, 76 WTO members, including China, the EU and the US, announced the launch of negotiations of new e-commerce rules.[97] The conclusions of the 2019 G20 Summit in Osaka, which underscored the importance of the rule-based multinational free trade system, moreover, endorses the 'data free flow with trust' initiative of the Japanese government.[98] The future will show if work at the WTO will be successful in formulating new rules on trade-related aspects of electronic commerce that will gain the support of WTO members.

97. WTO, Joint Statement on Electronic Commerce, 19 January 2019, WT/L/1056.
98. See G20 Osaka Leaders' Declaration, 29 June 2019.

Section 4. EU external trade policy in relation to artificial intelligence

Against the backdrop of the ongoing WTO e-commerce negotiations, this Section will focus on EU's external trade policy in relation to cross-border trade in artificial intelligence powered digital services. The Section will start with a brief overview of the EU's e-commerce proposal tabled in the ongoing WTO negotiations, before assessing its internal compatibility with EU law and policy, also with a view to current policy developments in the field of artificial intelligence. Considering whether the cross-border flows of data and artificial intelligence would require additional safeguards, the Section will conclude in suggesting a few points to ponder for EU and member states' decision-makers.

EU proposal in the WTO e-commerce negotiations

In line with its commitment to greater transparency in trade negotiations,[99] the European Commission published its initial proposal in the WTO e-commerce negotiations.[100] The 'EU proposal for WTO Disciplines and Commitments relating to Electronic Commerce' of April 2019 affirms the EU's commitment to the ongoing WTO negotiations on e-commerce and its intention to seek to negotiate "a comprehensive and ambitious set of WTO disciplines and commitments"[101].

In keeping with the trend to cover digital trade or e-commerce inside bilateral and regional trade agreements, the EU proposal tables disciplines and commitments that are a mix of classical trade law, which seeks to remove barriers to cross-border trade and positive integration, which sets standards on trade-related matters.

The EU proposal put forward a permanent exception from customs duties for electronic transmission and content. Moreover, the EU proposal backs several new disciplines that seek:

- Protection for source code of software from a member's measures that require its transfer or access, however, subject to specific derogations;
- Limitations on members' use of specific data and technology localization measures, subject to a broad exception for members' safeguards to ensure the protection of personal data and privacy; and
- Guarantees for open internet access in the sense that members should allow the access, distribution and use of services and applications at the discretion of end-users and their ability to connect devices of their choice to the internet.

Additionally, the EU proposal tables measures that aim to provide for positive harmonization of electronic contracts, electronic authentication and signatures, protection of consumers against fraudulent and deceptive commercial practices in electronic commerce as well as protection against unsolicited commercial electronic messages.

Finally, the EU proposal calls on members to substantially broaden existing commitments in the computer services category, covering inter alia 'Data base services' and 'Data processing services', with a view to full market access and national treatment commitments in modes 1 to 3 for the sector as a whole. In relation to this, the EU requests other member's to commit to the understanding on computer and related services,[102] which seeks to advance the mutual understanding of the 'Computer and related services' category of the Central Product Classification.

Compatibility with internal EU policies

The EU has the exclusive external competence to negotiate trade deals on behalf of its member states, which includes the trade-related aspects of e-commerce.[103] When conducting trade negotiations, the competent

99. See European Commission, Transparency Policy in DG TRADE, Factsheet November 2018.
100. WTO, EU Proposal for WTO Disciplines and Commitments Relating to Electronic Commerce, 26 April 2019, INF/ECOM/22.
101. Ibid.
102. WTO, Understanding on the scope of coverage of CPC 84 - Computer and Related Services, S/CSC/W/51.
103. Treaty on Functioning of the European Union (TFEU), Articles 3(1)(e) and 207.

EU institutions, i.e. the Council and the Commission, are responsible to ensure "that the agreements negotiated are compatible with internal Union policies and rules."[104] It is for this reason that the EU needs to attune its negotiations with more recent EU policy initiatives on technological sovereignty and vigilantly preserve the leeway necessary to exercise its right to regulate with a view to adopt rules on ethical and trustworthy artificial intelligence.

The current situation appears to share some similarities with recent developments that have helped to align the EU's framework on personal data protection with its approach to cross-border flows of personal data in external trade policy.[105] EU institutions initially disagreed on whether the GDPR's rules on transfer of personal data to third countries was compatible with its proposals for new commitments on cross-border data flows as part of its external trade negotiations. Following an inter-institutional dialogue at the level of the Cabinet of Commissioners the European Commission adopted a new position on horizontal provisions in cross-border data flows and personal data protection in EU trade and investment agreements.[106] Ever since, these horizontal provisions are tabled by EU negotiators in external trade negotiations, including in the 'EU Proposal for WTO Disciplines and Commitments Relating to Electronic Commerce'.

»However, most users probably do not know that trade agreements cover AI.«

Susan A. Aaronson (2018)

The EU proposal and herein referenced documents make no mention of artificial intelligence as an emerging technology that is increasingly adopted in the software architecture of digital services. One possible explanation is that trade in services operates primarily with service sector classifications, an approach that underpins the WTO e-commerce negotiations as well. Even though there is no mentioning of machine learning and applied artificial intelligence, where they are part of a traded service, these technologies are nevertheless covered by present agreements on cross-border trade in services and future rules on e-commerce at the level of the WTO.

Given the transformative impact artificial intelligence is believed to exert not only on global value chains and service sectors but individuals and societies at large, the discrete impact trade law in the governance of artificial intelligence surely deserves more prominence and public debate among EU decision-makers, stakeholders and the general public. What does the cross-national interdependency through artificial intelligence systems mean for their transparency, accountability and governance in the EU?

The role of cross-border flows of data

It is undisputable that large quantities of relevant digital data are necessary to train machine learning systems, thus rendering data an indispensable input for applied artificial intelligence. At this stage of development, training data may even be more important than machine learning code. Commentators advocate the free flow of data as a progressive trade law discipline to the benefit of artificial intelligence.[107] However, the free flow of data, which enables the cross-border deployment of artificial intelligence (upstream), does not necessarily come with reciprocal benefits for countries that are at the receiving end of foreign artificial intelligence systems (downstream).[108]

Under the EU proposal cross-border data flows shall not be restricted by one of four specific measures that require data or technology localization:

1. requiring the use of computing facilities or network elements in the member's territory for processing, including by imposing the use of computing facilities

104. TFEU, Article 207 para. 3.
105. Svetlana Yakovleva and Kristina Irion, Toward Compatibility of the EU Trade Policy with the General Data Protection Regulation, (2020) 114 AJIL Unbound 10.
106. European Commission, Horizontal provisions for cross-border data flows and for personal data protection (in EU trade and investment agreements), May 2018.
107. See e.g. Hosuk Lee-Makiyama, 'Briefing Note: AI & Trade Policy', Tallinn Digital Summit 2018 (2018); Joshua P. Meltzer, 'The Impact of Artificial Intelligence on International Trade', Brookings Institution (2018).
108. Susan A. Aaronson, 'How AI is prodding governments to rethink trade in data', Center for International Governance Information (2018).

or network elements that are certified or approved in the territory of the member;
2. requiring the localization of data in the member's territory for storage or processing;
3. prohibiting storage or processing in the territory of other members;
4. making the cross-border transfer of data contingent upon use of computing facilities or network elements in the member's territory or upon localization requirements in the member's territory.[109]

In line with the aforementioned horizontal provisions for cross-border data flows and for personal data protection in EU trade and investment agreements, measures that safeguard personal data and privacy would be broadly excepted. The EU proposal provides for the recognition of personal data and privacy protection as fundamental rights and the exception of such measures from trade law disciplines:

> Members may adopt and maintain the safeguards they deem appropriate to ensure the protection of personal data and privacy, including through the adoption and application of rules for the cross-border transfer of personal data. Nothing in the agreed disciplines and commitments shall affect the protection of personal data and privacy afforded by the members' respective safeguards.[110]

The horizontal provisions are deemed compatible with EU's fundamental rights approach to the protection of personal data and the GDPR's high level of protection and rules for the cross-border transfer of personal data.

Commentators moreover discuss the digital trade imbalance between the EU and the US and the corresponding implications for commitments on free data flows.[111] A trade regime that prioritizes the free flow of data may render countries with little or no local industry and know-how in artificial intelligence to data suppliers.[112] Some go as far as arguing that "data policy which matches the requirements of artificial intelligence […] needs to be structured around the goals of sovereignty and strategic autonomy."[113] While the argument appears to resonate with the European Commission's recent political initiative for technological sovereignty that includes critical datasets it risks running afoul of the EU proposal regarding cross-border data flows tabled in the WTO e-commerce negotiations.

There is an inherent risk that trade agreements will cement the EU's position before its strategic interest in artificial intelligence is sufficiently clear. Similar to the inter-institutional dialogue that negotiated the horizontal provisions on trade and data protection, the EU would be advised to deliberate their strategy on free data flows in trade agreements in relation to EU artificial intelligence more inclusively. The current discourse lopsidedly emphasizes the flow of non-personal data and open government data (upstream) without considering how the use of European data should contribute to public value and societal interests (downstream).

»The current open government data landscape is like an area of common land that everyone has access to and works to cultivate; except that only a few have the tools and technologies needed to harvest its crops.«

Rosie Collington (2019)

The European Data Economy

The suite of instruments that together make up the European Data Economy policy have been drawn up with EU's Digital Single Market in mind. New legislation further opens up public sector information[114] and makes open access the default for publically-funded, scientific

109. EU Proposal for WTO Disciplines and Commitments Relating to Electronic Commerce (n 100), Section 2.7.
110. Ibid, Section 2.8.
111. Susan A. Aaronson, 'The Digital Trade Imbalance and Its Implications for Internet Governance' [2016] Global Commission on Internet Governance.
112. Aaronson (n 108).
113. Cedric Villani et al, 'For a Meaningful Artificial Intelligence: Towards a French and European Strategy' (2018).
114. See Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information.

data.[115] Critics of open data policies have argued that "the real agenda of business interested in open data is to get access to expensively produced data for no cost, whilst […] weakening [governments] position as the producer of such data."[116] The costs of producing open data "fall largely on the public sector and society, but the surplus value so often comes to be realised by large digital platform companies and the financial services industry."[117]

Whilst open data initiatives are considered very important for data-driven innovation, it is equally important to realize that EU open data are essentially released to the world. In combination with a free flow of data commitment under international trade law, the EU could not re-institute strategic safeguards against the transfer of entire libraries of public sector and scientific data to third country actors, unless such measures could be justified under one of the exceptions in trade law.

There is no cast-in-stone rule in artificial intelligence that dictates that data must be transferred to the machine learning code, machine learning code can also be moved to where the data resides. Alternative options for data governance that can mediate trust and values, such as computation to data, ethical data licenses or technology mediated trust, e.g. through blockchain technology, could so be foreclosed.[118]

Surplus value from European data

Finally, there is the question how surplus value created from machine learning and applied artificial intelligence should be distributed between originators of the data and the supplier of the artificial intelligence application.[119] The question is who owns the learning in artificial intelligence systems that marry data to code. One could argue that free data flow provisions in trade agreements pre-condition an outcome that favours code suppliers, thereby placing the originators of essential data, where they are government and public sector entities, in a disadvantageous position when they seek to negotiate a stake in the surplus value in the public interest.

Towards ethical and trustworthy artificial intelligence in the EU

Elements of the envisaged trade commitments may have unintended consequences for EU governance of artificial intelligence. Artificial intelligence, as any new technology, inevitably presents novel legal questions that are not always readily discernible at the time of their introduction on the market. At EU level, the debate about the appropriate governance of artificial intelligence is in full swing. The European Commission presently draws up a legislative proposal for "a coordinated European approach on the human and ethical implications of artificial intelligence."[120] As with the GDPR, the EU has demonstrated a preference to afford a high level of protection to artificial intelligence.

Non-disclosure of source code

Transparency and accountability are valid currency in algorithmic governance. In tune with European human rights and values, accountability is considered "extremely important because it deals with biases and discrimination caused by data mining and profiling"[121] and "a necessary condition for the social acceptability of AI."[122] Transparency which essentially underpins accountability should be thought of broadly to not only concern the transparency of algorithms, but in addition transparency of data inputs and the explainability of automated decision making.[123] Social scientists, who have studied "black box" algorithms, advocate "regulation toward auditability"[124] that privileges public scrutiny of artificial intelligence systems over internal auditing and in addition to possible regulatory oversight.

115. See Commission Recommendation (EU) 2018/790 of 25 April 2018 on access to and preservation of scientific information C/2018/2375.
116. Rob Kitchen, 'Four critiques of open data initiatives', 24 November 2013.
117. Rosie Collington, 'Digital Public Assets: Rethinking Value and Ownership of Public Sector Data in the Platform Age' (2019).
118. See e.g. the Amsterdam Data Exchange (AMDEX), 'Towards an internationally trusted exchange of data', 26 January 2018; EOSC Executive Board, 'EOSC Strategic Implementation Plan' (2019).
119. See for legal issues in the private sector Brian Higgins, 'When It's Your Data But Another's Stack, Who Owns The Trained AI Model?', AI Technology Law Blog, 31 January 2018.
120. Von der Leyen U, 'Political Guidelines for the next European Commission 2019-2024' (2019).
121. Massimo Craglia (ed.), 'Artificial Intelligence - A European Perspective' (Publications Office of the European Union 2018), 58.
122. Villani (n 113), 115.
123. Caglia (ed.) (n 121), 59.
124. Christian Sandvig, Kevin Hamilton, Karrie Karahalios, and Cedric Langbort, 'Auditing Algorithms: Research Methods for Detecting Discrimination on Internet Platforms', ICA 2014 Data and Discrimination Preconference.

Transparency, accountability, and auditing require a healthy measure of access to the machine learning code. However, the 'EU proposal for WTO Disciplines and Commitments relating to Electronic Commerce' supports a new commitment that members should not require transfer or access to source code of software.

The relevant provision reads:

> Members shall not require the transfer of, or access to, the source code of software owned by a natural or juridical person of other members.

Paragraph 1 is without prejudice to:

1. requirements by a court, administrative tribunal, or by a competition authority to remedy a violation of competition law;
2. the protection and enforcement of intellectual property rights; and
3. the right to take any action or not disclose any information that is considered necessary for the protection of essential security interests relating to the procurement of arms, ammunition or war materials, or to procurement indispensable for national security or for national defence purposes.[125]

The term 'source code of software' is not defined in the EU proposal. 'Software' can also take a multitude of meanings. It would be important to understand whether 'source code of software' comprises machine learning code and models used in applied artificial intelligence.[126] Were this the case, such a commitment could limit EU's scope of manoeuvre to introduce regulatory mechanisms that require access to code to test and verify the functionality of an artificial intelligence system in relation to a foreign service supplier.

Furthermore, software source code frequently enjoys protection as intellectual property or may qualify as a trade secret; rights which can be invoked against a country's disclosure requirements. Perhaps as trade-related aspects of intellectual property rights, a commitment restricting transfer and access to source code is more appropriately dealt with inside the WTO TRIPS than in WTO e-commerce negotiations.

While the problem of mandatory technology transfers in several countries compounds the need to protect service suppliers against forced disclosure of source code, this goal could be at cross purpose with the legitimate interest in auditing source code. For example, in a recent recommendation, the German Data Ethics Commission advices prior authorization of artificial intelligence systems that are deemed high-risk for affected individuals, groups or the society at large.[127] It further recommends a specialised authority that should be competent to engage with all components of an artificial intelligence system, including – in the high risk category – with the source code.[128] The German example may portend the increasing prominence of ex ante assessment of artificial intelligence systems, a trend that conflicts with the non-disclosure of source code in the EU e-commerce proposal.

»With AI being easily tradeable across borders, only global solutions will be sustainable in this domain.«

European Commission (2018)

In anticipation of EU's prospective regulation on ethical and trustworthy algorithmic intelligence, the EU's e-commerce proposal must ensure the future ability of competent authorities to audit artificial intelligence systems and request access to machine learning code when appropriate. If a competition authority can be excepted in order to remedy a violation of competition law than surely a competent authority that supervises compliance of artificial intelligence with prospective EU regulation should be foreseen as well.

125. EU proposal for WTO Disciplines and Commitments relating to Electronic Commerce (n 100), Section 2.6.
126. See e.g. a similar provision in Article 19.16 USMCA which specifically bans the forced transfer of all source code, including "algorithms expressed in that source code" while allowing for legitimate regulatory or judicial necessity.
127. German Data Ethics Commission, 'Gutachten der Datenethikkommission', 23 October 2019 (in German), 179.
128. Ibid., 200.

Governance of transnational algorithmic systems

Liquid artificial intelligence systems, that are deployed across borders, will affect societies they interact with. For example, the predictive outcomes of an artificial intelligence system that is located in a third country can be applied at a distance to EU citizens who are affected by the prediction. Future governance of artificial intelligence in the EU is likely to anticipate transboundary effects when receiving cross-border trade in services involving artificial intelligence. The EU will presumably champion a regulatory approach that harmonises standards for ethical and trustworthy artificial intelligence throughout the EU and also allows for inbound artificial intelligence that comports with EU standards.

From the perspective of its trade law commitments, EU legislators must be cautious in ensuring that prospective regulation of artificial intelligence applies evenly to domestic and foreign suppliers, both substantively and procedurally. The GDPR provides a model for prospective regulation of artificial intelligence that applies to domestic and foreign suppliers whenever individuals and societal values in the EU are affected by an artificial intelligence system. However, the EU should avoid the pitfalls of the GDPR's adequacy decision for cross-border transfers of personal data to third countries, which opens the EU up to claims of arbitrary administration and discriminatory treatment.

The regulatory space for EU governance of artificial intelligence overlaps with data privacy in its reliance on public interest exceptions provided for in GATS Article XIV (c)(II). Based on the general exceptions WTO member can justify the adoption of measure in the public interest, even if such a measure is inconsistent with one or several GATS disciplines. Against this background, the EU proposal for the WTO e-commerce negotiations should propose language on reserving members right to regulate artificial intelligence in order to protect individuals' fundamental rights and societal values.

One important function of the WTO e-commerce negotiations is to enhance legal certainty for businesses with regards to the conditions for cross-border trade in digital services. While aiming for clarifying the rules for cross-border electronic commerce, the EU should not falter in its aspiration to adopt regulation that affords a high level of protection against the risks of artificial intelligence systems.

While the 2019 OECD Principles on Artificial Intelligence are a significant step forward, these principles do not lead to harmonization of domestic laws and policies on responsible artificial intelligence. The EU has to remain vigilant about the transboundary effects of artificial intelligence on fundamental rights and European values. At the international level, the EU is actively contributing to current and future work at the G7/G20, the United Nations and the Organisation for Economic Co-operation and Development, on all aspects of artificial intelligence governance.[129]

129.European Commission, Artificial Intelligence for Europe (COM(2018) 237 final).

Section 5. Promoting a fair balance of digital trade for developing countries

There is no doubt that artificial intelligence will provide material benefit to developing countries' economically and help alleviate poverty. However, the WTO e-commerce negotiations manifestly hold repercussions for developing nations. This Section provides an overview of the issues that developing countries face in the context of these negotiations.

Developing countries in the WTO and the GATS acquis

The WTO and the GATS *acquis* contain special provisions that give recognition to the situation of developing countries in the international trading system. Upon joining the WTO, a country can declare itself to be a developing country. To date, roughly two-thirds of the WTO's 164 members have done so.[130] The recent controversy regarding China's WTO status as a developing country only serves to highlight the lack of a WTO policy or rules on the status as a developing country.

GATS Article IV calls for cooperation and capacity building measures specifically aimed to strengthen the ability of developing countries to deliver services. These measures include increased access to technology on a commercial basis, improvement of distribution channels and information networks, liberalisation of market access in sectors and modes of supply of export interest to them. Importantly, GATS Article IV(3) gives special recognition to the difficulty least developed nations face in upholding service commitments in view of their development, trade and financial needs. GATS Article V(3) provides developing countries flexibility in maintaining certain measures contrary to non-discrimination obligations even when developing countries have partaken of preferential trade agreements or agreements for economic integration.

Provisions in WTO law which grant developing countries special rights are called 'special and differential treatment' provisions. WTO agreements, in several places, refer to the need for technology transfer to take place between developed and developing countries, however, no specific measures have been taken in practice. Developing countries have, for example, been calling for making the provisions on technology transfers more operational and meaningful. The GATS used to give special treatment to least-developed countries during the negotiations, which is no longer discernible from the WTO e-commerce negotiations.

> *»The digital economy offers opportunities and challenges for the developing world, which needs the space to maximize the benefits and minimize the risks.«*
>
> Jane Kelsey (2018)

WTO e-commerce negotiations

The discourse on how further liberalisation of e-commerce affects developing countries is rather controversial.[131] Over the long history of e-commerce negotiations at the WTO, developing countries have often protested that new initiatives on e-commerce foreclose local and regional options for digital development. For example, a group of African countries submitted in 2017 a communication stating that "trading developmental policy space in this area could pose a serious threat for developing countries, and attempts to curtail this policy space would prevent developing countries from building the capacities, and skills to close the widening technological gap."[132]

130. Bryce Baschuk, Here's What It Means to Be a WTO Developing Country, Bloomberg, 14 November 2019.

131. See for an excellent overview Jane Kelsey, 'How a TPP-Style E-Commerce Outcome in the WTO Would Endanger the Development Dimension of the GATS Acquis (and Potentially the WTO)' (2018) 21 Journal of International Economic Law 273.

132. WTO General Council, Work Programme on Electronic Commerce,

Western commentators argue that "[r]estrictions on cross-border data flows are likely to have the greatest impact on smaller (often developing) countries."[133] For example, to develop artificial intelligence in health care, countries with smaller populations will need access to global health data.[134] It follows that developing countries should be keen to maintain open access to health data, since foreclosing access would "reduce the accuracy and relevance of AI systems for developing countries."[135]

By contrast, developing nations typically have little to no existing privacy and data protection laws, making them a prime target for the mining of datasets used to train artificial intelligence.[136] They may moreover forego appraising the true value of training data, including their citizens' rights in relation to their data, before bargaining it away. For instance, in April 2018, the government of Zimbabwe signed an agreement with Chinese AI firm CloudWalk Technology for a large-scale facial recognition program which promised to teach Chinese algorithms to differentiate between African faces.[137] The Zimbabwean government will have to turn over a database of photos of its citizens' faces in exchange for access to CloudWalk's computer vision technology.[138]

Developing countries have economic needs that are unlike their developed counterparts.[139] In the past, globally operating Internet companies have attempted to barter free access to internet, software and hardware in exchange for data and surveillance rights.[140] There is a risk that developing countries may be prematurely bound by digital commitments that may have unintended and untested consequences. For example, artificial intelligence licensing terms may impose unfair conditions on developing nations. As a result, developing nations may become locked into a position of supplier of raw behavioral data and consumer of artificial intelligence, which could perpetuate a cycle of economic dependence.

»Electronic commerce is fast becoming a proxy battleground for the future of the WTO.«

Jane Kelsey (2018)

A 2019 report by the United Nations Conference on Trade and Development (UNCTAD) propounds a new line of argument:

> Indeed, in the global "data value chain", many countries may find themselves in subordinate positions, with value and data being concentrated in a few global platforms and other lead [multinational enterprises]. Countries at all levels of development risk becoming mere providers of raw data to those digital platforms while having to pay for the digital intelligence produced with those data by the platform owners. Breaking this vicious circle will require out-of-the-box thinking aimed at finding an alternative configuration of the digital economy that leads to more balanced results and a fairer distribution of the gains from data and digital intelligence.[141]

In January 2019, a consortium of 18 non-profits sent a letter opposing e-commerce negotiations to high-level decision-makers, including the Dutch government.

Report of Panel Discussion on 'Digital Policy and Development'. Communication from the African Group, JOB/GC/133, 21 July 2017, 2.

133. Joshua P. Meltzer, 'The Impact of Artificial Intelligence on International Trade', (2018).

134. Ibid.

135. Ibid.

136. Renata Ávila Pinto, 'Digital Sovereignty or Digital Colonialism?' (2018) 15 Sur International Journal on Human Rights.

137. Arthur Gwagwa, 'Exporting Repression? China's Artificial Intelligence Push into Africa', Council on Foreign Relations, 17 December 2018.

138. Ibid.

139. See GATT enabling clause recognising the serious difficulty developing nations face in negotiating concessions and allowing for derogations to the most-favored nation (non-discrimination treatment in favour of developing countries).

140. Ibid.

141. UNCTAD, 'Digital Economy Report 2019: Value Creation and Capture: Implications for Developing Countries', United Nations, 2019, XVIII.

The letter detailed the ways in which the proposed e-commerce initiative undermines regulatory autonomy and is contrary to the digital industrialisation goals of the Agenda 2063: The Africa We Want vision.[142]

There appears to be scope for alignment between developing countries and developed partners, such as the EU and Canada,[143] which are both characterised by a digital trade imbalance relative to the US and China. For example, developing countries' objections to the non-disclosure of source code proposed in the WTO e-commerce negotiations[144] echo the concerns in this study that non-disclosure may counteract prospective EU regulation on the ethical and trustworthy artificial intelligence. Whether the WTO e-commerce negotiations will provide the space for 'out-of-the-box thinking' is not so certain considering that the reform of the WTO will likely overshadow the e-commerce negotiations.

142.See Statement from Civil Society Organizations Against E-commerce Rules in the World Trade Organization January 25, 2019.
143.Aaronson (n 108).
144.Third World Networks Briefing, Some preliminary implications of WTO source code proposal, Buenos Aires, 13 December 2017.

Conclusions

This Prospective Policy Study has the objective to interrogate whether EU's external trade policy meets the challenges in the face of artificial intelligence. The study embarked on research of artificial intelligence with a comprehensive look at areas where EU external trade and EU governance of artificial intelligence intersect.

Section 1 has mapped the current ecosystem of artificial intelligence in terms of technology, deployment, competition and collaboration. The artificial intelligence ecosystem has two tracks: The first track relates to scientific discovery and the second track concerns applied artificial intelligence. What is today marketed under the label of artificial intelligence are specialized machine learning applications.

Applied artificial intelligence's key inputs are data and machine learning code. At its most basic, applied artificial intelligence requires as key inputs a wealth of data and machine learning code (upstream) in order to generate inferences and predictions (downstream). While access and flow of data is one key enabler of machine learning, a policy that only focuses on open data and the free flow thereof is likely to entrench existing geopolitics of machine learning.

Artificial intelligence systems are fairly fluid across borders. International trade in services that supply or incorporate machine learning in their software architecture is ever increasing. Artificial intelligence's digital components can freely be moved across today's global digital ecosystems; Even the predictive outcomes can be applied at a distance. The liquidity of artificial intelligence systems affects the societies it interacts with.

Section 2 sketches the contours of law and policies governing artificial intelligence in the EU and the Netherlands. The EU regulatory framework comes to rest on two pillars: The first pillars is the EU's comprehensive rules on the protection of personal data (the GDPR). As of yet, there are no specific EU rules on artificial intelligence but new rules are currently drawn up to ensure an appropriate ethical and legal framework.

Respect for European values and fundamental rights as well as ethical principles. The EU has a preference to afford a high level of protection of individuals' rights and European values when using artificial intelligence. Future law and policy must cope with the fluidity of algorithmic systems without disrupting beneficial algorithmic flows. EU rule-making in this area has to anticipate the liquidity of artificial intelligence which can serve European users from outside EU territory.

Turning to international trade law, Section 3 analyses whether existing rules on cross-border trade in services already cover digital services that incorporate applied artificial intelligence into their software architecture. Under the GATS, which operates service categories as a proxy for rule application, it is plausible to conclude that digital services powered by applied artificial intelligence are presumably covered by the GATS.

The 1994 GATS could not have conceived of the transformative effects of artificial intelligence. At the time of the Uruguay Round of negotiations between 1986 to 1993, Members cannot have envisioned the impact of digitalization and cross-border digital trade. Nonetheless, have WTO adjudicating bodies consistently found digital commercial activities to be covered by the GATS. What has been heralded as a 'technologically neutral' interpretation of the GATS has however upset the balance struck when the WTO treaties were ratified.

1994 GATS disciplines remain adequate to address digital trade issues. The GATS, which aims to eliminate barriers to trade, is founded on general principles of transparency, predictability and non-discrimination. While there are enduring questions regarding the proper service classification for specific digital services and the interpretation to be given to a member's scheduled commitments in a digital context, existing GATS-rules are capable of addressing questions of discriminatory treatment and market access arising from the implementation of data-restrictive measures. In a hypothetical challenge, we assessed a suite of such measures for their conformity with the GATS:

1. Data and/or technology localization;
2. Restrictions of cross-border flows of personal data;
3. Digital security;
4. Technological sovereignty;
5. Mandatory technology transfer requirements; and
6. Other behind-the-border regulations.

A WTO Member's regulatory autonomy to adopt a GATS-inconsistent measure is however confined to the boundaries of the GATS exceptions.

Justifying a GATS-inconsistent measure is tipping towards the security exceptions. The suite of public policy exceptions under GATT Article XX or the GATS Article XIV permits a member to impose measures justified by inter alia, public morals, the protection of health, or privacy. In practice, WTO panels have mandated that countries remedy any discriminatory application of a public policy measures, regardless of the relative weight of a legitimate policy concern. There has been only one instance of a challenged public policy measure passing muster.

However, unlike the public policy exceptions, the national security exceptions at GATS Article XIV *bis* are not subject to a balancing test that weighs legitimate public interest against disguised protectionism. This makes the national security exception a stronger weapon in countries' arsenal of legal justifications for measures that restrict trade in artificial intelligence. Recent trends at the country level appear to confirm that national security is invoked with increasing frequence as a justification for measures affecting artificial intelligence.

Multilateralization of e-commerce proposals at the WTO impacts on trade in artificial intelligence. Beginning of 2019, 76 WTO members announced the launch of WTO negotiations on trade-related aspects of electronic commerce. In spite of the current crisis of the WTO and its need for reform, the negotiations aim for the multilateralization of new WTO disciplines and commitments relating to e-commerce. Unresolved conflicts over the scope outdated service classifications, the boundaries between modes-of-supply and outdated members' individual schedules of commitments overshadow WTO e-commerce negotiations.

Submitted to the ongoing WTO e-commerce negotiations, EU e-commerce proposal were discussed in Section 4. The EU's proposal backs new commitments on software source code protection and the restriction of countries' data and technology localization measures, among others. The proposal requests that members endorse a contemporary interpretation of what computer and related services means and that they substantially broaden market access and national treatment commitments in this service category.

EU trade policy has to be aligned with EU rule-making on artificial intelligence. The competent EU institutions are responsible to ensure that the agreements negotiated are compatible with internal EU policies and rules. A case in point are the 2018 horizontal provisions for cross-border data flows and for personal data protection in EU trade and investment agreement. As a next step, EU's external trade policy will have to be reconciled with expected EU rule-making on artificial intelligence.

Trade law's impact on artificial intelligence governance requires an open public debate. Nothing in EU's proposal suggests that applied artificial intelligence where it is part of a traded service is in the purview of the e-commerce negotiations. However, given artificial intelligence' transformative impact on every aspect of our information civilization, an open and inclusive deliberation of the interactions between the e-commerce proposal and EU's emerging governance of artificial intelligence would be imperative.

Cross-border trade in artificial intelligence should be contingent on accountability. The *quid pro quo* for cross-border digital trade would be a healthy measure of transparency of artificial intelligence systems. EU external trade policy should preserve the regulatory space for domestic measures that mandate source code transparency, accountability and auditability of artificial intelligence systems.

Free data flow commitments foreclose policy space for state-of-the-art data governance. The free flow of data, which enables cross-border trade in artificial intelligence (upstream), does not necessarily come with reciprocal benefits for countries at the receiving end

(downstream). Quality data which is key for algorithmic performance should only be used for purposes that are compatible with European values. The current discourse lopsidedly emphasizes the flow of and access to data without considering how knowledge and surplus value generated of European data should contribute to public value and societal interests.

Artificial intelligence holds great potential for developing countries in the alleviation of poverty. However steps must be taken to avoid perpetuating past cycles of economic dependence. The 'special and differential treatment' provisions in WTO law are a strong building block for trade in artificial intelligence that favors developing countries. Cooperation and capacity building under GATS Article IV is also key to improving the ability of developing countries to build their own artificial intelligence services. Special care must be given to ensure the terms of trade in North-South licensing benefit developing countries. On the one hand, developing countries have a strategic interest in the creation of open access software, on the other hand, they must also guard against to the predatory data mining practices. Like the EU, developing countries must pursue policies that seek to harmonise norms in a multilateral agreements and close the digital trade imbalance.

As a general purpose technology, cross-border trade in artificial intelligence holds great potential for economic growth. Existing GATS disciplines as well as future multilateral agreements governing the flow of data are key to harmonising approaches to artificial intelligence. However, artificial intelligence portends a few challenges to the multilateral trading system which are distinct from previous waves of technological advance. Unlike previous technologies, artificial intelligence is imbued with ethical values that may not be compatible with domestic human rights frameworks. Accordingly, WTO members will have to strike a balance between national security and free trade in data-extractive services. To this end, Members must situate the artificial intelligence ecosystem within the context of international trade.

References for the quotes

»AI will outperform humans in many activities in the next ten years, such as translating languages (by 2024), writing high-school essays (by 2026), driving a truck (by 2027), working in retail (by 2031), writing a bestselling book (by 2049), and working as a surgeon (by 2053).«	Kate Grace and others, 'When Will AI Exceed Human Performance? Evidence from AI Experts' (2018) 62 Journal of Artificial Intelligence Research 729.
»What we have gotten from deep learning instead is machines with abilities—truly impressive abilities—but no intelligence.«	Dana Mackenzie and Judea Pearl, The Book of Why: The New Science of Cause and Effect (Basic Books 2018)
»The US may be leading the discoveries in AI—but Chinese entrepreneurs are better at implementing them.«	Kai-Fu Lee, 'Why China Can Do AI More Quickly and Effectively Than the US' WIRED, 23 October 2018.
»The main ingredients are there for the EU to become a leader in the AI revolution, in its own way and based on its values.«	European Commission, 'Artificial Intelligence for Europe (COM(2018) 237 Final)'
»It will be the job of the next Commission to deliver something so that we have regulation similar to the General Data Protection Regulation that makes it clear that artificial intelligence serves humanity.«	Angela Merkel quoted in Laura Kayaly, 'Next European Commission Takes Aim at AI' Politico, 18 July 2019.
»It's absurd to believe that you can become world leader in ethical AI before becoming world leader in AI first.«	Ulrike Franke quoted in Janosch Delcker, 'Europe's silver bullet in global AI battle: Ethics' Politico, 17 March 2019.
»AI will generate transformative products and services that alter world trade patterns.«	Avi Goldfarb and Daniel Trefler, 'How Artificial Intelligence Impacts Labour and Management', World Trade Report: The future of world trade (WTO 2018).
»… judicial transplants cannot replace political consensus on the substance, particularly in a complex and highly technical domain, such as digital trade.«	Mira Burri, 'Current and Emerging Trends in Disruptive Technologies: Implications for the Present and Future of EU's Trade Policy' (European Parliament 2017)
»The world's most valuable resource is no longer oil, but data.«	The Economist, "The world's most valuable resource is no longer oil, but data" 17 May 2017.
»The internet is going to be regulated by trade agreements – or better said, trade agreements are already regulating the internet.«	Carolina Rossini (2019), 'In flux- examining the evolving role of the WTO in the digital world', Bot populi, 12 November 2019

»The current open government data landscape is like an area of common land that everyone has access to and works to cultivate; except that only a few have the tools and technologies needed to harvest its crops.«	Rosie Collington, 'Digital Public Assets: Rethinking Value and Ownership of Public Sector Data in the Platform Age' (2019).
»With AI being easily tradeable across borders, only global solutions will be sustainable in this domain.«	European Commission, 'Artificial Intelligence for Europe (COM(2018) 237 Final)'
»The digital economy offers opportunities and challenges for the developing world, which needs the space to maximize the benefits and minimize the risks.«	Jane Kelsey, Kelsey J, 'How a TPP-Style E-Commerce Outcome in the WTO Would Endanger the Development Dimension of the GATS Acquis (and Potentially the WTO)' (2018) 21 Journal of International Economic Law 273.

Bibliography

Aaronson SA, 'Data Minefield: How AI Is Prodding Governments to Rethink Trade in Data' International Policy Considerations (2018) accessed 17 January 2020

Alliance on Artificial Intelligence, 'ALLAI' accessed 17 January 2020

Amsterdam Data Exchange (AMdEX), 'Towards an Internationally Trusted Exchange of Data' accessed 17 January 2020

Andrenelli A, Gourdon J and Evdokia M, 'International Technology Transfer Policies' (2019) 222 OECD Trade Policy Papers accessed 17 January 2020

Baschuk B, 'Here's What It Means to Be a WTO Developing Country' (Bloomberg QuickTake, 14 November 2019) accessed 14 January 2020

Burri M, 'Current and Emerging Trends in Disruptive Technologies: Implications for the Present and Future of EU's Trade Policy' (2017) European Parliament accessed 14 January 2020

—, 'The Regulation of Data Flows Through Trade Agreements' (2017) 48/1 Georgetown Journal of International Law 407 accessed 14 January 2020

Craglia M (Ed.), 'Artificial Intelligence – A European Perspective', EUR 29425 EN, Publications Office Luxemburg accessed 17 January 2020

Carlson G, 'Argentina – Measures Relating to Trade in Goods and Services' (Argentina–Financial Services) (2016) 15(4) World Trade Review 706-708 accessed 17 January 2020

Chander A, 'The Internet of Things: Both Goods and Services' (2019) 18 World Trade Review 9–22 accessed 17 January 2020

CJEU, C-176/03 Maximillian Schrems v Data Protection (2015) EU:C:2015:650 accessed 17 January 2020

Cockburn IM, Henderson R and Stern S, 'The Impact of Artificial Intelligence on Innovation: An Exploratory Analysis' in Ajay K Agrawal, Joshua Gans and Avi Goldfarb (eds), The Economics of Artificial Intelligence: An Agenda (University of Chicago Press 2019)

Collington R, 'Digital Public Assets: Rethinking Value and Control of Public Sector Data in the Platform Age' Common-Wealth (1 November 2019) accessed 17 January 2020

Copeland R, 'Google Lifts Veil, a Little, Into Secretive Search Algorithm Changes' (2019) Wall Street Journal accessed 17 January 2020

Crosby D, 'Analysis of Data Localization Measures Under WTO Services Trade Rules and Commitments' (e15Initiative, March 2016) accessed 17 January 2020

Datenethikkommission der Bundesregierung, 'Gutachten der Datenethikkommission', Datenethikkommission der Bundesregierung (2019) accessed 17 January 2020

de Jong R, Kool L and van Est R, 'This Is How We Put AI into Practice Based on European Values' (2019) Rathenau Instituut accessed 17 January 2020

Delcker J, 'Europe's Silver Bullet in Global AI Battle: Ethics' (2019) Politico accessed 17 January 2020

Ding J, 'Deciphering China's Dream' (Future Humanity Institute, University of Oxford, 2018) accessed 17 January 2020

European Commission, 'Exchanging and Protecting Personal Data in a Globalised World' Press Release COM(2017) (10 January 2017) 7 accessed 17 January 2020

—, 'Artificial Intelligence for Europe' COM(2018) 273 accessed 17 January 2020

—, 'Horizontal Provisions for Cross-Border Data Flows and for Personal Data Protection (in EU Trade and Investment Agreements)' (2018) accessed 17 January 2020

—, 'Transparency Policy in DG TRADE: Listening and Engaging' (2018) accessed 17 January 2020

—, 'Communication: Building Trust in Human Centric Artificial Intelligence' (8 April 2019) COM(2019)168 accessed 17 January 2020

—, 'EU Member States Sign up to Cooperate on Artificial Intelligence Digital Single Market', European Commission (10 April 2018) accessed 14 January 2020

—, 'Recommendation (EU) 2018/790 of 25 April 2018 on Access to and Preservation of Scientific Information' COM(2018) C/2018/237 Official Journal of the European Union accessed 17 January 2020

—, 'EU Proposal for WTO Disciplines and Commitments Relating to Electronic Commerce' EU INF/ECOM/22 (26 April 2018) accessed 17 January 2020

—, 'High-Level Expert Group on Artificial Intelligence' accessed 17 January 2020

—, 'Member States and Commission to Work Together to Boost Artificial Intelligence "Made in Europe"' Press Release COM IP/18/6689 (7 December 2018) accessed 17 January 2020

—, 'Towards a Common European Data Space' COM(2018) 232 final accessed 17 January 2020

—, 'Communication From the Commission to the European Parliament and the Council, Data protection rules as a trust-enabler in the EU and beyond – taking stock' COM(2019) 374

European Parliament and the Council, 'Council Directive 2019/1024 of the European Parliament and the Council of 20 June 2019 on open data and the re-use of public sector information' (2019) Official Journal of the European Union L 172/56 accessed 17 January 2020

— , 'Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data' Official Journal of the European Union L119/1 accessed 17 January 2020

European Union, 'Treaty on Functioning of the European Union (TFEU)' Articles 3(1)(e) and 207 (2012) OJ C326/47 accessed 17 January 2020

G20, 'G20 Osaka Leaders' Declaration' (24 July 2019) accessed 17 January 2020

Goldfarb A and Trefler D, 'AI and International Trade' (2017) University of Toronto and NBER

— 'How Artificial Intelligence Impacts Labour and Management' in WTO, World Trade Report 2018, 140 – 149 accessed 17 January 2020

Delcker J. 'Google Top Lawyer Pushes Back Against One-Size-Fits-All Rules for AI' (2019) Politico accessed 15 January 2020

Gwagwa A and Garbe L, 'Exporting Repression? China's Artificial Intelligence Push into Africa' (Council on Foreign Relations 2018) accessed 15 January 2020

Higgins B, 'When It's Your Data But Another's Stack, Who Owns The Trained AI Model?' (Artificial Intelligence Technology and the Law, 31 January 2018) accessed 17 January 2020

Irion K, Yakovleva S and Bartl M, 'Trade and Privacy: Complicated Bedfellows? How to Achieve Data Protection-proof Free Trade Agreements' (2016) Amsterdam, Institute for Information Law (IViR) accessed 14 January 2020

Jovanovic B and Rousseau PL, 'Chapter 18 General Purpose Technologies' (2005) 1/B Handbook of Economic Growth 1181 accessed 17 January 2020

Kayali L, 'Next European Commission Takes Aim at AI' (2019) Politico accessed 17 January 2020

Kelsey J, 'How a TPP-Style E-commerce Outcome in the WTO would Endanger the Development Dimension of the GATS Acquis (and Potentially the WTO)' (2018) 1/2 Journal of International Economic Law 273 accessed 17 January 2020

Khan M, 'EU Plans Sweeping Regulation of Facial Recognition' (2019) Financial Times accessed 15 January 2020

Kitchen R, 'Four Critiques of Open Data Initiatives' accessed 17 January 2020

Kossuth J and Seamans R, 'The Competitive Landscape of AI Startups' (2019) Harvard Business Review accessed 14 January 2020

Lee-Makiyama H, 'Briefing Note: AI & Trade Policy' (Digital Summary, Tallinn Estonia, 2018) accessed 17 January 2020

Lianos I et al, 'The Global Governance of Online Consumer Protection and E-Commerce: Building Trust' (2019) World Economic Forum White Paper, accessed 17 January 2020

Lohr S, 'US Moves to Ban Huawei From Government Contracts' New York Times (7 August 2019) accessed 17 January 2020

López González J and Ferencz J, 'Digital Trade and Market Openness' (2018) OECD Trade Policy Papers, No. 217 accessed 17 January 2020

Marcus G, 'Deep Learning: A Critical Appraisal' (New York University, 2017) accessed 17 January 2020

Meltzer JP and Kerry CF, 'Cybersecurity and Digital Trade: Getting It Right' (Brookings, 2019) accessed 17 January 2020

Ministry of Foreign Affairs, 'Digital Agenda for Foreign Trade and Development Cooperation (BHOS) Digital Opportunities for Global Prospects' (2019) Ministry of Foreign Affairs, Netherlands accessed 17 January 2020

—, 'Dutch Digitalisation Strategy' (2018) Ministry of Foreign Affairs, Netherlands accessed 17 January 2020 Ministerie van Economische Zaken en Klimaat, 'Nederlandse Digitaliseringsstrategie 2.0' (Ministerie van Economische Zaken en Klimaat, NL, 2019) accessed 17 January 2020

—, 'Strategisch Actieplan Voor Artificiële Intelligentie' (Ministerie van Economische Zaken en Klimaat, NL, 2019) 64 accessed 17 January 2020

Mitchell AD and Hepburn J, 'Don't Fence Me In: Reforming Trade and Investment Law to Better Facilitate Cross-Border Data Transfer' (2017) 19 Yale Journal of Law and Technology accessed 17 January 2020

Murgia M, 'Who's Using Your Face? The Ugly Truth about Facial Recognition' (2018) Financial Times accessed 17 January 2020

OECD, 'Private Equity Investment in Artificial Intelligence New Analysis Shows Important Increases in Investments in AI Start-Ups' (2018) accessed 17 January 2020

—, 'Recommendation of the Council on Artificial Intelligence' (OECD/LEGAL/0449) accessed 17 January 2020

Pinto RÁ, 'Digital Sovereignty or Digital Colonialism?' (2018) 15 Sur International Journal on Human Rights accessed 17 January 2020

Sandvig C et al, 'Auditing Algorithms: Research Methods for Detecting Discrimination on Internet Platforms' (Data and Discrimination: Converting Critical Concerns into Productive Inquiry, Seattle, Washington, USA, 22 May 2014) accessed 17 January 2020

Scott M, 'What's Driving Europe's New Aggressive Stance on Tech' (2019) Politico accessed 17 January 2020

Stix C., et al, 'A Survey of the European Union's Artificial Intelligence Ecosystem' European Union Joint Research Centre of the European Union (2019) accessed 17 January 2020

The Economist, 'Who Shot the Sheriff? – It's the End of the World Trade Organisation as We Know It' (2019) accessed 17 January 2020

The Royal Society, 'Machine Learning: The Power and Promise of Computers That Learn by Example' (2017) accessed 17 January 2020

Van den Bossche P and Zdouc W, The Law and Policy of the World Trade Organization (3rd edition, Cambridge University Press 2014)

Villani C, 'For a Meaningful Artificial Intelligence: Towards a French and European Strategy' (2018) accessed 17 January 2020

von der Leyen U, 'Political Guidelines for the next European Commission 2019-2024' (2019) accessed 17 January 2020

WTO, 'Services Sectoral Classification', MTN. GNS/W/120 (10 July 1991) accessed 17 January 2020

—, GATT 1994: General Agreement on Tariffs and Trade 1994, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, 1867 U.N.T.S. 187, 33 I.L.M. 1153 (1994) [hereinafter GATT 1994]

—, 'The Geneva Ministerial Declaration on Global Electronic Commerce' WT/MIN(98)/DEC/2 (adopted 20 May 1998) accessed 17 January 2020

—, 'Joint Statement on Electronic Commerce' (2019) WTO accessed 17 January 2020

Weber RH and Burri M, Classification of Services in the Digital Economy (Schultheiss 2012)

WTO, Council for Trade in Services WTO, Progress Report on the Work Programme on Electronic Commerce' (19 July 1999) S/L/74, para. 4.

—, 'Report of Panel Discussion on Digital Policy and Development, Communication from the African Group; JOB/GC/133' (2017) accessed 17 January 2020

—, World Trade Organization, '2018 World Trade Report', World Trade Organization (2018) accessed 17 January 2020

— Report of the Appellate Body, China- Publications and Audiovisual Products WT/DS363/AB/R (adopted 19 January 2010) accessed 17 January 2020

—, Panel Report, China-Electronic Payment Services, WT/DS413/R (adopted 31 August 2012)

—, Panel Report, Russia-Measures Concerning Traffic in Transit, WT/DS512/R (adopted 26 April 2019) accessed 17 January 2020

—, TRIPS: Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 299, 33 I.L.M. 1197 (1994) accessed 17 January 2020

— 'Understanding on the Scope of Coverage of CPC 84 – Computer and Related Services' WT TN/S/W/60 S/CSC/W/51 (2007) accessed 17 January 2020

Yakovleva S and Irion K, 'Toward Compatibility of the EU Trade Policy with the General Data Protection Regulation' (2020) 114 AJIL Unbound 10 accessed 14 January 2020

Zhang N, 'Trade Commitments and Data Flows: The National Security Wildcare: Reconciling Passenger Name Record Transfer Agreements and European GATS Obligations' (2019) 18(S1), S4 World Trade Review accessed 17 January 2020

2019, Institute for Information Law (IViR)
The University of Amsterdam
https://www.ivir.nl